



Mobile call termination

Statement

Statement

Publication date:

27 March 2007

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Section 1

Summary

- 1.1 Wholesale mobile voice call termination (“MCT”) is the service necessary for a network operator to connect a caller with the intended mobile recipient of a call on a different network. If voice call termination, generally, was not available a network operator could only terminate calls to other customers on its own network. This service is referred to as wholesale because it is sold and purchased by network operators rather than retail customers.
- 1.2 In this statement, Ofcom is setting out the conclusions of its review of the market(s) for supply of MCT, including its conclusions on market definition, the existence of Significant Market Power (“SMP”), the detriments likely to arise from the exercise of that SMP and the remedies which should be imposed. Ofcom’s review is a forward looking review of the four years from 1 April 2007.

Background

- 1.3 Ofcom last conducted a review of markets for the supply of MCT during 2003/2004, and concluded that exercise on 1 June 2004 when it published the statement *Wholesale Mobile Voice Call Termination* (the “June 2004 Statement”) in which it designated Vodafone, O2, T-Mobile, Orange and Hutchison 3G UK (together, “the five MNOs”) as having SMP. Various conditions were imposed on the five MNOs, including charge controls which were imposed on only Vodafone, O2, T-Mobile and Orange (the “2G/3G MNOs”). The charge controls imposed on the 2G/3G MNOs will expire on 31 March 2007.
- 1.4 Hutchison 3G UK (“H3G”) subsequently appealed its SMP designation and the Competition Appeal Tribunal (“CAT”) remitted the decision back to Ofcom to reconsider. Ofcom is publishing separately today the conclusions of its reassessment of H3G’s SMP during the period to 31 March 2007 (see *Statement Assessment of whether H3G holds a position of SMP in the market for wholesale mobile voice call termination on its network - the “Reassessment of H3G’s SMP”*)
- 1.5 The present market review was initiated on 7 June 2005 when Ofcom published a document *Wholesale mobile voice call termination – a preliminary consultation* (“the Preliminary Consultation”). That document was intended to initiate consideration of the issues.
- 1.6 On 30 March 2006, having considered responses to the Preliminary Consultation, Ofcom published a more detailed consultation document *Wholesale mobile voice call termination – (“the March 2006 Consultation”)*. That consultation set out Ofcom’s initial view that there are separate markets for MCT supplied by each of the five MNOs, and that the prima facie evidence indicated that each of these mobile operators has SMP in the market in which it supplies MCT. Ofcom emphasised, however, that it had not yet concluded its analysis of whether any purchasers of MCT have countervailing buyer power (“CBP”) sufficient so as to constrain a supplier’s ability to exercise SMP.
- 1.7 The March 2006 Consultation also considered the detriments which may arise from the exercise of SMP in these markets, and explored a number of regulatory options for addressing those detriments. Ofcom indicated an initial view that, in the presence of SMP, some form of charge control might be appropriate and that there may be

merit in applying a “technology-neutral” charge control to each MNO. For example, in the case of MNOs with both 2G and 3G networks a single control applying irrespective of which network is used to terminate a specific call. The March 2006 Consultation noted that as Ofcom had not yet concluded its cost modelling work it was unable also to express a view as to whether the same or different charge controls should be imposed on each of the five MNOs.

- 1.8 On 13 September 2006, having considered responses to the March 2006 Consultation, Ofcom published a third consultation *Mobile call termination – Proposals for consultation* (the “September 2006 Consultation”). In the September 2006 Consultation, Ofcom set out its view that there are separate markets for MCT supplied by each of the five MNOs and each of these mobile operators has SMP in the market in which they supply MCT. The September 2006 consultation also set out Ofcom’s view of the detriments which are likely to arise from the exercise of that SMP, and the remedies which Ofcom proposed should be imposed. These remedies included charge controls to apply to each of the five MNOs for four years to 31 March 2011, obligations to meet reasonable demand for MCT on fair and reasonable terms, prohibitions of undue discrimination and obligations concerning transparency of charges and contract terms.
- 1.9 Responses were received from BT, C&W, Vodafone, O2, Orange, T-Mobile, H3G, The European Commission, Mr Alan Horne, and 3 others [redacted] who wished to remain anonymous

Ofcom’s conclusions

- 1.10 Having considered responses to the September 2006 Consultation, Ofcom is setting out in the present Statement its conclusions that
- There are separate markets for the provision of wholesale mobile voice call termination in the UK to other Communications Providers by each of Vodafone, O2, Orange, T-Mobile and H3G.
 - Each of the five MNOs has SMP in the market for termination of voice calls on its network(s)
 - Charge controls should be imposed on the supply of MCT by each of the five MNOs, and those controls should apply without distinction to voice call termination whether on 2G or 3G networks.
 - The charge control should apply for 4 years from 1 April 2007
 - Average charges of H3G should be reduced to 5.9 ppm (2006/7 prices) by the final year of the charge control (1 April 2010 to 31 March 2011). This level reflects exogenous cost differences between H3G and the 2G/3G MNOs. The change to be implemented by an initial reduction to 8.5ppm (2006/7 prices) followed by three reductions each of equal (percentage) change across the next three years (ie from April 2008 to March 2011).
 - Average charges of Vodafone, O2, Orange and T-Mobile should be reduced to 5.1 ppm (2006/7 prices) by the final year of the charge control period (1 April 2010 to 31 March 2011). The reduction should be implemented in 4 equal (percentage) steps across the four years.

- In these particular markets, Ofcom would normally give around 60 days notice of regulatory charge reductions. As existing MCT charge controls expire less than one week after publication of the present statement, such notice cannot be given on this occasion without a break between the old and new controls (which Ofcom does not consider appropriate). To address this procedural concern, Ofcom has decided, therefore, to impose new controls from 1 April 2007 but to adjust the level of the year-one (1 April 2007 to 31 March 2008) controls by weighting them as though they applied for only 10 of the 12 months of the year one control and as though for two of the 12 months the present average charges applied. This adjustment increases H3G's year one control level to 8.9ppm (2006/7 prices). The impact on the year one control level for the 2G/3G MNOs is less than 0.1ppm.
 - Further conditions should be imposed requiring provision of voice call termination on fair and reasonable terms and conditions (including contract terms), prohibiting undue discrimination, and requiring charge transparency. Ofcom has concluded, however, that the proposed obligation to publish contracts is not proportionate.
- 1.11 The Notification setting out the market definition, SMP designations and SMP conditions, including charge control conditions, is attached at Annex 20.
- 1.12 Ofcom is publishing in parallel with the present statement a consultation which considers whether the charge controls set out in the Notification at Annex 20 should be modified to take into account the impact on average MCT charges of the present mobile number portability arrangements.

Section 2

Introduction

Market reviews and regulation today

- 2.1 As provided for in the Framework Directive (Directive 2002/21/EC), the European Commission (the “Commission”) has adopted a Recommendation on relevant products and services markets (“the Recommendation”)¹ which identifies markets within the electronic communications sector, the characteristics of which may be such as to justify the imposition of regulatory obligations. NRAs such as Ofcom are obliged to take the utmost account of the Recommendation when defining markets appropriate to national circumstances. If Ofcom considers a market reviewed is not effectively competitive, it must consider imposing remedies where appropriate on undertakings with SMP within that market. The Recommendation’s Market 16 is the market for voice call termination on individual mobile networks.
- 2.2 Ofcom last conducted a full review of the market for mobile voice call termination during 2003/4. Ofcom concluded in the statement Wholesale Mobile Voice Call Termination published on 1 June 2004 (“the June 2004 Statement”) that, as envisaged by the Commission in its Recommendation, there are separate markets for mobile termination of voice calls on the network(s) of each of Vodafone, O2, T-Mobile, Orange and H3G (“the five MNOs”) (plus Inquam which has since ceased to provide MCT). Those markets were considered to include voice call termination on both 2G and 3G networks, but they excluded termination of data and SMS. The June 2004 Statement also found that each of the five MNOs (plus Inquam) had SMP in their respective market. The formal Notifications to each of the MNOs defined the markets as follows (H3G was referred to in that document as “3”):
- wholesale voice call termination provided by 3 (such termination being provided via 3's mobile network);
 - wholesale voice call termination provided by Inquam (such termination being provided via Inquam's mobile network);
 - wholesale voice call termination provided by O2 (such termination being provided via O2's mobile network);
 - wholesale voice call termination provided by Orange (such termination being provided via Orange's mobile network);
 - wholesale voice call termination provided by T-Mobile (such termination being provided via T-Mobile's mobile network); and
 - wholesale voice call termination provided by Vodafone (such termination being provided via Vodafone's mobile network).

¹ *Recommendation on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services.*

http://europa.eu.int/information_society/topics/telecoms/regulatory/publicconsult/documents/relevant_markets/l_11420030508en00450049.pdf

- 2.3 As a consequence of those SMP designations, SMP conditions were imposed on all of the five MNOs (and on Inquam), but these varied between the MNOs. Vodafone, O2, T-Mobile and Orange (the “2G/3G MNOs”) were made subject to charge controls on mobile to mobile and fixed to mobile 2G voice call termination (but not 3G termination). The Target Average Charge for Vodafone and O2, which operate networks at 900MHz and 1800MHz, was set at 5.63ppm and for T-Mobile and Orange, which operate networks at 1800MHz, at 6.31 ppm. These Target Average Charges were also subject to a Weights Adjustment Factor which makes small adjustments for changes in traffic profiles. No charge control was imposed on any form of termination by H3G (or by Inquam).
- 2.4 The 2G/3G MNOs were also made subject to further conditions which prohibit undue discrimination in the supply of 2G voice call termination, require supply of 2G voice call termination on fair and reasonable terms and conditions, and require publication charges for 2G voice call termination and supply to Ofcom of copies of contracts.
- 2.5 The charge controls imposed on the 2G/3G MNOs in June 2004 were time-limited and unless extended would have expired at the end of March 2006. Following consultation² with stakeholders, the charge control conditions were amended in December 2005 such that they will now expire at the end of March 2007 (Wholesale Mobile Voice Call Termination – statement and notification extending the charge controls published by Ofcom on 16 December 2005 – the “December 2005 Statement”).³
- 2.6 H3G was made subject only to an obligation to notify 2G voice call termination volumes and total voice call termination volumes to Ofcom and to supply, 28 days before implementation, details of 2G charges (and charge changes) to those with whom it had entered into contracts for the supply of 2G voice call termination.
- 2.7 In summary, therefore, the SMP conditions imposed on the 2G/3G MNOs in June 2004, and which are in force, are as follows;
- Requirement to provide network access on reasonable terms and conditions
 - Requirement not to unduly discriminate
 - Control of fixed to mobile interconnection charges
 - Control of mobile to mobile interconnection charges
 - Requirement to notify access contracts to Ofcom
 - Requirement to publish charges
- 2.8 In respect of H3G, Ofcom imposed only one condition as follows;
- Requirement to publish charges and call volumes
- 2.9 In respect of Inquam, Ofcom imposed only one conditions as follows

² *Wholesale mobile voice call termination markets – a proposal to modify the charge control conditions* published by Ofcom on 7 June 2005 (“the June 2005 Extension Consultation”)

<http://www.ofcom.org.uk/consult/condocs/wholesale/wholesale.pdf>

³ http://www.ofcom.org.uk/consult/condocs/wholesale/wmvct_statement/statement.pdf

- Requirement to notify charges
- 2.10 In July 2004 H3G challenged Ofcom's determination, attached to the June 2004 Statement, that H3G has SMP. On 29 November 2005 the Judgement ("H3G Judgement") of the CAT⁴ found that Ofcom had erred in its determination as to the existence of significant market power because it did not carry out a full assessment of the extent to which BT had CBP. The CAT therefore required Ofcom to reconsider its determination of SMP taking into account the extent to which countervailing buyer power exists in BT. On 13 September 2006 Ofcom published for consultation its *Assessment of whether H3G holds a position of SMP in the market wholesale mobile voice call termination on its network*. Having considered responses to that consultation, Ofcom is publishing separately today this "Reassessment of H3G's SMP"⁵, and is imposing a condition requiring notification of charges and call volumes.

Consultation relating to the present market review

Preliminary Consultation

- 2.11 In June 2005, in parallel with the proposal to extend the present charge controls for a further 12 months to 31 March 2007, Ofcom published the Preliminary Consultation⁶ which was intended to initiate consideration of the issues which would need to be addressed during the next review of the MCT market, to be completed before the extended charge controls expire.

Second Consultation

- 2.12 Having considered responses to the Preliminary Consultation, Ofcom set out in the March 2006 Consultation⁷ its proposed views on market definition, the existence of SMP and appropriate remedies, intending that the document should move forward the discussion of future options for regulation after 31 March 2007. The document noted, however, that Ofcom had not yet concluded its analysis of CBP and, therefore, its views on SMP were limited to the prima facie evidence. The document's exploration of detriments arising from the exercise of SMP, and the nature of possible remedies to address SMP, was, therefore, conditioned by this qualification.

Consultation on the cost model

- 2.13 Throughout the process of developing a cost model, Ofcom has actively consulted key industry stakeholders (including the five MNOs as well as BT and UKCTA). This contact has been critical in terms of developing Ofcom's understanding of 3G network design and likely future demand scenarios as well as obtaining cost benchmarks for calibration of the new cost model. This process has taken place through a wide range of channels:
- **Information requests:** Mobile operators have submitted responses to several Ofcom data requests. These requests have focussed on obtaining accurate

⁴ <http://www.catribunal.org.uk/documents/Jdg1047H3G281105.pdf>

⁵ See Assessment of whether H3G holds a position of SMP in the market for wholesale mobile voice call termination on its network published by Ofcom on 27 March 2007

www.ofcom.org.uk/consult/condocs/h3gsmp/statement/
<http://www.ofcom.org.uk/consult/condocs/h3gsmp/>

⁶ <http://www.ofcom.org.uk/consult/condocs/termination/wholesaleprelim.pdf>

⁷ <http://www.ofcom.org.uk/consult/condocs/mct/summary/mct.pdf>

model inputs, realistic network dimensioning algorithms and calibration benchmarks for total Gross Book Value and operating costs.

- **Workshops:** Ofcom has held three workshops with key industry stakeholders to discuss the structure, inputs and outputs of the model at various stages of development.
- **Meetings:** A series of face-to-face meetings have been held with each of the mobile operators, BT and UKCTA. Generally these meetings have focussed on modelling implementation and key conceptual issues, as well as providing stakeholders with the opportunity to question Ofcom on all relevant issues.

Third consultation

- 2.14 Having considered responses to the March 2006 Consultation, and having completed an analysis of CBP, Ofcom set out in the September 2006 Consultation its formal proposal in respect of market definition, SMP and appropriate remedies.
- 2.15 Before formally defining a market, designating an operator as having SMP, and imposing SMP conditions (where these measures would affect trade between member states) Ofcom is required by Article 7 of the European Framework Directive to make its draft measures accessible to the Commission and to other NRAs, as well as interested parties. Ofcom submitted the September 2006 Consultation to the Commission and other NRAs. Ofcom also provided a copy to the Secretary of State.

The present statement

- 2.16 Ofcom received responses to the September 2006 Consultation from BT, C&W, Vodafone, O2, Orange, T-Mobile, H3G, Mr Alan Horne, the Commission and 3 others [redacted] who wished to remain anonymous. Having considered those responses, and having taken the utmost account of the views expressed by the Commission (as Ofcom is required to do by Article 7 of the Framework Directive), the present Statement sets out Ofcom's conclusions with respect to market definition, the existence of SMP, the detriments likely to arise from the exercise of that SMP and the appropriate remedies. The Notifications setting out the market definition, SMP designations and SMP conditions are attached at Annex 20.

Commercial context

- 2.17 Annual retail revenues of the mobile industry are approximately £13 billion, and wholesale revenues around £3.6 billion. Annual revenue from MCT is of the order of £2.5 billion, which is equivalent to approximately 15% of revenue for the sector. Around two thirds of this revenue from mobile call termination (£1.5 billion) relates to calls between MNOs, and the remaining sum (£1 billion) to calls from fixed operators.
- 2.18 The 2G/3G MNOs each report having between 12 million and 18 million subscribers (the basis on which these figures are assessed may vary according to different churn management practices which, for a period of time, leave some non active subscriptions on an MNO's subscriber records). H3G reports that its current registered subscriber base is over 3.5 million [redacted]. Volumes of voice call minutes terminated by each of the five MNOs are roughly proportionate to the volume of subscribers, although there is some material variation between MNOs.
- 2.19 Termination revenues are, of course, affected by the different charges levied for mobile termination; the unregulated charges levied by H3G (see Figure 2.1 below),

which average at about [\approx], materially narrow the termination revenue gap between H3G and the 2G/3G MNOs despite the fact that H3G terminates for its subscriber base far fewer call minutes than each of the 2G/3G MNOs terminate for theirs.

- 2.20 In addition to receiving revenue for mobile voice call termination, each MNO also makes payments to other MNOs for voice call termination on their networks. Although, as might be expected, the flow of termination minutes between most MNOs is broadly in balance, there are some MNOs which are material net providers of inter-MNO termination minutes (and, therefore, net receivers of inter-MNO revenue).

Profitability

- 2.21 To provide some commercial context to this market review, Ofcom has performed a high level accounting review of the reported profitability of the MNOs. Ofcom recognises, however, that accounting returns may or may not of themselves provide a complete picture in relation to economic returns of the MNOs. Drawing robust conclusions from accounting data can be problematic where, for example,
- the industry is not in a steady state;
 - the industry is subject to technological change;
 - the industry tends to make investments with long payback periods;
 - asset valuations for accounting purposes are not representative of the assets' economic value.
- 2.22 These issues are relevant for the five MNOs. However, as explained below, it is Ofcom's view that the observed returns are not out of line with the Weighted Average Cost of Capital ("WACC") for the industry.
- 2.23 Accounting returns over a short period are unlikely to be representative of the long term return, particularly in capital intensive industries; for example, the MNOs have incurred the costs of building out their networks and of acquiring 3G spectrum in anticipation of returns over a long period. It is only after looking at the returns over the duration of the investment cycle that a full picture of the profitability can be assessed.
- 2.24 Specifically, for the MNOs, the assumptions regarding the treatment of the 3G spectrum costs will impact significantly on any measure of performance, whether it is in assessing the profit (which will be impacted by assumptions regarding amortisation) or the asset base (which will be impacted by assumptions regarding the appropriate valuation of the asset). 3G spectrum represented a substantial upfront cost to the MNOs. The amortisation of these costs represents a significant reported annual cost to the MNOs, yet the expected increase in revenues will occur in future years. The impact is therefore to increase the capital employed and depress annual profits in the short term.
- 2.25 In 2005, the five MNOs reported aggregate earnings before interest and tax (EBIT) of approximately £0.1bn⁸. However, this was after deducting the amortisation of 3G

⁸ Based on results for the years ended 31 December 2005 or 31 March 2006. The EBIT figure has been updated since the September 2006 consultation for the latest accounting information. The EBITDA figure has been updated due to a modification of the calculation methodology and for the latest accounting information. Although the EBIT and EBITDA figures have changed, the key

spectrum costs and, significantly, includes the results of H3G, which has reported losses in the early years of its operations. Aggregate earnings before interest, tax, depreciation and amortisation (EBITDA) were approximately £4.4bn.

- 2.26 Return on capital employed (ROCE) represents the efficiency with which capital is being used to generate revenue. ROCEs that consistently and significantly exceed a company's cost of capital could indicate that prices are higher than would be found in a competitive market. ROCE figures need to be treated with particular caution as they are dependent on assumptions regarding both the return and the capital employed figure. In respect of the capital employed figure, assumptions have to be made regarding assets on the balance sheet and, potentially, assets that do not appear on the balance sheet (including, for example some costs relating to customer acquisition). However, based on a measure of ROCE that excludes 3G spectrum costs, Ofcom has estimated that in recent years the four 2G/3G MNOs (excluding H3G which has made losses to date) have made an aggregate ROCE of around 16%, which slightly exceeds Ofcom's current estimate of the pre-tax nominal WACC for the industry of 14.6% (see Annex 18).

Termination charges

- 2.27 All 2G/3G MNOs now terminate some voice calls using their 3G network, and H3G continues to use national roaming to terminate some calls on O2's 2G network (see paragraph 2.29 below). However, the five MNOs' wholesale billing systems do not distinguish on a call by call basis between calls terminated on 2G and 3G networks (and a call may even switch between the two networks while in progress if the called party is moving). All MNOs charge the same charge for both forms of termination, although that charge varies by time of day and week. As explained in more detail in paragraph 2.30 below, the contractual charge is implicitly a blend of underlying 2G and 3G charges. The blended contractual charges for wholesale voice call termination levied by each of the five MNOs are set out in the left hand column of Figure 2.1 below.

Blending of regulated 2G and unregulated 3G termination charges

- 2.28 Volumes of termination on 3G networks by the 2G/3G MNOs remain low. MNOs have asked that the proportion should not be published. An understanding of the order of magnitude can be gained by noting that in August 2006, when Ofcom obtained data from the MNOs, no 2G/3G MNO had more than about 10% of its customers connected to 3G phones (the proportion of voice minutes terminated on 3G will be lower as calls to 3G phones which are outside the MNO's 3G coverage area will be terminated using the 2G network). However volumes are growing.
- 2.29 H3G has in place two contracts for national roaming to provide coverage for voice, SMS and certain GPRS services when H3G customers are not somewhere they can connect to H3G's own 3G network. The proportion of calls which are received and made in this way has been falling and is expected to continue to do so as H3G further rolls out its network. H3G stated in March 2006 that its 3G network now provides 88% population coverage.
- 2.30 In the case of the 2G/3G MNOs, which are subject to a charge control, the contractual charges referred to in paragraph 2.27 above (and set out in the left hand column of Figure 2.1 below) reflect a blend of underlying regulated 2G and

observation (that the amortisation of 3G spectrum costs and H3G's losses significantly impact on the measurement of MNO's profit) remains the same.

unregulated 3G charges weighted by volumes of each over a measurable period. All 2G/3G MNOs are either actively blending distinct charges for 2G and 3G termination or have proposed (to interconnected parties) revised blended termination charges which are based on distinct underlying charges for 2G and 3G termination. Figure 2.1 below sets out the underlying regulated 2G charges alongside the contractual blended charges. It should be noted, however, that although the contractual charges are fixed commercially (subject to any future contract variation) and the underlying 2G maximum average charge is fixed by regulation, the assumed 3G charge within the blend can only be an estimate based on the MNO's forecasts of the ratio of 2G to 3G termination minutes within a contractual billing period.

Figure 2.1 Distinction between regulated 2G charges and contractual blended charges

| | Contractual blended charge (day/eve/w.e) Figures implemented or proposed at 1 March 2007 ⁹ | | | Underlying 2G charge (day/eve/w.e) | | |
|----------|--|--------|--------|---------------------------------------|-------|-------|
| Vodafone | 8.22 | 3.34 | 2.74 | 7.91 | 3.22 | 2.66 |
| O2 | 6.845 | 6.778 | 3.422 | 6.267 | 6.205 | 3.14 |
| Orange | 7.5000 | 5.7312 | 5.7312 | 7.400 | 5.146 | 5.146 |
| T-Mobile | 8.00 | 6.15 | 6.15 | 7.309 | 5.621 | 5.621 |
| H3G | 15.62 | 10.78 | 2.51 | Not applicable | | |

- 2.31 An ability to determine the level of unregulated 3G charges within the blend, enables 2G/3G MNOs to set blended charges at the level of their choice (subject to competition law and any commercial considerations). Ofcom is currently considering a number of ¹⁰disputes in relation to MCT charges. As the proportion of traffic terminated on 3G networks increases, so the blended charges, applicable to all forms of voice call termination, can be expected to rise (absent changes in the assumed underlying 3G charge and absent regulation of 3G MCT).

Number porting

- 2.32 Technical arrangements, devised by the industry, for delivering calls to phones with ported numbers are such that the termination charge billed is that set by the MNO originally allocated the number, rather than that set by the MNO to whom the user currently subscribes. Around 20% of total mobile terminated minutes are terminated on mobile numbers that have been ported in from another MNO. This proportion can be expected to grow as mobile penetration plateaus and MNOs rely increasingly on competing for their rivals' subscribers to increase market share. The proportion of incoming call minutes terminated on ported-in numbers varies significantly between MNOs. This results in further adjustment to the overall average price per minute received by each MNO for call termination. The current impact of the number porting arrangements can be seen in Figure 2.2 below.
- 2.33 On 16 November 2006, Ofcom published a Review of General Condition 18 "Number Portability"¹¹. Several options were presented including possible changes to the Mobile Number Portability arrangements, which could take effect within the 4 year lifetime of the MCT charge control. These new arrangements could be such that

⁹ Many of the charges quoted remain the subject of contractual negotiation and/or dispute

¹⁰ http://www.ofcom.org.uk/bulletins/comp_bull_index/comp_bull_ocases/open_all/cw_942/

¹¹ <http://www.ofcom.org.uk/consult/condocs/gc18/gc18r.pdf>

MNOs then control the amount charged for termination of calls on numbers ported in from other operators, for example because calls to ported in numbers are no longer routed via the donor network. Under the provisions of the new charge control conditions at Annex 20, charges for termination of calls where the terminating MNO controls the termination charge are subject to the charge control conditions.

- 2.34 In the meantime, Ofcom is also publishing simultaneously with this statement a consultation which considers whether the charge control conditions included in the Notifications at Annex 20 to this statement should be modified to take into account the impact of the current arrangements for charging for calls to mobile ported telephone numbers.

Adjustment to reflect changes in traffic profiles

- 2.35 In addition to the blending of underlying 2G and 3G charges and termination charges set by the original donor of a ported number, current regulation also requires 2G/3G MNOs to adjust the headline target average charge for 2G voice call termination to reflect changes in traffic profiles. The Weights Adjustment Factor (WAF) forms part of the charge control conditions applicable to each of the 2G/3G MNOs and modifies the headline target average charge for each MNO (respectively 5.63 ppm for Vodafone and O2 and 6.31 ppm for Orange and T-Mobile) taking into account changes in the MNO's traffic profile by time of day/week. The purpose of the adjustment is to address concern that unearned gains and losses could arise solely through a change in traffic profiles.

Overall impact of charge adjustments

- 2.36 The overall impact of these three different influences on the charge levied for mobile voice call termination (at September 2006) is set out in Figure 2.2 below.

| | Vodafone | O2 | Orange | T-Mobile | H3G |
|---|----------|---------|---------|----------|---------------|
| Headline regulated average charge (2G) | 5.63ppm | 5.63ppm | 6.31ppm | 6.31ppm | Not regulated |
| Regulated 2G charge WAF adjusted | [< ppm] | [< ppm] | [< ppm] | [< ppm] | Not regulated |
| Effective rate incl ported numbers | [< ppm] | [< ppm] | [< ppm] | [< ppm] | [<] |
| Average contractual blended charge (ex ported numbers ¹²) | [< ppm] | [< ppm] | [< ppm] | [< ppm] | [<] |

Figure 2.2 Adjustments to headline regulated charge

The European context

- 2.37 When Ofcom published the June 2004 Statement, the UK was the only NRA to have completed a review of this market under the new European regulatory regime.

¹² Indicative figures based on charges proposed or implemented for 1 September 2006 (see Figure 2.1 above) and historic rather than forward looking traffic profiles

Subsequently, all EU NRAs (with one exception) which have formally notified their market definition for mobile call termination have, like Ofcom, adopted the Commission's technologically-neutral definition which does not distinguish separate markets for 2G and 3G termination¹³. The one exception, Cyprus, was invited¹⁴ by the Commission to reconsider its position or at least to monitor closely the market and to analyse 3G termination services as soon as these services become available (there are currently no 3G networks in Cyprus).

- 2.38 All NRAs which have considered the issue so far, have also found that all MNOs have SMP (including, in some cases, MVNOs which have control over termination charges).
- 2.39 No NRA, other than Ofcom, however, has imposed different remedies in respect of 2G and 3G termination, and no NRA has set different charge caps to apply to 2G and 3G termination by the same MNO. It should be noted that in June 2004, when Ofcom imposed charge controls only on 2G voice call termination, no 2G MNO was using 3G networks to terminate voice calls. H3G, which was using its 3G network to terminate voice calls, still had less than 1% of the mobile subscribers in the UK. Consequently, Ofcom determined that there was insufficient evidence to conclude that regulation of 3G termination charges was a proportionate approach. Any adverse effects on consumers were likely to be small given H3G's very small subscriber base relative to the wider mobile sector. As noted above, all 2G/3G MNOs now terminate some voice calls on their 3G network and H3G's subscriber volumes have increased greatly.

Structure of the statement

- 2.40 The rest of this Statement sets out Ofcom's market analysis and regulatory conclusions for MCT from 1 April 2007:
- **Section 3** sets out Ofcom's analysis of the relevant markets;
 - **Sections 4 and 5** set out Ofcom's SMP analysis with Section 5 dealing specifically with the issue of countervailing buyer power;
 - **Section 6** sets out Ofcom's duties and objectives in the review as a framework for developing Ofcom's regulatory proposals;
 - **Section 7** sets out the benefits of regulation and discusses the different issues associated with unregulated MCT charges. Annex 19 provides further detail of Ofcom's welfare analysis that is specifically referred to in this section;
 - **Section 8** discusses the different regulatory remedies Ofcom has considered in this market review;
 - **Section 9** discusses in detail the charge controls that Ofcom has decided that it should impose. **Annexes 5-18** are concerned with Ofcom's estimation of the cost of MCT and inform the level of the charge controls that are set out in Section 9.

¹³ See Commission's website at

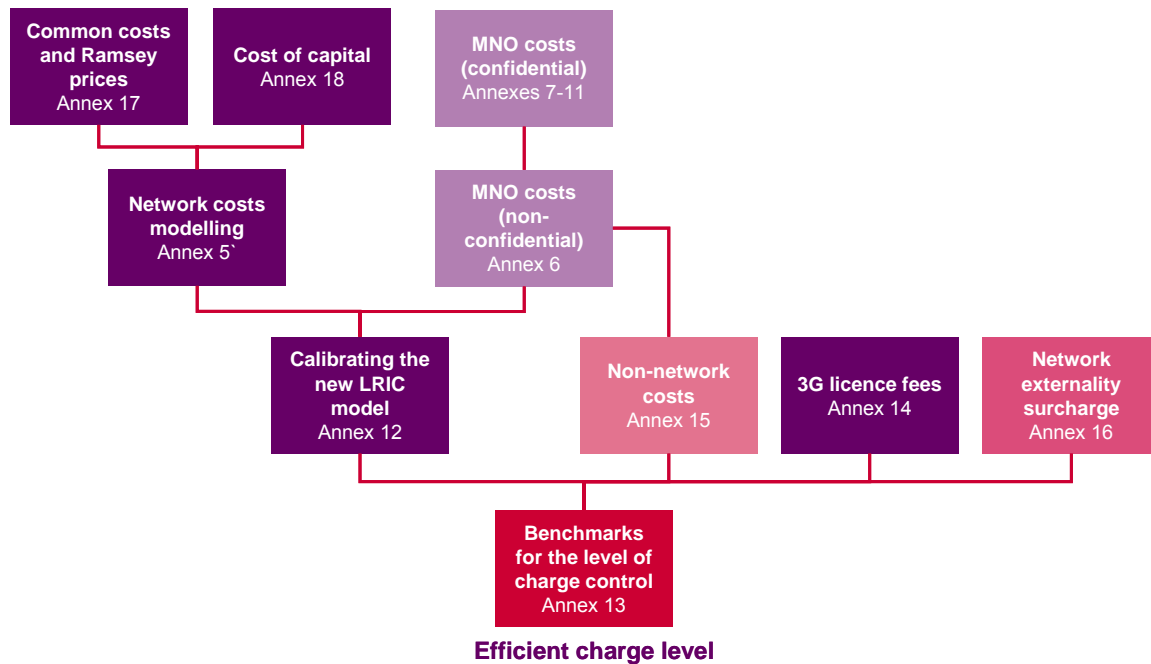
<http://forum.europa.eu.int/Public/irc/info/ecctf/library?l=/&vm=detailed&sb=Title>

¹⁴ See Commission's website

<http://forum.europa.eu.int/irc/Download/khesAKJDmRGGikPF1r2U9ySwTZP1Z3m-fv1Cu-yITHuU9qbGX3kMpf4n1-0Jd-d2ro21ETUp2UxVqIIDj3h0IF5/CY%20333-334%20decision%20EN%20public.pdf>

The diagram below sets out how these cost modelling annexes fit together in estimating the costs of MCT:

Figure 2.3 Cost modelling annexes



- **Section 10** summarises Ofcom’s regulatory conclusions and **Annex 20** sets out the conditions which, based on the regulatory conclusions, Ofcom has decided to impose.

Section 3

Market definition

3.1 The service considered in this statement is wholesale voice call termination on individual mobile networks (“MCT”). This is market 16 in the European Commission’s Recommendation.

Proposal set out in the September 2006 Consultation

3.2 In the September 2006 Consultation, Ofcom proposed that there are five separate markets as follows:

- Wholesale mobile voice call termination provided to other Communications Providers by O2 in the UK;
- Wholesale mobile voice call termination provided to other Communications Providers by Orange in the UK;
- Wholesale mobile voice call termination provided to other Communications Providers by T-Mobile in the UK;
- Wholesale mobile voice call termination provided to other Communications Providers by Vodafone in the UK; and
- Wholesale mobile voice call termination provided to other Communications Providers by H3G in the UK.

Responses to the September 2006 Consultation

3.3 BT agreed with Ofcom’s market definition, and the European Commission noted that the product market definition was in line with the Commission’s Recommendation. C&W, while broadly in agreement, argued that the market should be widened to include all forms of mobile call termination and not just that supplied to other Communications Providers. [38].

3.4 The 2G/3G MNOs all disagreed with Ofcom’s market definition, arguing, in one form or another, that the relevant market for MCT is a so-called cluster market, encompassing MCT as well as a wider range of other mobile services (including outbound retail mobile services). For example, in a previous submission (to which it referred back), T-Mobile argued that the relevant (cluster) market was the “general market for mobile services including mobile outgoing and incoming calls and data services”. Vodafone specifically argued that the market should be analysed within the theoretical framework of a two-sided market. Vodafone considered that such a framework has implications for the determination of a “competitive price”, the application of the SSNIP test and when considering substitutability. T-Mobile noted that it had previously submitted lengthy reasoning and evidence, which it continued to believe was correct, setting out that termination services are supplied as part of a cluster of services, in what it characterised as the overall competitive mobile market. T-Mobile also considered that Ofcom had not considered the collective impact of potential competitive constraints and stated that a “relatively small” number of callers would be capable of constraining MCT charges. Orange, similarly, noted that it had previously submitted, and continued to believe, that MCT forms part of a cluster of markets for mobile services. O2 broadly shared the views of Orange and T-Mobile.

- 3.5 H3G presented a view, which it had previously presented in response to the March 2006 Consultation, that the use by some consumers of more than one handset should in some way be reflected in Ofcom's market definition. H3G declined to set out precisely what form the appropriate market definition should take (noting that the onus is on Ofcom to establish the appropriate market definition), but indicated that the market definition could include MCT on other networks. H3G also argued that a wide variety of alternative "communications choices while on the move" may, individually or collectively, constrain MCT charges. Here again, H3G declined to offer a definitive view of how such factors should be reflected in the market definition; H3G stated that its view was that either the market definition needs to be widened to include a wider range of communications methods (such as Voice over Internet Protocol ("VoIP"), instant messaging, email and developing alternatives) or that all these services should be excluded from the market definition.

Ofcom's response to key points raised by stakeholders

- 3.6 Ofcom has considered C&W's view that the market definition should not be so narrow as to exclude self-supplied call termination, and C&W's view that the proposed definition is not consistent with Ofcom's market definition in respect of termination on fixed networks. As explained in paragraphs 3.135-3.137, in Ofcom's view there is no common pricing constraint as between the supply of MCT to other Communications Providers and self-supply. Further, the conditions of competition relating to the self-supply of MCT and the supply of MCT to other Communications Providers are not relatively homogenous (indeed, Ofcom considers that the conditions of competition for the supply of these two products are particularly different). Accordingly, Ofcom does not consider that the relevant market includes all wholesale mobile voice call termination provided by a particular MNO.
- 3.7 As the 2G/3G MNOs acknowledged in their responses to the September 2006 Consultation, the view that MCT forms part of a cluster of markets including retail outbound services (and perhaps other services, such as data, as well) has been discussed at length in previous consultations on MCT. Having considered responses, Ofcom continues to maintain the view that MCT does not form part of the same market as retail outbound services. As set out in more detail below, the Calling Party Pays ("CPP") charging arrangement introduces a disconnect between the party paying for MCT (the caller via his originating operator) and the party which chooses the provider of MCT and retail outbound mobile services (the called party). Ofcom acknowledges that, to the extent that the behaviour of the called party is influenced by the level of MCT charges, the called party may impose a constraint on MCT charges (and, if the constraint were significant, this might then support the view the MCT forms part of a wider cluster of markets including outbound retail services). However, as set out below, in practice such a constraint does not exist. The market research evidence summarised in paragraphs 3.35 to 3.64 supports the view that, when selecting a supplier of mobile outbound services, purchasers do not take into account the cost to others of calling them or the impact which cost differences may have on the behaviour of callers. Furthermore, the evidence summarised at paragraphs 3.73 to 3.81 indicates that, in any event, callers are not sufficiently well informed to be able to change their behaviour in response to changes in MCT charges. Ofcom therefore rejects the argument that MCT forms part of a wider cluster of markets which include retail outbound services.
- 3.8 Ofcom agrees (as Ofcom noted in the March 2006 Consultation and September 2006 Consultation) that MCT can be viewed in the context of a "two-sided market" in which there are two types of retail customer: called parties and callers. To the extent that the implications of this insight are relevant to the particular circumstances of MCT,

Ofcom has taken them into account throughout its analysis. For example, in defining the market(s) for MCT, as discussed in greater detail below, Ofcom has considered the responses to a SSNIP of customers on both “sides”, i.e. both callers and called parties. In its consideration of remedies, Ofcom takes full account of the waterbed effect, which arises as a consequence of the interaction of the two “sides”, See in particular, the discussion of the detrimental effects that are likely to arise absent regulation in section 7 and the associated welfare analysis in Annex 20. The implications of the waterbed effect are also considered in section 9 (in the context of potential impacts on MNOs’ ability and incentives to invest in 3G) and Annex 14 (in the context of whether 3G auction bids in 2000 reflected only scarcity rents). Similarly, the network externality surcharge, discussed in Annex 16, arises from consideration of the impact that the behaviour of one “side” has on consumers on the other “side”. However, Ofcom does not agree that Vodafone has in all of its arguments correctly identified the implications of “two-sidedness” for the specific circumstances of MCT. Ofcom’s position, addressing all of Vodafone’s points, is set out in paragraphs 3.143 to 3.154 below.

- 3.9 Ofcom has considered the evidence presented by H3G in response to the March 2006 Consultation and the views expressed by H3G in response to the September 2006 Consultation (H3G provided argumentation but no further evidence in that response) in respect of H3G customers who have more than one handset, how these customers use those handsets and what impact, if any, this might be considered to have on market definition. Only around 16% of H3G customers have mobile phones connected to more than one network.¹⁵ As noted in the September 2006 Consultation, Ofcom does not accept that the evidence presented by H3G indicates that the ability of some H3G customers to receive calls on an alternative network would constrain charges, even if in practice a significant proportion of inbound calls to these customers were terminated on a network other than H3G. Most of those who use two mobile phones do so for reasons other than to minimise inbound call charges, and a strategy of using one phone for inbound calls may conflict with the original rationale (typically to keep separate business and personal calls – see below).
- 3.10 The evidence provided by H3G in response to the March 2006 Consultation, and market research conducted¹⁶ by Ofcom during October 2006, indicates that H3G customers are no more likely than the customers of other MNOs to report that the cost to others of calling them is a significant factor when selecting a provider of outbound mobile phone services. In addition, calling parties are not sufficiently well informed about the mobile network which they are calling and the price for calling different networks to cause them to alter their behaviour in response to changes in MCT charges (and thereby cause called parties to adjust their behaviour). Indeed, given callers’ limited awareness of the price they pay when calling other mobile phones, Ofcom considers it highly unlikely that recipients (i.e. the party that does not pay for the call) with mobile phones connected to different networks are sufficiently well informed about the cost of calling them to deliberately provide callers with the cheapest number on which to contact them (as suggested by H3G). Furthermore, in its response to the September 2006 Consultation, O2 noted that H3G’s “WePay” tariff credits subscribers that receive calls on their H3G phone. Such tariffs discourage H3G customers that receive these credits from providing callers with a number on an alternative mobile network from H3G’s.

¹⁵ In Ofcom’s October 2006 survey of H3G customers, 35% of H3G customers reported that they had more than one SIM. Of these, 44% said that they were connected to more than one network.

¹⁶ Survey of H3G customers commissioned by Ofcom in October 2006 and available at www.ofcom.org.uk/consult/condocs/mobile_call_term/

3.11 Ofcom notes that H3G also recommended that the market definition should take into account the availability of other forms of communication on the move. In this section, as in section 3 of the September 2006 Consultation, Ofcom considers alternatives to voice call termination including email, short message services (“SMS”), MMS, Instant Messenger and VoIP to the extent that VoIP services do not deploy the use of voice call termination. As in the September 2006 Consultation, and as set out in greater detail later in this section, Ofcom does not consider that these alternatives can be considered adequate demand-side substitutes capable of constraining MCT charges at the competitive level. For example, SMS termination is offered by the same MNO which provides voice termination, enabling that MNO to set SMS termination charges in such a way as to avoid competitive pressure on its MCT charges (SMS also has functional differences to voice calls). Similarly, VoIP calls are only capable of acting as an effective substitute if it is possible to make a VoIP call without incurring a termination charge controlled by the terminating operator. At this time there is insufficient clarity about the likely prevalence and billing arrangements associated with VoIP calls for Ofcom to take the view that they are likely to impose a significant constraint on MCT charges over the period to 2011.

3.12 Ofcom sets out its view of market definition more fully in the rest of this section.

Ofcom’s reasoning and conclusions with respect to market definition

3.13 Call termination is the service necessary for a network operator to connect a caller with the intended recipient of the call on a different network. If call termination were not available, a network operator could only terminate calls to other customers on its own network. This service is referred to as wholesale because it is sold and purchased by network operators rather than retail customers.

3.14 The European Commission is reviewing the Recommendation and in 2006 consulted on a proposal, amongst others, that market 16 should be widened to include termination of SMS.¹⁷ SMS termination is not being reviewed within the present statement as Ofcom considers that it is a limited substitute for calling a mobile (see paragraphs 3.101 to 3.105 below). Ofcom plans to review SMS termination separately later this year.

3.15 This statement addresses only wholesale voice call termination on mobile networks in the UK. At present there are five suppliers of wholesale voice call termination on mobile networks in the UK. These are Vodafone, O2, Orange, T-Mobile and H3G. These suppliers currently use 2G and 3G mobile networks. In the future it is possible that they may use other mobile network technologies to supply wholesale mobile voice call termination. For the avoidance of doubt, where these MNOs use other technologies to supply MCT, such MCT would be deemed to be included in the market defined by the present statement. In the future, and potentially within the forward looking period of this statement, it is also possible that there will be additional suppliers of wholesale voice call termination on mobile networks. Moreover, the programme of liberalisation of spectrum in the UK (including auctions of vacant spectrum bands) may result in the emergence of new mobile network operators and also, potentially, new providers of public wireless local area networks (“WLANs”).

¹⁷ *On Relevant Product and Service Markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services*, public consultation on a draft Commission recommendation, 28 June 2006, SEC(2006) 837. http://europa.eu.int/information_society/policy/ecomms/doc/info_centre/public_consult/review/recommendation_final.pdf

Ofcom will monitor such developments and, as recommended by H3G and Orange in their responses to the September 2006 Consultation, will consider at what stage further markets should be defined and reviewed.

Approach to product market definition

- 3.16 The narrowest possible market definition is wholesale voice call termination to a specific mobile number (or subscriber). In the rest of this section, a discussion of demand-side substitution, supply-side substitution and other potentially relevant factors (e.g. the extent to which all MCT provided by an MNO should be aggregated, cluster markets, two-sided markets, the treatment of MNOs with 2G and 3G networks) is presented to see whether this narrow market definition should be expanded to include other products. This analysis is undertaken in relation to calling any of the MNOs' networks. Where there are specific issues relating to particular MNOs these are discussed, for example in relation to dual handset ownership (which H3G has proposed is an important factor for it). Ofcom's approach to market definition follows that set out in the European Commission's guidelines on market analysis and assessment of significant market power.¹⁸

Demand-side substitution

- 3.17 To assess whether there are any demand-side substitutes that should be included in the relevant market, it is necessary to examine the effect on the profitability of a terminating operator of an increase in its termination charge (a small, significant, non-transitory increase in price or "SSNIP"). To perform this exercise Ofcom has assessed the effect on both retail consumers and wholesale customers. Note that it is not necessary for *all* consumers to switch to substitutes in order to render an increase in MCT charges unprofitable – switching by a sufficiently large group of marginal consumers is capable of doing so (a point made by T-Mobile in its response to the September 2006 Consultation).

Retail demand-side substitution

- 3.18 Demand for termination is a derived demand in that it comes from a fixed or mobile originating network operator on behalf of a customer who has originated a call. Therefore changes in termination charges may be expected to feed through to fixed and mobile retail prices for calls to mobiles.
- 3.19 In this context, two related issues are relevant. First, the proportion of the increase in MCT charges that is passed-on through increases in the retail price of calls to mobiles. In principle, the greater the degree of competition in retail fixed and mobile call origination, the more increases in termination charges will feed through to fixed and mobile retail prices respectively. However, even where competition (or regulation) drives out excess profits, where retail operators offer a broad basket of retail services there may be a diluting effect in the relationship between the marginal costs of calls to mobiles (which includes the wholesale mobile termination charge) and the retail price of calls to mobiles. The retail operator may pass on part of the increase in its costs by raising the price of those elements in the basket of services for which demand is most inelastic (i.e. which consumers are least likely to respond to) – this may not include the marginal price of retail calls. Accordingly, the extent of pass-through of increased termination charges to retail prices could well be less than

¹⁸ *Commission guidelines on market analysis and assessment of significant market power under the Community regulatory framework for electronic communications networks and services* (See http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/c_165/c_16520020711en00060031.pdf)

one-for-one, even for retail operators without SMP. Second, for any given percentage increase in MCT charges, the smaller the cost of termination within the fixed and mobile retail call cost stack, the smaller the potential percentage increase in the retail price of calls to mobiles.

- 3.20 The extent of pass-through of changes in wholesale mobile termination charges to retail prices is important from the perspective of retail demand-side substitution. The lower the level of direct pass-through to retail prices, the less exposure retail customers have to changes in the wholesale termination charge. Therefore they have less incentive to switch to alternative ways to call and, hence, the less constraint their behaviour is likely to exert on a hypothetical monopolist of wholesale voice call termination.
- 3.21 T-Mobile's response to the September 2006 Consultation stated (in the context of whether charge controls should be the same for MNOs using 900MHz and 1800MHz spectrum) that there was a "lack of a rigid relationship between termination charge levels and retail prices" and cited FNOs' retail prices in support of its position.
- 3.22 Ofcom reported in the March 2006 and September 2006 Consultations that, overall, around two-thirds of recent reductions to termination charges have been passed through directly to retail prices for fixed originated calls to mobiles. However, as Ofcom acknowledged, the level of direct pass-through achieved by BT was much higher than that of other providers of fixed to mobile calls, thereby contributing significantly to the overall average figure. Furthermore, as T-Mobile highlighted in its response to the March 2006 Consultation, BT's assurance that it would pass through reductions in MCT charges will expire at the end of 2007. Given that direct pass-through is materially less than 100%, the behaviour of retail customers, the called and calling parties, in response to a retail price increase in calls to mobiles arising from an increase in wholesale voice call termination charges will impose less competitive constraint on wholesale termination charges than would otherwise be the case. This issue of pass-through is discussed again in paragraphs 7.37 to 7.40 in relation to the detriments of excessive termination charges.
- 3.23 In addition, many mobile tariff packages currently do not charge callers a different price for calls to phones on different off-net networks. For example, in January 2007 Vodafone's pay monthly offer ("Anytime") to subscribers charged the same price for voice calls to mobiles on all other (non-Vodafone) networks.¹⁹ Similarly, evidence provided by T-Mobile in its response to the September 2006 Consultation suggested that most FNOs (including BT) charge the same price for calls to different 2G/3G networks.²⁰ This is despite a difference of up to 12% between 2G/3G MNOs' headline regulated MCT charges (see Figure 2.2 above) and a [×] difference between the 2G/3G MNOs' average contractual charges. Whilst Ofcom understands that BT (under its basic "Together" tariff) does charge a different retail price for calls to handsets on H3G's network, Ofcom notes that H3G's MCT charges are markedly higher than the 2G/3G MNOs' charges (the difference is much larger than the 5-10% increase in prices normally considered for market definition purposes). This suggests that, were a hypothetical monopolist MNO to increase the price of MCT on its network by a small, significant amount (5-10%), it is possible that other network

¹⁹ <http://shop.vodafone.co.uk/index.cfm?go=priceplans.callcharges&pid=>

²⁰ T-Mobile provided details of FNOs' retail prices in October 2006. This data indicated that BT Together Option 1, Telewest, Vonage and Toucan talk all charged the same prices for calls to Vodafone, O2, Orange and T-Mobile subscribers (despite differences in headline regulated MCT charges). Whilst NTL talk and Tesco Talk charged different prices for calls to different 2G/3G MNOs' networks, T-Mobile stated that these FNOs' prices differ even where the 2G/3G MNOs in question charge the same headline regulated MCT charges.

operators would respond by increasing the price of calls to all (off-net) mobiles, rather than simply increasing the price of calls to mobiles on the monopolist's network. If this occurs then it will further dilute the impact of any pass-through of increased MCT charges on the behaviour of calling parties. Moreover, even where recipients have multiple mobile phones connected to different networks, if the relative price of calling the monopolist's network does not change then this erodes the incentives for callers to substitute away from calling that network (see paragraph 3.29).

Behaviour of the called party in response to an increase in the retail price of calls to mobiles

- 3.24 There would be a constraint on termination charges if mobile subscribers chose their network on the basis of the prices of incoming calls and switched network as a result of an increase in these prices. If this were the case, this would support the 2G/3G MNOs' proposals in response to the September 2006 Consultation that MCT is part of wider cluster market for mobile services in general. However, the calling party pays ("CPP") arrangement adopted in the UK telephony market has a notable impact on mobile subscribers' sensitivity to the price of incoming calls.
- 3.25 Under the CPP arrangement, the calling party (and not the called party) pays the total price of a retail call (unless partial or full receiving party pays ("RPP") arrangements apply, as happens in the UK with Freephone and special low cost call types). This means that the voice call termination charge is included in the originating network provider's (either fixed or mobile) cost base and is reflected in the retail price it sets for calls originating on its network. CPP leads to a disconnection between the person paying for a call (i.e. the calling party) and so, indirectly, for the termination charge and the person who makes the choice of the terminating network which sets the termination charge (i.e. the called party).
- 3.26 The overall effect of this arrangement in retail markets (i.e. calls from fixed to mobiles and calls from mobile to mobile) is that, while MNOs have an incentive to keep the price of those services paid for by their subscribers at a level to attract and retain customers, they do not have the incentive to keep the price of fixed and off-net calls to their subscribers low.
- 3.27 Nevertheless, it is still possible that mobile subscribers might respond to a rise in the termination charges of the MNO to whom they subscribe, by switching to a network with lower termination charges, if they expected and were concerned that the higher price of calling them would have an impact on callers to them. For this to be true, Ofcom considers that the following conditions would have to be met:
- Mobile subscribers should value incoming calls to such an extent that a sufficient reduction in these calls induced by a price increase, in turn induces subscribers to change network (or, in the case of those with more than one mobile phone, to give out a different number for incoming calls – see paragraph 3.29 below);
 - Callers must be sufficiently aware that they are calling a mobile and that they are calling a specific network;
 - Callers must be sufficiently aware of the price of calling that particular network; and
 - Callers must be sensitive to changes in the prices of calling the network they want to reach.

- 3.28 Ofcom considers that only if all four of the above conditions are met could the behaviour of mobile subscribers act as a competitive constraint on mobile termination charges; MNOs that increase charges would risk a loss of users on their networks.
- 3.29 In its response to the September 2006 Consultation, H3G argued, in relation to the first bullet point, that Ofcom was wrong to refer to subscribers being induced to switch network, as subscribers with more than one mobile phone have the option, more simply, to give out a different number for incoming calls. Ofcom agrees that this is an option for the minority of mobile phone users (around 16% in the case of H3G customers and 7% in the case of all mobile phone users) who have mobile phones connected to more than one network.²¹ However, this would act as a constraint on MCT charges only if these subscribers were sufficiently numerous and they were sufficiently concerned by the impact of high termination charges to cause them to give out a different number for people to use when calling. The threshold for such action may conceivably be lower than the threshold for switching network but it is likely to be material given that most of those who use two mobile phones do so for reasons other than to minimise inbound call charges, and a strategy of using one phone for inbound calls may conflict with the original rationale (typically to keep separate business and personal calls – see paragraphs 3.61-3.64 below). Furthermore, the evidence presented in the September 2006 Consultation and referred to below indicates that subscribers are relatively unconcerned about the cost to others of calling them, and calling parties are not sufficiently well informed about the mobile network which they are calling and the price for calling different networks to cause them to alter their behaviour in response to changes in MCT charges (and thereby cause called parties to adjust their behaviour).
- 3.30 In addition, as noted in paragraph 3.23 above, many tariff packages currently do not charge callers a different price for calls to phones on different off-net networks. This implies that, with the exception of callers that have the opportunity to make on-net calls, the price to callers of contacting a subscriber with more than one mobile phone may not vary according to which network the caller contacts them on. In these circumstances it may not be possible for callers to reduce the cost of calling a H3G customer by contacting them on the recipient's other mobile phone to another network (even if the call recipient possessed a non-H3G phone). If the relative price of calls to different off-net networks does not change following a hypothetical monopolist's increase in MCT charges, one of the necessary conditions for H3G's argument fails to be satisfied (at least for those callers for whom an on-net call is not an effective substitute).
- 3.31 O2, in its response to the September 2006 Consultation, noted that H3G's pre-pay tariff (known as "WePay") allows users to receive a 5 pence credit for each minute of calls that they receive. O2 argued, and Ofcom agrees, that this discourages H3G customers that receive such credits from providing callers with a number on an alternative mobile network.
- 3.32 In its response to the September 2006 Consultation, H3G also argued, in relation to the second, third and fourth bullet points in paragraph 3.27, that customers with multiple handsets will learn by experience which number to provide to those trying to contact them. H3G did not provide any evidence to support its assertion, although it did observe that a proportion of calls will be between the same pairs of customers

²¹ The figure for H3G customers is taken from Ofcom's October 2006 survey (see footnote 15 above). In Ofcom's January 2006 survey, 12% of mobile users reported that they had more than one SIM and, of these 60%, reported that they were connected to more than one network (i.e. 7% of all mobile users overall).

(i.e. people have their own calling circle of acquaintances). Importantly, H3G did not explain how call recipients would learn the price paid by others when calling each of their different handsets (a necessary prerequisite for H3G's argument). Indeed, as explained in paragraph 3.79 below, even callers (i.e. the party which pays) have limited awareness of the price paid when calling other mobile phones (including the people they contact most regularly). Accordingly, Ofcom considers it highly unlikely that recipients (i.e. the party that does not pay for the call) are sufficiently well informed about the cost of calling them. This aligns with the evidence that few, if any, subscribers maintain more than one mobile phone in order to reduce the cost to others of calling them (see paragraphs 3.61-3.64 below). As a result, Ofcom does not consider that a hypothetical monopolist would in practice be prevented from profitably raising MCT charges as a result of call recipients learning the relative cost of calling them and then, in response, providing potential callers with an alternative mobile number to contact them on that offers a lower calling price.

3.33 Mobile subscribers (in relation to the first bullet in paragraph 3.27 above) are discussed further below. Callers to mobiles (in relation to the second, third and fourth bullets) are discussed further under 'Behaviour of the calling party in response to an increase in the retail price of calls to mobiles'.

3.34 In summary, for the reasons set out in the paragraphs which follow, Ofcom takes the view that the price of incoming calls is not considered by consumers to be an important factor in their choice of a mobile network. Consumer awareness of the price of calls to mobile phones is limited, especially in respect of the price of calls to each specific network. Therefore the behaviour of the called party in response to an increase in the price of calls to mobiles does not provide a sufficient competitive constraint on termination charges.

3.35 In assessing the behaviour of consumers, as set out in the following paragraphs, Ofcom has taken into account evidence from the following surveys (which are referred to and defined in the following paragraphs):

- Surveys referred to in the "Competition Commission's 2003 Report";²²
- Surveys of residential and SME consumers conducted for Ofcom during February 2005;
- A survey of residential customers conducted for Ofcom in January 2006; and
- A survey of H3G customers conducted for Ofcom in October 2006.

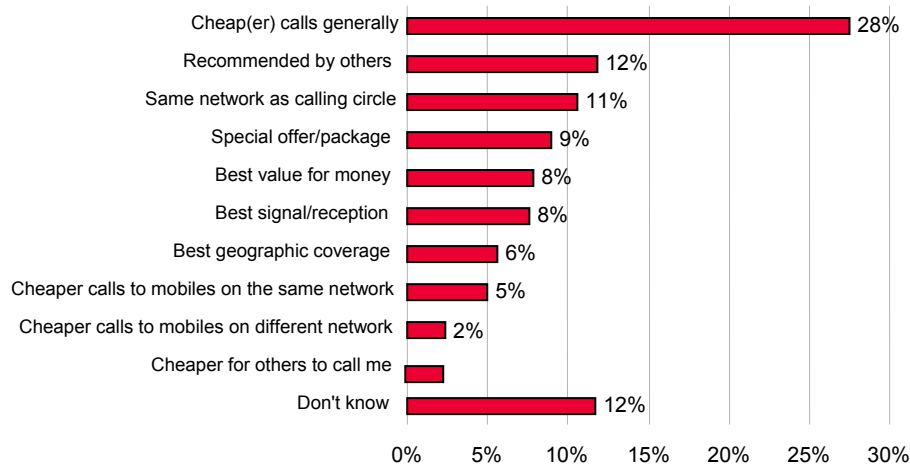
3.36 Ofcom carried out a survey of residential and SME consumers during February 2005²³ ("the February 2005 survey"). In this survey it was found that when residential subscribers were asked what their considerations were when making their network choice, only one in fifty (2%) spontaneously said that they considered whether the network was cheaper for others to call. However, it is possible that the cost to others of calling them may have been taken into account when deciding to choose the same network as their calling circle (one in nine (11%) referred to this factor) and may also have been reflected in the consideration that calls within the same network may be

²² Vodafone, O₂, Orange and T-Mobile, Competition Commission (see <http://www.competition-commission.org.uk/inquiries/completed/2003/vodafone/index.htm>)

²³ Findings from these surveys were presented in Annex F of Ofcom's consultation document *Wholesale mobile voice call termination markets – a proposal to modify the charge control conditions*, 7 June 2005 (see <http://www.ofcom.org.uk/consult/condocs/wholesale/wholesale.pdf>)

cheaper (one in twenty (5%) noted this factor). Figure 3.1 below presents the full set of considerations indicated by residential consumers choosing their network provider themselves.

Figure 3.1 Spontaneous considerations when choosing network



February 2005 survey, Base: Adults aged 16+, mobile phone users and choosing network provider themselves (1,413)

- 3.37 As shown in Figure 3.1 above, the most frequently mentioned factor in residential consumers' network choice was found to be "cheap(er) calls generally".
- 3.38 When specifically prompted as to whether the cost of others calling them was a consideration in their choice of network, overall only one in nine (11%) residential subscribers said they found out how much it would cost other people to call their network. Only one in ten (10%) said that the cost for other people to call them was a significant consideration.
- 3.39 The Competition Commission's 2003 Report (paragraphs 2.134 – 2.135) noted that the cost of incoming calls was not an important factor for consumers when choosing their mobile network. It ranked 10th out of the 14 factors suggested, the most important being "the price you pay to call others". In addition, just under two thirds (61%) of mobile users expressed more concern about the cost to them of calling others than the cost to others of reaching them. Only 9% were more concerned about the cost to others (paragraphs 2.133 to 2.135). At the time, these findings were consistent with surveys of residential customers commissioned by two of the MNOs and presented at the Competition Commission's inquiry. O2's NOP survey found that for nearly three quarters (75%) of respondents the cost to other people of calling them on their mobile phone was an unimportant factor when they decided which mobile network to join. Under one fifth said that it was important. High proportions (85%) of both categories were unable to say why they took the view they did (paragraphs 2.133 to 2.135). An NOP survey commissioned by Vodafone showed that the price of outgoing calls was much more important to mobile users than the costs that others incurred to call them (paragraphs 2.133 to 2.135).
- 3.40 H3G in its response to the March 2006 Consultation argued that it is not sufficient for Ofcom to rely on market research relating to the views of the generality of mobile

users as there may be material differences between the customers of different MNOs. [3<.]

3.41 [3<]

3.42 Ofcom reported in the September 2006 Consultation that it had analysed its survey data with a view to assessing whether there are material differences between the characteristics and views of the customers of different MNOs, particularly with respect to attitudes to the cost to others of calling them and the extent to which they use more than one phone/SIM to reduce these costs. Ofcom's own research, cited above, suggests that H3G customers are more likely than those on other networks to use more than one mobile phone/SIM card. Across three waves of research in November 2004, Q2 2005 and Q4 2005, 26% of H3G customers claimed that they used more than one mobile phone (with different numbers) at least once a month, compared to 9% of those connected to non-H3G networks. These data align broadly with the data supplied by H3G.

3.43 In Ofcom's January 2006 research, cited above, the majority (60%) of consumers with more than one mobile phone number or SIM card reported that they were connected to different networks. The ability to split business and personal calls was the reason most commonly given for ownership of more than one mobile phone number or SIM card (44%). Approximately 12% claimed to have multiple numbers or SIM cards to split calls made to different mobile phone networks and 11% to take advantage of free calls at different times. Due to small sample sizes, it has not been possible to explore these findings specifically among H3G customers. [3<]

3.44 Following receipt of responses to the March 2006 Consultation, Ofcom commissioned further market research²⁴ to complement that referred to in the preceding paragraph. This further survey was conducted in October 2006 and focussed on the views and behaviour of H3G customers which, given the relatively small number of H3G customers, are not robustly represented by surveys of the general populace or surveys of the generality of mobile phone users.

3.45 The results of the October 2006 survey confirm the view indicated by H3G's own research and by Ofcom's earlier research on the generality of mobile phone users, that H3G customers are no more likely than the customers of other MNOs to report that the cost to others of phoning them is a significant consideration when choosing a provider of mobile services; only 1% spontaneously reported that the cost to others of calling the network had been a consideration when choosing H3G. Furthermore, whether the customer also used a second SIM connected to another network, made no statistically significant difference to this finding; H3G customers with another mobile phone connected to another network were equally unlikely to report that the cost to others of calling them was significant factor when choosing a mobile services supplier. These data are similar to those presented in Figure 3.1 above.

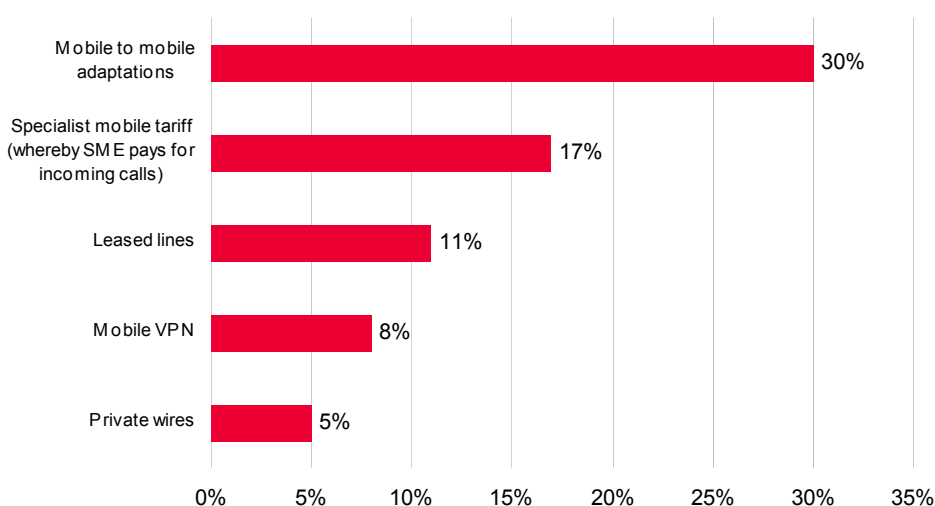
3.46 When prompted as to the factors considered when choosing a mobile phone supplier, the proportion of all H3G users who agreed that the cost to others was a significant factor in their choice of network, was 12%. It was notable, however, that the difference between those who had only a H3G phone and those who also had a mobile phone connected to another network was not statistically significant.

²⁴ See note 15 above. Sample of 477 adults aged 15+ on the H3G network. Data was weighted to ensure demographic profiles match those for all adults in Great Britain aged 15 or over.

- 3.47 As discussed in section 2, H3G currently has higher average termination charges than the 2G/3G MNOs. It is thus notable that the October 2006 survey found that half of H3G subscribers believed that it costs the same or less for other people to call their H3G mobile compared to phones on other networks, and one fifth did not know the cost. Just under three in ten H3G users believed that it is definitely or probably more expensive for other people to call their H3G mobile. A large proportion (two in ten) reported that they did not know the cost to callers.
- 3.48 In Ofcom's view, the research evidence does not indicate that the ability of some H3G customers to receive calls on an alternative network is used in a manner which would constrain charges. The ability of a larger than average proportion of H3G's customers to receive calls on a mobile phone connected to another network may impact H3G's overall termination revenues (in that H3G does not receive payment for terminating those calls). However, it will not impose downward pressure on H3G's termination charges as the choice of terminating MNO, for most subscribers, is not influenced by termination charges. This is because the four factors set out in paragraph 3.27 do not all apply for most subscribers.
- 3.49 Overall it appears that the attitudes of the residential mobile subscribers of each of the five UK MNOs towards the cost of others calling them is not a major consideration in their choice of mobile network. Therefore, in Ofcom's view, these subscribers do not impose a competitive constraint on the termination charge, since they are unlikely to switch to networks with cheaper termination charges. Looking forward, and assuming that the CPP arrangements persist in the UK, it is difficult to see why mobile subscribers may become more sensitive to the cost of others calling them and begin to offer a competitive constraint to termination charges.
- 3.50 Closed user groups are groups of people whose members care about the cost to the other members of calling their mobile number, for example a group of co-workers whose mobile phones are provided by their employer. The existence of closed user groups could ameliorate the effect of the CPP arrangement and act as a constraint on voice call termination charges. However, for this constraint to be effective these groups should be numerous and not capable of being isolated through targeted tariffs that bypass the usual termination charges. As discussed above, the evidence available shows that few groups of people are sensitive to the cost of incoming calls. Moreover, those that are can be targeted with tariffs which bypass the usual termination charges (see paragraph 3.56 below). Therefore Ofcom takes the view that closed user groups do not provide a sufficient competitive constraint on termination charges.
- 3.51 The minority of subscribers who are concerned about the impact of high mobile termination charges on the behaviour of callers generally, may be able to mitigate the impact by using call diversion services, including personal numbering services ("PNS"). To a degree, such services enable the called party to decide how much callers should be charged for calling them (provided that, in some instances, the called party is willing to contribute to the cost of incoming calls). However, call diversion services are fundamentally more expensive than calls direct to mobile numbers because (i) their routing is indirect (calls to a personal number go to the PNS provider first, which then forwards them to the appropriate terminating network) and (ii) they require access to some form of database which is used to determine the called party's preferences for termination. In any event, where calls are diverted to a mobile phone, the MNO's standard mobile termination charge is payable, either by the caller in the cost of the call or, in whole or in part, by the called party within the cost of the call diversion service.

- 3.52 Whether offered on a CPP or RPP basis, the higher cost suggests that it is unlikely that PNS could represent effective substitutes to calls to mobile phones for called and calling parties. This service may be attractive to those subscribers who are sensitive to the price payable by others to call them on their mobile. However, the MNOs will typically have already separated these subscribers from the generality of subscribers by offering them specially targeted tariffs (discussed at paragraph 3.56 below). Therefore, Ofcom believes that automatic call forwarding services do not currently generate significant pressure on the level of mobile voice termination charges.
- 3.53 Business users, in particular small and medium sized enterprises (“SMEs”) with up to 250 employees, appear to be more concerned than residential users about the cost of calling their mobiles.
- 3.54 In the February 2005 survey, one in three (33%) SMEs²⁵ owning or renting mobile phones said that they chose the mobile network that was cheapest to call – and an additional fifth (18%) said that they would consider doing so in the future. It should be noted, however, that it is not clear from these data to what extent SMEs are concerned about the cost of off-net versus on-net calls made by their own employees (i.e. a closed user group) to their mobile phones, as opposed to the costs faced by customers calling them. Low awareness amongst the generality of residential callers of the cost of calling different mobiles (see paragraph 3.79 above), and the prevalence of retail call tariffs which do not differentiate between calls to different mobile networks (see paragraph 3.23 above), may suggest that the costs faced by customers is not a major consideration when SMEs choose a supplier of mobile services. This view is also supported by the survey data relating to action taken to reduce the cost of calling their mobile, as set out in the following paragraphs.
- 3.55 In the February 2005 survey, one half (53%) of SMEs indicated that they had taken additional steps to reduce the cost of calling their mobiles (see Figure 3.2 below).

Figure 3.2 Steps taken to reduce cost (to other people) of calling their mobile phones, prompted (Proportion of SMEs taking steps)



February 2005 survey, Base: UK SMEs owning/renting mobile phones having taken steps to reduce the cost of calling their mobiles (255)

²⁵ Base, UK SMEs owning/renting mobiles phones (585).

- 3.56 It is notable that four of these possible steps (including the most popular) are steps which would benefit members of a closed user group, rather than callers from outside such groups. As mentioned above, closed user groups do not generate sufficient competitive pressure to constrain the level of termination charges because the MNOs can separate them from less sensitive customers by offering special arrangements that by-pass standard termination rates. This means that MNOs face even less competitive pressure in setting charges for the other customers. The examples given in Figure 3.2 above e.g. private wire, mobile VPNs, leased lines, special tariffs and mobile-to-mobile adaptations, are examples of such arrangements that segment the market in this way.
- 3.57 There are costs of private wire services and mobile-to-mobile adaptations and it is likely that they will be introduced only where the savings from lower prices for calls to mobiles outweigh the costs of installing them. This, in turn, is likely to occur only where a sufficient proportion of the fixed line originated phone calls of the customer is directed to a single mobile network (such as, for example, mobile phones used by a business's own workforce). They are unlikely to be an effective substitute to standard fixed-to-mobile calls for residential consumers. However, as mentioned above, the main reason why their presence is unlikely to constrain termination charges for fixed-to-mobile calls generally is that they constitute a targeted tariff aimed at separating out the most price-sensitive customers. On-net pricing can also have the effect of separating more price sensitive callers from applying pressure on termination charges. This may result in subscribers seeking to subscribe to the same network to take advantage of cheaper on-net calls. Therefore, in general, targeted tariffs do not impose a competitive constraint on the prices which operators can charge for calls to less price sensitive customers.
- 3.58 If mobile users, generally, could receive their incoming calls on mobile networks other than the one to which they subscribe for making outbound calls, this could put some pressure on mobile voice termination charges. For this form of substitution to take place, the called party must be able to switch his handset between different networks (or hold active mobile phones connected to more than one network). This is possible through the use of multiple SIM cards.
- 3.59 A subscriber can have a mobile phone with an internal multiple SIM card-holder that allows him to switch from one network to another. There are devices available in the UK market which allow customers to use different SIM cards in the same handset and switch between networks. However, to place some pressure on the MNO with high termination charges the subscriber should, by default, be on the network with cheap voice call termination charges and only switch to the other network to make cheap outbound calls. The process of switching networks is currently laborious and time-consuming as it requires manually switching by the user. In addition, it relies on the called party having the incentive to change network potentially every time he needs to make a call and to switch back again at the end of the call, so that the next inbound call will use the network with lower termination charges. Ofcom does not consider that such an incentive currently exists given the CPP arrangement and customer behaviour described above – indeed in an Ofcom survey no respondents suggested that they had multiple SIM cards in order to receive calls on a different number (see paragraph 3.61 below). Ofcom considers that subscribers currently exploit the multiple SIM card opportunity mainly, if not exclusively, to take advantage of differences in the prices of outgoing calls.
- 3.60 As a variation on SIM card switching, subscribers could hold more than one mobile phone and provide the mobile number with the lowest incoming call price to those that call them. In this way mobile subscribers could combine their preference for

cheaper outbound calls whilst at the same time ensuring that those that call them pay the lowest price.

- 3.61 In January 2006 Ofcom commissioned a survey of residential customers²⁶ (“the January 2006 survey”) and found that of those personally using a mobile phone, approximately one in eight (12%) said that they had more than one mobile phone number or more than one SIM card that they currently used. This is a relatively low proportion of mobile subscribers. Furthermore, when asked why they had more than one number or SIM card two fifths (44%) of these subscribers said it was to split business and personal calls with the next most popular reason being to split calls made to different mobile phone networks, approximately one in eight (12%) giving this response. No respondents suggested they had more than one mobile phone or SIM card in order to receive calls on a different number and thereby reduce the cost to others of calling them.
- 3.62 As noted earlier, the sample size of this particular survey was too small to provide a robust indication of whether the customers of H3G are more likely than others to use more than one number or SIM to reduce the cost to others of calling them, as H3G had suggested might be the case in its response to the March 2006 Consultation. However, the evidence of Ofcom’s October 2006 survey indicated that H3G customers are more likely to also have a mobile phone connected to another mobile network (although such customers are still a minority (16%) of H3G subscribers overall). However, those H3G customers who do also have a phone connected to another network reported very similar reasons for having more than one mobile phone: 41% said that it was to split business and personal calls and 32% said that it was to take advantage of free (outgoing) calls at different times. Only 22% reported that it was to make it cheaper for others to call them. Only around 16% of H3G users have mobile phones connected to more than one network. Thus less than 4% of H3G users overall have mobile phones connected to more than one network and gave reducing the cost of incoming calls as a reason for doing so.
- 3.63 [REDACTED]
- 3.64 [REDACTED]
- 3.65 In its response to the March 2006 Consultation, H3G argued that the key issue, in relation to market definition, is not why H3G customers choose to keep two phones but, rather, whether calls are received on that other network. Ofcom does not agree. The callers’ ability to contact an H3G customer without using H3G’s network will not impose a constraint on H3G’s ability to levy excessive termination charges unless the behaviour of those callers can be expected to change as H3G’s CTM charges change. If callers do not have the characteristics set out in paragraph 3.27 above, they may, for other reasons, contact H3G customers on an alternative network, but they will not impose a constraint on H3G’s CTM charges. As such, this will have no bearing on Ofcom’s market definition which relates to termination on individual networks.
- 3.66 In theory, an automatic mechanism to re-route calls can also be conceived of so that subscribers can choose which operator terminates their calls. Such a mechanism would instruct the called party’s mobile phone to switch network automatically when a call is arriving. No such mechanism currently exists and, in Ofcom’s view, the prospects for such a development are low during the period covered by this

²⁶ The findings and questionnaire concerning Ofcom’s January 2006 survey were set out in Annex 6 of the March 2006 Consultation.

statement (4 years from March 2007). This is due to significant technological difficulties and to the lack of incentives on the part of the called party to make use of a facility that reduces the cost of incoming calls. In addition, a further hurdle is posed by the need for MNOs to allow access to their handsets/SIM cards to install the necessary software (as well as allowing any necessary signalling to pass across the mobile network to control network selection). The MNOs have little incentive to co-operate in this way.

- 3.67 The main limitation of both manual and automatic SIM switching, and owning more than one mobile phone, is that all rely on the called party having an interest in reducing the cost to other persons of calling his mobile. It seems unlikely that mobile subscribers place pressure on the cost of calling them through owning multiple SIM cards or phones. At present these subscribers make up a small proportion of subscribers and are motivated by the same underlying incentives as most mobile subscribers, which is to take advantage of differences in the prices of outgoing calls or separate billing arrangements.
- 3.68 Having considered the likely behaviour of called parties in response to a hypothesised increase in the price of calls to mobiles, Ofcom has concluded that, over the period of this statement, the behaviour of called parties will not constrain MNOs' ability to set excessive wholesale termination charges.

Behaviour of the calling party in response to an increase in the retail price of calls to mobiles

- 3.69 As discussed in paragraphs 3.19 to 3.22 above, the extent of pass-through of changes in wholesale termination charges to retail prices will affect the competitive constraint that callers to mobiles may impose on termination charges. If pass-through were significant, callers may impose a competitive constraint if they react to an increase in the retail price for calling mobiles by employing other means of communication to reach mobile subscribers. This form of substitution could act as a competitive constraint on wholesale voice call termination charges. Whether it would act as a sufficient constraint would depend on the amount and nature of substitution that takes place. The MNOs' behaviour would be affected only if the behaviour of calling parties was sufficient to make the increase in the wholesale charges unprofitable because of switching to substitutes (either by calling or called parties). However, for callers to react to an increase in the price of calls to mobiles, it is Ofcom's view that three conditions need to be satisfied:
- Callers must be sufficiently aware that they are calling a mobile and that they are calling a specific network;
 - Callers must be sufficiently aware of the price of calling that particular network; and
 - Callers must be sensitive to changes in the prices of calling the network they want to reach, i.e. an increase in the termination charge above the competitive level must cause consumers to adapt their behaviour to find an alternative satisfactory way of contacting the person they want to call.
- 3.70 Ofcom's view on these three criteria is that none of them is sufficiently met for calling parties to act as a competitive constraint on call termination charges. The reasons for this are discussed below.

- 3.71 Furthermore, different retail consumers face different retail costs of calling a mobile. For example a caller who has purchased a number of calls to mobiles as part of a bundled subscription package faces a different marginal cost of calling compared to a caller who has used up his bundled minutes or who purchased a subscription without inclusive minutes. It is likely that callers with bundled minutes would be less sensitive to changes in the price of calling and therefore impose less of a competitive constraint on wholesale termination charges. Ofcom considers that this could mean that many callers are not particularly sensitive to increases in termination charges. Whether or not this is the case, Ofcom still considers that calling parties do not impose a competitive constraint on the charges for MCT for the reasons set out below.
- 3.72 In its response to the March 2006 Consultation, H3G noted Ofcom's market research which showed that callers are not generally aware of which mobile network they are calling, even though a quarter of callers to mobiles claim to have more than one mobile number for one or more of the people they call. H3G proposed that as H3G is a new entrant entering a saturated market it is relevant to consider whether new customers retain a handset from their old network to receive calls. As explained above, it is Ofcom's view that what is relevant is whether callers who have the ability to choose between more than one mobile network on which to deliver a call, (i) are aware which network(s) they are calling; (ii) are aware of any difference in the cost of phoning those different networks (given the varying extent of pass-through, the existence of call bundles and many operators' practice of charging the same price for all off-net mobile calls); and (iii) are sufficiently sensitive to price that an increase in H3G's MCT charge above the competitive level would cause them to use an alternative means of contacting the called party.

Awareness of calling a mobile and awareness of calling a specific mobile network

- 3.73 In Ofcom's January 2006 survey residential consumers with a fixed or mobile phone were asked how often they know whether they are calling a mobile phone number. Overall the majority (84%) of consumers claimed to always or mostly know when they are calling a mobile.
- 3.74 In the January 2006 survey Ofcom found that of all consumers making calls to mobiles two fifths (42%) claimed never to know which mobile network they are calling or were unable to give an opinion. In addition, one quarter (23%) claimed rarely to know, one in six (16%) sometimes know and only one fifth (19%) mostly or always know which mobile network they are calling.
- 3.75 These results are consistent with previous survey evidence. In the February 2005 survey Ofcom found that, of mobile phone users which know they are calling a mobile, two fifths (44%) claimed never to know which network they are calling, a quarter (24%) occasionally know, one fifth (18%) usually know and only one in ten (10%) always know.
- 3.76 The Competition Commission's 2003 Report collected evidence on consumer awareness of the identity of the particular mobile network they are calling. The Competition Commission's own market research (paragraph 2.136) indicated that on average just under a third (28%) of mobile users said they knew whether they were calling a mobile phone on the same network as themselves. Callers appear to have limited knowledge of which specific network they are connecting to when making a call to a mobile. To date, this awareness does not appear to have improved

significantly over time and accordingly Ofcom considers that this is evidence that it is unlikely to significantly improve over the period to 2011.

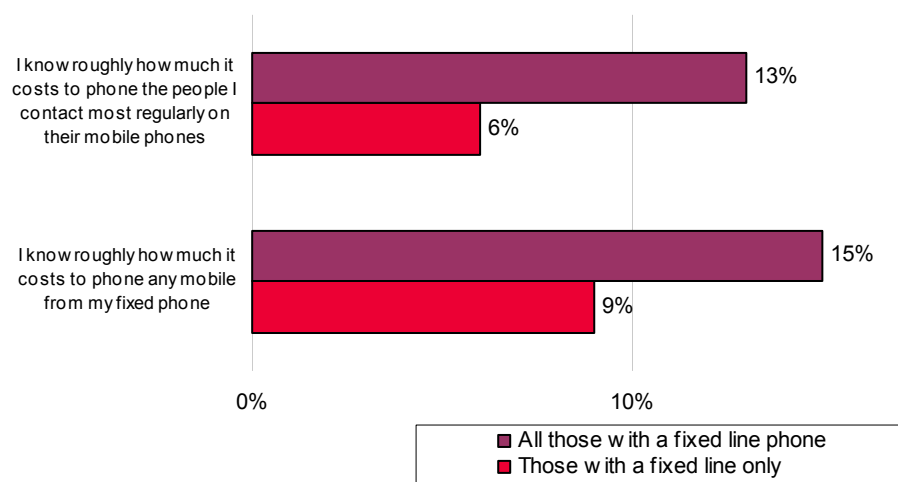
3.77 It thus appears that there is a lack of knowledge of mobile number ranges and how these are assigned to the different MNOs. In addition, the number portability arrangements render it difficult for callers to find out which network they are calling (and thus what the relevant cost is) unless they have a repeated calling relationship with the person they are calling (since, even if the caller were aware of which MNO was originally assigned a particular number, they may not know whether that number has subsequently been ported to another network). In total, around 20% of total mobile terminated minutes are terminated on mobile numbers that have been ported in from another MNO.

Awareness of relative and actual prices

3.78 Awareness of the cost of making calls to other mobile phones appears to be limited. In Ofcom’s February 2005 survey it was found that fewer than one quarter (22%) of mobile phone users claimed to know the approximate cost of calling a mobile on the same network as them. This proportion dropped to one in seven (14%) for calls to mobiles on a different network. Of note is that the proportion who claimed to know how much it costs to phone the people whom they contact most regularly on their mobile phones was similarly low (16%). In Ofcom’s October 2006 survey the equivalent responses for all H3G users were 12%, 12% and 15% respectively. There was no statistically significant difference between the responses of the generality of H3G users and the response of H3G users connected to more than one network.

3.79 Awareness is low amongst callers making a call to a mobile phone from a fixed line. Figure 3.3 below highlights the survey results for these callers – less than one in seven (15%) of consumers with a fixed line phone in their household reported that they knew roughly how much it would cost to call a mobile phone.

Figure 3.3 Awareness of the cost of calling mobile phones from your own landline



February 2005 survey, Base: All those with a fixed line phone (2,158), Those with a fixed line only – i.e. no mobile phone (461)

3.80 The data from Ofcom’s February 2005 survey is broadly consistent with the results of earlier surveys. The Competition Commission’s 2003 Report referred to this issue (paragraphs 2.136 to 2.141) and suggested that a large number of callers had little

knowledge of the actual prices or the relative levels of charges for calling each network. The Competition Commission concluded that these findings overall:

“...reveal a degree of awareness on the part of consumers which is insufficient to enable them to make an appreciable impact on prices or to drive termination charges down to competitive levels” (paragraph 2.141).

- 3.81 Ofcom’s February 2005 survey reveals that callers do not appear to be significantly aware of the cost of calling a mobile from a mobile or a fixed line. The Competition Commission’s conclusion accords with more recent market research. As discussed in paragraph 3.71 above, the practice of bundling inclusive minutes as part of tariff packages means that some callers face a very low marginal cost of calling. Going forward, it is Ofcom’s view that there are no compelling reasons to believe that this awareness will improve significantly over the period to 2011.

Callers’ sensitivity to changes in the prices of calling a specific network - adapting behaviour

- 3.82 Even if, contrary to the evidence currently available, awareness of prices was to grow significantly, competitive pressure will only be exerted on wholesale mobile termination charge if callers are willing to adapt their behaviour through substitution, so that MNOs lose profits on mobile termination if they attempt to raise termination charges above the competitive level.

- 3.83 There is a range of potential options available to a caller as a substitute for contacting a specific recipient (by calling them on their mobile number). These include:

- Mobile-to-fixed call as a substitute for mobile-to-mobile off-net call;
- Mobile-to-mobile call as a substitute for fixed-to-mobile call;
- On-net mobile-to-mobile call as a substitute for mobile-to-mobile off-net call;
- SMS as a substitute for mobile-to-mobile call;
- Voice over Internet Protocol calls; and
- Call-back arrangement.

- 3.84 Each of these potential substitutes is discussed below in terms of their suitability as a satisfactory means of calling a mobile. In their responses to the September 2006 Consultation, H3G and T-Mobile argued that Ofcom should consider the aggregate competitive constraint collectively exerted by these potential substitutes. Ofcom agrees and has done so, although for clarity of exposition each of these potential substitutes is discussed separately and in turn below.

- 3.85 In its response to the September 2006 Consultation, H3G referred to the extent of usage of its instant messenger service, email and its social network site (although it provided no evidence suggesting that callers would switch to these services in response to higher MCT charges). Similarly, in its response to the September 2006 Consultation, Orange claimed that an increasing number of substitutes are being brought to market (e.g. devices based on Wi-Fi or WiMax technology). Orange asserted that these products lead to a “downward ratchet-effect” on MCT charges

(although it provided no evidence to support this claim). Ofcom notes that there are numerous other means of communicating with an individual, such as other computer messenger services or email. However, Ofcom does not believe that these are sufficiently effective substitutes for most callers. This is primarily because they are only feasible substitutes for most callers when both caller and called party have access to the required technology at the same time in order for these forms of contact to offer immediate, real time communication.

Mobile-to-fixed call as a substitute for mobile-to-mobile off-net call

- 3.86 Following an increase in the wholesale termination charge, a calling party may switch to calling the intended party on a fixed number. This, however, will depend on the extent to which the increase in the wholesale termination charge increases the cost of calling another mobile. As noted in paragraph 3.71 above, different retail customers face different retail costs of calling a mobile, and it is likely that those with bundled minutes available to them would be less sensitive than others to changes in the price of calling another mobile. More broadly, however, it is unlikely that a call to a fixed line can represent a satisfactory substitute for calling someone on a mobile network in a sufficient number of instances to act as a constraint on the charges for MCT. In particular, a call to a fixed line is not a viable alternative if the called party is, or is thought to be, away from their fixed line phone, since immediacy of contact is an important feature of calls to mobiles.
- 3.87 In its response to the March 2006 Consultation, H3G commented that this view of the importance of the immediacy of contact with respect to calls to mobiles ignores the fact that significant numbers of calls to mobiles go to voice mail and that this is an accepted feature of calling a mobile. In Ofcom's view, the use of voicemail does not remove this advantage of calling a mobile, as callers may still have a reasonable expectation that they will be called back before the called party returns to the location of his fixed phone. Moreover, Ofcom does not consider that the fact that a proportion of calls go to voice mail, for example because the called party is unavailable or unable to answer their phone, implies that the *calling* party does not regard immediacy of contact as an important factor when deciding to make a call to a mobile phone.
- 3.88 Ofcom's view is consistent with evidence from Ofcom's January 2006 survey. Callers were asked to imagine themselves away from their home and calling someone on their mobile phone. While just under one third (31%) of callers said that in the last month they had tried calling people on the recipient's fixed phone first (before trying their mobile) in order to reduce the cost of these calls, a lower proportion (14%) reported that, on at least one occasion in the last month, they had waited to call the recipient on their fixed phone rather than calling them on their mobile.
- 3.89 In its response to the March 2006 Consultation, H3G proposed that Ofcom should consider whether this evidence of some callers first attempting to reach a called party on a fixed line, and calling the mobile only when the call to the fixed line is not answered, could indicate that the two types of calls are in the same market. In Ofcom's view, however, this market research indicates, on the contrary, that calls to fixed lines are not adequate substitutes for calls to mobiles where the called party is away from his fixed phone and the caller values immediacy, or near immediacy, of contact.
- 3.90 Ofcom also recognises, as H3G noted in its response to the March 2006 Consultation and Orange noted in its response to the September 2006 Consultation, that fixed-mobile converged products may proliferate over the coming years. Such

products typically have access to intelligent routing of calls which takes account of the called party's proximity to the various networks available to terminate the call. In certain circumstances (e.g. when the called party is at home) the converged product could, in principle, have a viable choice between more than one network on which the call could be terminated, for example between a fixed network and a mobile network. In Ofcom's view, however, the outcome of that choice is unlikely to change following a small, significant increase in the price of MCT above the competitive level. This is because the cost of MCT is substantially higher than the cost of termination on a fixed network. Therefore providers of fixed-mobile converged services are likely to opt for fixed termination, rather than mobile termination, whenever fixed termination offers the same utility, even if mobile termination is priced at cost. Accordingly, a provider of fixed-mobile converged services is unlikely to switch from termination on the mobile network to termination on the fixed network in response to a SSNIP – when both termination options are feasible, the provider is unlikely to terminate on the mobile network in the first place.

Mobile-to-mobile call as a substitute for fixed-to-mobile call

- 3.91 After an increase in termination charges and in the cost of calling a mobile, a caller who previously used a fixed line to make a call to a mobile may continue to call the desired party's mobile number, but from a mobile phone rather than from a fixed one. Ofcom's January 2006 survey found that just under one fifth (18%) of callers reported having used their mobile, rather than their fixed phone, to call a mobile when at home during the last month because they had inclusive minutes to use up and this would reduce the cost of calling.
- 3.92 The ability of this form of substitution to constrain voice call termination charges depends on its effect on the profits from termination services for the network operator. The terminating MNO controls the termination charge for a call originated from a fixed or mobile operator and therefore is able effectively to control the impact such substitution might have on its profits. If termination charges for mobile-to-mobile calls are set at the same level as for fixed-to-mobile calls – as has been the experience in the UK – then substitution by callers between these call types does not reduce the terminating MNO's profit and so will not provide a constraint on MCT charges.
- 3.93 Mobile-to-mobile on-net call retail prices do not involve a payment to another operator for mobile termination and are generally set at lower levels than off-net calls and so tend to generate lower revenues per minute for the MNOs. In Ofcom's view, for on-net calls to be a viable alternative to fixed-to-mobile calls:
- The caller must know the mobile network they are calling; and
 - The caller must be on the same network as the call recipient.
- 3.94 As discussed in paragraphs 3.73 to 3.77 above, awareness of the specific network being called is limited. In addition, mobile subscribers are split between five MNOs, hence, the probability of the caller being able to reach the desired call recipient with an on-net call is substantially less than 100%, although Ofcom recognises that some groups of customers which frequently call each other may congregate on the same network. Ofcom's January 2006 survey revealed that one in seven (14%) callers to mobiles claimed to have called from their mobile rather than their fixed phone in the last month because they knew that the person they are calling is on the same network as them.

- 3.95 However, if a caller knows that they make calls to one network more often than to the others, this could influence the choice of network as subscribers seek to benefit from the lower prices charged for on-net calls. In that case, calling mobile-to-mobile on-net might be an effective substitute for a call from a fixed phone. However, this substitution is unlikely to constrain termination charges because one of the effects of MNOs' tariffs is that they tend to separate the more price sensitive subscribers from the others, e.g. by attracting them with low on-net prices on which the effects of a high termination charge is bypassed. This limits the constraint that the more price-sensitive subscribers impose on the termination charge paid on off-net and fixed-to-mobile calls. This issue was examined in more detail, in paragraph 3.56 above, in the context of closed user groups.

On-net mobile-to-mobile call as a substitute for mobile-to-mobile off-net call

- 3.96 Termination charges for off-net calls could be constrained by substitution to on-net calls. This would require the (i) calling party to be on the same network as the called party and (ii) for either the calling or called party to use more than one network to originate/terminate their calls e.g. by having more than one mobile subscription – in the form of multiple SIM cards or handsets and/or having more than one number on which to contact the called party.
- 3.97 As noted in paragraph 3.59 above, the use of multiple SIM cards is problematic for callers because the process of switching cards (to make different calls) is laborious and time-consuming. In addition, MNOs often lock handsets to the SIM that is originally sold with the handset so that it can only be used on their network. Accordingly, Ofcom does not consider that multiple SIM devices generate any significant competitive pressure on mobile voice call termination charges.
- 3.98 As discussed in paragraph 3.61 above, Ofcom's January 2006 survey found that of those with a mobile phone, approximately one in eight (12%) claimed to have more than one mobile phone number or more than one SIM card that they currently use. Of these 60% reported that they were connected to more than one network; this equates to 7% of mobile users overall. Ofcom's October 2006 survey of H3G customers indicated that relatively more H3G customers report also having a mobile phone connected to another mobile network; around 16% of H3G customers reported having mobile phones connected to more than one network. However, responses to these surveys also indicated that use of multiple handsets to reduce the cost of making calls to mobiles currently is not common. Approximately one in nine (11%) of those owning more than one SIM or mobile phone number claimed that they did so in order that they can split calls made to different mobile phone networks. In respect of the H3G customers that were connected to more than one network, Ofcom's October 2006 survey indicated that only 22% were connected to more than one network in order to make it cheaper for others to call them.
- 3.99 In the January 2006 survey, it was revealed that one quarter (26%) of callers to mobile claimed to have more than one mobile number for one or more of the people who they call. This offers another opportunity for callers to mobiles to make an on-net call instead of an off-net call if they know which of the mobile numbers is associated with their own network (assuming also that it is cheaper for the caller to make an on-net call and that the caller is aware of this fact). As already discussed, callers do not have much awareness of which network they are calling. Moreover, the January 2006 survey revealed that two fifths (39%) of mobile subscribers claiming to have more than one number or SIM reported that they were connected to the same network. Further, even where the call recipient does have multiple handsets connected to different networks, there may be other reasons why the caller may not

switch to an on-net call (for example because the recipient uses one handset for business calls and the other for personal calls) – see paragraphs 3.29-3.32,

- 3.100 Overall, Ofcom considers that substitution from off-net calls to on-net calls is unlikely to provide a competitive constraint on termination charges. MNOs, by offering lower on-net call prices, can segment the market by type of customer and separate the more price-sensitive customers from the others who are less price-sensitive. They can then set high termination charges for others (i.e. off-net termination charges). Thus, Ofcom is of the view that the nature and extent of this type of call substitution is not sufficient to act as a competitive constraint on termination charges.

SMS as a substitute for fixed or mobile-to-mobile call

- 3.101 SMS enable parties to exchange text messages between mobile phones. SMS may also be received on and/or sent from some fixed network phones, and text is sometimes converted to a synthesised voice message. H3G noted in its response to the September 2006 Consultation the very large volumes of SMS which are sent and received.
- 3.102 Evidence from Ofcom's January 2006 survey suggests that some callers do view SMS as a substitute for calling a mobile in order to save money. When asked whether callers had sought to reduce the cost of calling a mobile by sending an SMS instead of calling, just over half (52%) said they had done this in the last month when they were away from their home. When calling from their home the proportion claiming to substitute to SMS in the last month was lower at around two fifths (43%).
- 3.103 However, Ofcom does not consider that SMS provides a competitive constraint on MCT charges. First, there are some functional differences which limit the extent to which it is a close substitute for calling a mobile. SMS can only be relatively short, because the number of characters allowed in a text message is limited to 160 characters (although some phones now enable the user to link together more than one SMS message). Where an individual wishes to have a dialogue, this is simpler to accomplish during a voice conversation than through a 'back and forth' exchange of SMS messages. Also SMS are transferred between networks on a store and forward basis. Whilst many messages may be transferred in "real time", this is not guaranteed. Accordingly, particularly where a message is urgent, SMS does not ensure the opportunity for immediate conversation and interaction offered by voice calls.
- 3.104 Second, and more importantly, whether or not SMS is a retail substitute for fixed-to-mobile or mobile-to-mobile calls is only relevant if this substitution can have an impact on the terminating MNO's profitability. Even if SMS termination were found to be a retail demand-side substitute for fixed-to-mobile or mobile-to-mobile calls, it is offered by the same MNO which provides voice termination and, therefore, the terminating MNO could set charges for SMS termination in such a way as to limit competitive pressure on its charges for voice termination.
- 3.105 The Commission's Recommendation currently does not include SMS termination in the same market as mobile voice call termination, and Ofcom has decided to adopt the same approach on the basis that the functionality offered by SMS means that it is a limited substitute for voice calls. As noted in paragraph 3.14 above, the Commission has however consulted on a revised Recommendation. That consultation noted that, as the market failure is the same for voice and SMS termination, and both are sold as part of the same cluster at both wholesale and retail levels, it seems appropriate to deal with them as part of the same termination market

(page 37). However that consultation explicitly stated at page 39 that it is open to NRAs to treat voice and data separately. As stated above, Ofcom plans to review SMS termination separately later this year. Moreover, Ofcom notes that if (contrary to its position) voice and SMS were treated as part of a single market then this has no material impact on the conclusion with respect to competitive constraints and appropriate regulatory remedies in respect of the supply of voice call termination, as voice and SMS termination to a given mobile phone are offered by the same MNO.

Voice over Internet Protocol calls

- 3.106 The future impact of VoIP calls during the period of this statement to 2011 is not clear. VoIP calls could, in theory, represent an effective substitute, but whether this applies competitive pressure on termination charges depends on whether it is possible to make a VoIP call to a mobile subscriber without incurring a termination charge controlled by the terminating operator. If this is possible, it is conceivable that callers could substitute to this alternative way of contacting a mobile subscriber, thereby providing a competitive constraint on the mobile termination charge. VoIP on fixed networks allows callers to speak via PC broadband connections at very low individual direct call cost, and for this type of call no termination charge is levied. Whether VoIP on mobiles would similarly be cheaper than conventional voice calls will depend on the charging arrangements set by the MNOs.
- 3.107 An individual making a VoIP call only pays to be on-line (which does not include a termination charge) and the target of the call (if he answers the call) similarly only pays to be connected. In a VoIP call both the called and the calling parties pay for the facility to receive/make the call. This is a quite different arrangement to traditional CPP and the concept of a wholesale termination charge no longer exists.
- 3.108 Such an arrangement changes the incentives on the called party and is likely to affect his behaviour, although it is still unclear in what specific manner. For example, it is possible that a called party may not accept VoIP calls if he would have, in part, to pay for them, thereby forcing the calling party to reach him via a standard voice call to his mobile. In this case, VoIP calls would not impose competitive pressure on the level of the termination charges. Whether there is an incentive from a receiver's perspective to accept a VoIP call, as opposed to a circuit-switched call, depends on the price the recipient pays to receive that VoIP call.
- 3.109 The constraining effect of VoIP calls to mobiles may also be undermined by the MNOs' behaviour. It is the MNO to which the called party subscribes that sets both the voice termination charges and the price for the Internet connection. That MNO also determines the quality of service (i.e. data delay and bit errors). Hence, it may be feasible to adjust network data quality parameters such that it is acceptable for web browsing and email, but not for voice calls.
- 3.110 It is possible today to originate a call to any mobile phone using VoIP. However, where such calls are addressed to a mobile (or geographic) PSTN phone number the call is terminated using the MNO's voice channel and a standard voice call termination charge is payable. As a consequence, no competitive pressure is applied to mobile termination charges.
- 3.111 However, it is also technically possible to use VoIP to make and receive end-to-end calls on "smart" mobile phones (i.e. phones which incorporate appropriate operating software). In these instances, IP addresses are used to identify the parties to the call. Such calls would typically be carried on the MNO's data channel and users would be charged at the MNOs' data rates; no voice call termination charges would be

payable. The ability to make calls in this way, bypassing voice call termination charges, is dependent on the user having the ability to install appropriate software on his mobile phone. It is also dependent on users being able to access, from their mobile phones, the Internet providers which offer VoIP services. There is much debate within the industry as to the extent to which, in future, smart mobile phone users will be able to access such sites. It is also unclear whether MNOs will develop the ability to price discriminate according to the nature of the data carried (e.g. VoIP)..

- 3.112 In its response to the September 2006 Consultation, H3G noted the possibility of changes in the market consequent on a wider take-up of VoIP. H3G stated that it was not clear whether VoIP was included in the market definition proposed by Ofcom. H3G proposed that VoIP should either be included in a wider market which includes a whole range of potential mobile communications methods or excluded along with instant messaging, emailing and other developing alternatives. Ofcom has considered H3G's comment and notes that the market definition proposed in the September 2006 Consultation (and which Ofcom has concluded should be adopted – see paragraph 3.166 below) relates to voice call termination. As such it excludes termination of data services including instant messaging and email. Furthermore, to the extent that VoIP services do not deploy the use of voice call termination, this too would be outside the defined market.
- 3.113 As Ofcom noted in the September 2006 Consultation, the future of VoIP calls to mobile numbers is unclear at present. If these types of call were to become prevalent they could act as a constraint on mobile termination charges associated with traditional circuit switched calls to mobiles. However, at this stage there is insufficient clarity about the likely prevalence and billing arrangements associated with these types of calls in the future for Ofcom to take the view that they are likely to impose a significant constraint on termination charges over the period to 2011. However, if VoIP calls were to become a real substitute for traditional circuit switched calls to mobiles and the billing arrangements for these calls displayed RPP characteristics Ofcom could examine again the impact of these types of calls on the market. The possible future impact of VoIP was discussed in more detail in section 6 of the March 2006 Consultation, and responses to that consultation have not changed Ofcom's view.

Call-back arrangement

- 3.114 Call-back refers to a situation where the direction of a call is 'reversed' and the calling party is called back by the called party, either in an ad hoc manner or through a commercial scheme. Call-back could render an increase in termination charges unprofitable only if the profitability of outgoing calls is lower than that of incoming calls, and call-back is carried out in sufficient volume.
- 3.115 Ofcom has no compelling evidence of any commercial operators currently offering call-back on calls to mobiles within the UK or that the practice of ad-hoc call-back has a constraining effect on voice call termination charges.
- 3.116 It is possible that during the period to 2011, MNOs could introduce a call-back service to offer an alternative to callers to their subscribers. However, Ofcom believes that this form of call-back could not be relied upon, in the period to 2011, to act as a viable constraint on mobile voice termination charges. Firstly, from a caller's and called party's perspective, call-back is not as convenient as normal call. Secondly, MNOs have no incentive to introduce a service of a price and a quality such that it could act as an effective substitute for its own monopoly service. In any

event, the inconvenience of call-back services, compared with direct calls, is likely to place a significant limit on the extent to which they constrain mobile termination charges.

Conclusions on retail demand-side substitution

3.117 Ofcom considers that there are currently no effective retail demand-side substitutes that, taken individually or acting together, would constrain mobile termination charges to the competitive level i.e. retail demand-side substitution does not act as an indirect constraint on MCT charges. Looking forward over the period to 2011, it is Ofcom's view that there is no clear prospect for changes in the behaviour of mobile subscribers or callers that will impose a competitive constraint on mobile termination. Perhaps the most likely source of competitive pressure may come from VoIP calls to mobiles which, because of the potential difference in billing arrangements, have the potential to provide a satisfactory and attractive substitute for making a traditional call to a mobile number. However, as discussed above, at this stage it is unclear how VoIP will develop in the mobile sector. Accordingly, there is insufficient clarity for Ofcom to take the view that VoIP services (to the extent that they do not deploy the use of voice call termination) are likely to impose a significant constraint on termination charges over the period to 2011.

Wholesale demand-side substitution

3.118 At the wholesale level the very nature of mobile termination means that substitution of wholesale voice call termination on an MNO's network with wholesale voice call termination on a different MNO's network does not provide any direct constraint on termination charges. An operator wishing to offer calls to a specific mobile number of a customer of a specific MNO must purchase termination from that MNO or it will not be able to terminate the calls. Looking forward to 2011, it is Ofcom's view that there are no prospects for termination to be provided, in relation to calling a specific mobile number, other than by the subscriber's MNO for that number.

Conclusions on wholesale demand-side substitution

3.119 For the reasons listed above, Ofcom considers that at present there are no effective demand-side substitutes for voice call termination to specific subscribers of a particular MNO. On a forward looking basis to 2011, Ofcom believes that there is no compelling evidence which indicates that this will change.

Supply-side substitution

3.120 Supply-side substitution occurs when, in response to a rise in the price of a product, suppliers of other products would at short notice and without incurring substantial sunk costs switch into supplying the product whose price has risen and render the price increase unprofitable for the hypothetical monopolist. Supply-side substitution can be examined both at the retail and wholesale level.

Retail supply-side substitution

3.121 For retail supply-side substitution to impose a constraint on the level of mobile voice termination charges, there would have to be operators which do not currently provide calls to mobiles that can switch into such provision and thus undermine a price set above the competitive level. In order to have such an effect, the new provider(s) would have to be able to provide a service which did not rely on the provision of termination from the MNO(s) to which the called party subscribes. At present, it is not

feasible to offer retail calls to a mobile without being reliant on the MNO(s) to which the called party subscribes to terminate such calls.

Wholesale supply-side substitution

3.122 For wholesale supply-side substitution to be an effective constraint on mobile voice termination charges, there have to be other firms that could switch into the provision of wholesale voice call termination to a specific subscriber of an MNO's network at short notice and without incurring substantial sunk costs in response to an increase in termination charges.

MNOs other than the one to which the called party subscribes

3.123 Supply-side substitution in the wholesale market could come most easily from other MNOs, which have the necessary network infrastructure and expertise to terminate mobile calls. However, having a mobile network is not, on its own, sufficient for an MNO to be able to terminate calls to a subscriber of a rival network. For this to happen, the mobile phone should be capable of automatically moving from its home network on to that of the alternative MNO on which the call would then be terminated. Ofcom takes the view that at present the lack of access to handsets/SIM details and the technical difficulties in taking control of the handset constitute an effective barrier to an MNO providing voice termination to subscribers of another MNO. On a forward looking basis to 2011, Ofcom believes that there is no compelling evidence which indicates that this will change.

New mobile network operators, Local Area Networks over short-range radio technologies and WLANs

3.124 Operators running WLANs could conceivably enter the market for mobile call termination in competition with MNOs and, thus, put pressure on the level of mobile voice termination charges. Ofcom believes that, at present, there are significant technical obstacles that would have to be overcome before such a service could become viable for mobile users. For example, WLAN operators cannot currently offer the same coverage as the MNOs' networks because of the limited range of reception enabled by their equipment, and technical difficulties, in terms of taking control of the called party's mobile phone, will arise. In any event, a further limitation of this scenario, and the scenario of other MNOs offering competing termination services to an extent which would constrain charges, is that it relies on the called party being responsive to the price of inbound calls, such that they would be prepared to incur some cost to reduce the price to the person calling his mobile (for example by acquiring a multiple SIM handset). At present, the evidence presented in this section suggests that mobile subscribers do not take into consideration to any great extent the price of inbound calls when making their purchasing decisions. Therefore Ofcom takes the view that all of these obstacles would prevent new mobile network operators and WLAN operators from being able to act as a supply-side substitute for the provision of mobile voice call termination by an existing MNO.

Mobile Virtual Network Operators

3.125 An MVNO is a firm that provides mobile telephony services to its customers, but does so by using part of an MNO's network. Ofcom understands that, at present, all calls to UK MVNOs' subscribers are routed directly to the host MNO's network and originating operators pay this MNO a terminating charge set by that host MNO. Where an operator has its own allocation of mobile numbers it would be able to control the termination charge for calls made to these numbers. However for the

reasons given in the preceding paragraph in respect of providers of WLAN services, in Ofcom's view such MVNOs do not apply competitive pressure to wholesale termination charges set by other MNOs as they are unable to compete to supply termination services, other than the termination of calls to their own customers.

- 3.126 More broadly, Ofcom considers that MVNOs with control over wholesale termination charges, and new entrants using alternative technologies, are likely to face similar incentives as MNOs when setting termination charges to the own networks. This is because calling parties and originating operators have no choice but to use that provider's wholesale termination services to deliver calls. For example BT has its own mobile number range, and Ofcom understands that it intends to use these numbers when supplying mobile services, such as BT Fusion. BT has published a charge for terminating calls to this number range and Ofcom understands that, unlike arrangements put in place by other MVNOs, BT controls the level of that charge and will collect termination charges from originating operators. Completion of each call, variously on a host MNO's network or otherwise, is a matter between BT and the various agencies which may be used to complete the call. Ofcom understands from BT that this number range has not yet been used except on a small scale, involving services to BT employees.
- 3.127 Responses to the March 2006 Consultation from O2, T-Mobile, H3G and Orange each argued that Ofcom should take steps now to develop its regulatory approach in relation to the termination services of new entrants which, as T-Mobile noted, may potentially utilise a variety of technologies. Orange warned that failure to consider all potential developments could be discriminatory, and O2 warned that failure to address these issues now will result in subsequent interconnection disputes. [X]. These concerns were reiterated by H3G and Orange in their responses to the September 2006 Consultation.
- 3.128 Ofcom shares the concern of these respondents and fully intends that a consistent and non discriminatory approach to regulation of such new entrants should be applied. Ofcom will continue to monitor the market and, in light of developments, will consider what, if any, steps to take, including whether it is appropriate to conduct a further market review in order to define appropriately new markets for mobile termination provided by other operators and to consider whether such providers have SMP in those markets and if so what regulatory remedies are appropriate. In judging what action to take, and the timing of that action, Ofcom will take all relevant circumstances into account, including the prices charged by other operators providing mobile termination, and the prima facie evidence that may as a result exist of potential detriment to consumers.
- 3.129 In conclusion, for the reasons given in paragraphs 3.126-3.127, Ofcom does not consider that wholesale supply-side substitution by MVNOs would render a small, significant increase in an MNO's MCT charges unprofitable.

Conclusion on supply-side substitution

- 3.130 For the reasons mentioned in paragraphs 3.120 to 3.129 above, Ofcom considers there are no effective supply-side substitutes for voice call termination to the subscribers of a specific MNO.

Aggregating all termination provided by an MNO

Aggregation across different numbers

3.131 On the basis of the initial conclusions reached above, there are no demand-side or supply-side substitutes that should be included in the relevant markets. Accordingly, the appropriate market definition might appear to be wholesale voice call termination to a specified telephone number (or subscriber). However, Ofcom does not consider that this is the case. Rather, Ofcom considers that it is appropriate to widen the market definition by aggregating across the provision of off-net MCT to different subscribers on the same network (“off-net MCT” in this context refers to the provision of MCT to other Communications Providers, as distinct from the self-supply of on-net MCT by an MNO to itself). This is for two reasons:

- First, the competitive conditions relating to the provision of wholesale voice call termination to different numbers (or different subscribers) supplied by the same MNO to other Communications Providers are likely to be relatively homogenous. This implies that a MNO’s conduct when supplying wholesale voice call termination to other Communications Providers relating to a particular number (or subscriber) is likely to be similar to its conduct when supplying that service in relation to other numbers. (Note that, as discussed in paragraphs 3.135-3.137, this reasoning does not apply to the self-supply of on-net MCT).
- Second, there is a common pricing constraint i.e. in practice, given MNOs’ billing systems, it would be difficult/costly for an MNO to charge different prices for MCT to different numbers (or different subscribers) even if it wished to do so. As discussed in paragraph 3.133 below, there are important exceptions to this common pricing constraint, namely self-supplied MCT (i.e. on-net termination) and ported numbers.

3.132 Reflecting the relative homogeneity of competitive conditions and this common pricing constraint, when supplying MCT to other Communications Providers, MNOs currently do not price discriminate between termination charges for off-net calls made to the different subscribers on their networks (with the exception of ported-in numbers – see below). Note also that MNOs can separate the more price-sensitive customers by offering them arrangements that bypass the MCT charge and so take such sales outside the scope of the market, e.g. through a private wire service or use of on-net calls. These issues have been discussed in the preceding paragraphs on demand-side substitution.

3.133 As noted above, there are two exceptions to MNOs’ general practice of not price discriminating between MCT charges for different subscribers on their networks. The first exception relates to the self supply of on-net MCT and is discussed in paragraphs 3.135-3.137 below. The second relates to ported numbers. The current mobile number portability arrangements, put in place by the industry, have led to the situation in which an MNO effectively charges a different termination charge for calls to those customers that have ported their number from a different network (“donor network”). In these instances, the termination charge is equal to the donor network’s termination charge. It is conceptually difficult to apply the SSNIP test in the case of ported numbers.²⁷ Ofcom considers it appropriate to include wholesale voice call termination for calls to subscribers with ported numbers in the same market as the

²⁷ The SSNIP test examines competitive constraints on a hypothetical monopolist increasing the price of its output – clearly this presupposes that the hypothetical monopolist is responsible for setting the price of its output in the first place.

network operator to which the subscriber currently subscribes. This is for the following reasons:

- Were MNOs able to freely set the MCT charges for calls to ported-in numbers, in the same way that they can freely set MCT charges for calls to other numbers (absent regulation of MCT charges), then Ofcom considers that the conditions of competition relating to the provision of MCT to both ported-in numbers and to other numbers would be relatively homogenous.
- The preceding factor is particularly important given that Ofcom is presently considering responses to a consultation on possible changes to MNP arrangements (see paragraph 9.232 below). These possible changes include direct routing arrangements for ported numbers. In the event that MNP arrangements change to allow MNOs to set the termination charge for all their own subscribers, this would not affect Ofcom's market definition: Ofcom's market definition relates to the supplier of termination rather than the MNO who sets the level of charges (which, in the case of calls to subscribers with ported numbers, could vary with the MNP arrangements).
- Ofcom does not consider that alternative approaches are appropriate. One alternative approach for the treatment of calls to subscribers who have ported their number would be to include wholesale voice call termination for calls to subscribers with ported numbers in the same market as the donor network operator. If this option were followed the situation would arise in which an MNO is supplying a service to its subscribers but the service is included in the market of a different MNO. It would be unusual for Ofcom to impose remedies on termination charges on an MNO when it does not supply the service to which the remedy applies.

3.134 When an MNO provides MCT to other Communications Providers, there is a common pricing constraint and competitive conditions are relatively homogenous across different subscribers on that MNO's network. Ofcom thus considers that, in the case of the provision of off-net MCT (i.e. provision to other Communications Providers), it is appropriate to aggregate across subscribers and include them all in the same market.²⁸ Accordingly, Ofcom concludes that the relevant market includes the supply of wholesale mobile voice termination to other Communications Providers for all subscribers of an MNO.

Self-supply relative to supply to other Communications providers

3.135 In its response to the September 2006 Consultation, C&W argued that the market definition should not be limited to MCT provided to other Communications Providers. C&W considered that the market definition should cover all MCT i.e. including the self supply of on-net MCT. C&W's reason for the inclusion of self-supplied MCT is not that it is a close substitute that constrains the price of MCT to other Communications Providers. Rather, in support of its position, C&W argued that termination does not differ depending on where the call originates. Further, C&W stated that in fixed telephony markets the relevant market is call termination for all calls to subscribers of fixed geographic services and that this is "essential" for controlling potential discrimination between internal and external supply by vertically integrated operators.

²⁸ When aggregating the supply of MCT for different customers in this way, it is important to recognise that this does not imply that the supply of MCT relating to subscriber A is a substitute for the supply of MCT relating to subscriber B. These products do not constrain each others' prices.

3.136 Ofcom does not accept C&W's argument. Whilst termination may not physically differ based on where the call originates, this does not imply that there is a common pricing constraint with the supply of MCT to other Communications Providers. Nor does it imply that the conditions of competition are relatively homogenous. Indeed, Ofcom considers that the conditions of competition in relation to self-supply of on-net MCT are particularly different from those relating to the provision of MCT to other Communications Providers:

- An MNO that increased the price of on-net MCT is effectively increasing the retail price that it charges its own customers for on-net calls. This, in turn, is likely to worsen the attractiveness of that MNO's retail offering to mobile subscribers relative to other MNOs, given the importance of a low retail price for outgoing calls (see Figure 3.1), including low on-net retail prices (see also the discussion of closed user groups above).²⁹ Accordingly, an MNO faces a disincentive to raising the price charged for self-supplied MCT, due to a constraint from competition with other MNOs in the retail market.
- In contrast, an MNO that increased the price of off-net MCT is effectively increasing the retail price charged by its competitors in the retail market. Whilst in principle there might be a disincentive to raise prices in this way (for example, if the conditions in paragraph 3.27 are met), in practice, as discussed in paragraphs 3.17-3.130 above, an MNO does not face material competitive constraints on increasing the price of MCT to other Communications Providers.

3.137 Ofcom has considered the issue of consistency with the market definition adopted for termination to fixed geographic numbers. For the reasons given above, Ofcom considers that its approach is appropriate given the factual circumstances relating to the supply of the wholesale mobile voice call termination. Furthermore, Ofcom does not accept C&W's claim that including self-supplied MCT within the market definition is "essential" for controlling potential discrimination between internal and external supply by vertically integrated operators; rather Ofcom considers that competition law allows such discrimination to be assessed, as indeed it has previously.³⁰

Conclusion on aggregating for all termination provided by an MNO

3.138 For the reasons set out in paragraphs 3.131-3.137, and having considered whether a common-pricing constraint exists and whether conditions of competition are relatively homogenous, Ofcom concludes that it is appropriate to aggregate its market definition across the supply to other Communications Providers of MCT to subscribers on the same network. However, Ofcom does not consider that it is appropriate to further broaden the market definition to include the self-supply of MCT by an MNO to itself.

Cluster market for mobile services including termination

3.139 As Ofcom noted in the September 2006 Consultation, termination could be considered as part of a cluster market incorporating all mobile services. This is the view presented, or referred to, by each of the 2G/3G MNOs in their responses to the

²⁹ For example, "same network as calling circle" was one of the most frequently cited considerations when residential subscribers were asked what their considerations were when making their network choice (11% of respondents; see Figure 3.1 above).

³⁰ See for example Ofcom's Competition Act 1998 decision of 21 May 2004 on "Suspected margin squeeze by Vodafone, O2, Orange and T-Mobile" available at: http://www.ofcom.org.uk/bulletins/comp_bull_index/comp_bull_ccases/closed_all/cw_615/decision.pdf

March 2006 Consultation and September 2006 Consultation. Ofcom considers that a cluster market approach might be appropriate if:

- Mobile subscribers purchased a bundle of services from MNOs that included voice call termination together with other retail services; and
- The price of MCT within a particular bundle was constrained because an increase in that price would result in subscribers switching and instead purchasing their bundle of services from another supplier.

3.140 In these circumstances, an MNO would not be able to raise voice call termination charges, while keeping prices for the other services in the bundle at the same level, without seeing its customers switch to another network in response to the increase in the overall price of the bundle. The MNO would, therefore, be able to raise termination charges only if, at the same time, it reduced prices for other services, so as to maintain the same overall price of the bundle. If this were true, an MNO could be constrained in its ability to increase charges for voice call termination although the extent of such constraint would depend upon the level of competition in relation to the provision of the overall bundle.

3.141 However, when deciding which mobile package to purchase, the CPP arrangement means that the prospective purchaser does not pay the MCT charges associated with that package i.e. there is a disconnect between the party paying for MCT (the caller via his originating operator) and the prospective purchase of a particular mobile package (of which the price of MCT is one element). Nonetheless, in principle, mobile subscribers' choice of package may be affected by MCT, provided that the four conditions set out in paragraph 3.27 are met. However for the reasons given above Ofcom does not consider that those conditions are met. In particular, as discussed in paragraphs 3.36 to 3.39 above, the evidence supports the conclusion that few mobile subscribers consider the prices of incoming calls as well as the prices of outgoing calls, when choosing their mobile network.

3.142 Therefore, Ofcom takes the view that the appropriate market definition is not that of a cluster market for all mobile services.

Two-sided markets

3.143 Ofcom noted in the March 2006 Consultation that MCT could be viewed in the context of a two-sided market in which there are two types of retail customer: called parties and callers. Vodafone and T-Mobile in their responses to the March 2006 Consultation argued that if Ofcom considered its analysis of mobile call termination from this perspective there are important issues related to the competitive constraints faced by MNOs in setting termination charges that need to be taken into account. Vodafone also made arguments relating to two-sided markets in its response to the September 2006 Consultation and provided further elaboration at a subsequent meeting with Ofcom. In its comments, Vodafone referred to a report for the European Commission (the "Cave-Stumpf-Valletti Report").³¹ In its responses to the March 2006 and September 2006 Consultations Vodafone claimed that there are two key features of such markets:

³¹ "A review of certain markets included in the Commission's Recommendation on Relevant markets subject to *ex ante* Regulation", M Cave, U Stumpf and T Valletti (July 2006) http://ec.europa.eu/information_society/policy/ecomms/doc/info_centre/studies_ext_consult/review_experts/review_regulation.pdf

- The interdependence of prices on the two sides of the market. Any change to the price on one side will change the price on the other side e.g. if prices on one side are increased they will fall on the other side; and
- The absence of a direct relationship between the price of a service on one side of the market and the incremental cost of serving that side of the market.

3.144 In Vodafone's view these principles affect Ofcom's market definition analysis in three fundamental ways. These are discussed in turn below.

3.145 First, Vodafone considered that, in order to perform the SSNIP test properly, Ofcom "must" take a view on the competitive price for MCT. Vodafone noted that, in two-sided markets "socially optimal prices" are generally not purely cost based – rather, it may be desirable for high prices on one side to subsidise low prices to the other side. In addition, in two-sided markets competition may not drive prices towards the socially optimal level. Vodafone considered that the current regulated price (namely a price based on LRIC plus a mark-up for common costs and the network externality) attempts to identify the socially optimal price, rather than the "competitive price". Vodafone argued that the "competitive price" for MCT is likely to be higher than the current regulated price and that Ofcom should perform the SSNIP test from the baseline of the higher competitive price.

3.146 As a general observation, when defining markets Ofcom does not accept Vodafone's view that Ofcom "must" take a view on what is the competitive price level. In general, regulators and competition authorities rarely accurately identify the competitive price when defining markets. This is because the SSNIP test – the question of whether a non-transitory price increase starting from the competitive price level is profitable – is in practice typically a thought experiment, the purpose of which is to identify the competitive constraints on the product under examination. Ofcom has carefully assessed the competitive constraints on mobile termination and it does not consider its conclusion depends on a precise level for the competitive price.

3.147 Turning now to Vodafone's argument that the "socially optimal price" may differ from the "competitive price" in two-sided markets and that the "competitive price" for MCT is above regulated MCT charges, it is important to be clear about the characteristics of the "competitive market" and the "competitive price" that Vodafone is referring to.

3.148 For example, one approach would be specify a hypothetical competitive market in termination alone, in which MNOs competed vigorously against each other. If so, cost might be a reasonable proxy for the competitive price. Vodafone has not explicitly stated what model of competition underpins its view of the "competitive price". However, in its submissions on market definition, Vodafone has argued that "exclusivity on the MCT side of the market" should not be of concern provided "there is sufficient inter-platform competition" such as competition between MNOs in retail markets to acquire subscribers. Ofcom thus interprets Vodafone's implied model of competition to be a two-sided market characterised by so-called "competitive bottlenecks". This is the term used in the economic literature³² to refer to a two-sided market in which one side (in this case, call origination) is competitive, with a number of competing platforms (MNOs), whereas the other side of the market (call

³² For example, Armstrong (2001), *The Theory of Access Pricing and Interconnection*, in *Handbook of Telecommunications Economics*, edited by Cave, Majumdar and Vogelsang. Similarly, the Cave-Stumpf-Valletti Report states at page 98 that "The "termination bottleneck" problem is endemic to the entire telecommunications sector under the current pricing arrangements (CPP)."

termination) is effectively monopolised, i.e. where dealing with a particular platform (MNO) is the only way to access that platform's (MNO's) customers.

- 3.149 Ofcom does not accept that it is appropriate to treat the price of termination that results in a two-sided market characterised by “competitive bottlenecks” as the “competitive price” of termination for the purposes as defining the market for MCT. Rather, the price of termination where there are “competitive bottlenecks” is more akin to the monopoly price. Defining the relevant market by considering a SSNIP above such a price is, in Ofcom's view, clearly incorrect and, as with the so-called “cellophane fallacy”, it risks defining the market inappropriately widely. Moreover, the price structure where there is a “competitive bottleneck” is unlikely to be socially efficient – rather it is likely to exhibit the undesirable features discussed in section 7 that would occur if MCT charges were unregulated. Ofcom does not accept that such a market is an appropriate baseline from which to conduct the SSNIP test.
- 3.150 Second, Vodafone considered that two-sided markets exhibit a “multiplier effect”. Specifically, a price increase to one side not only decreases demand for that product but will also affect the demand on the other side of the market. Ofcom agrees that such multiplier effects can arise in two-sided markets. However it does not accept that this adds anything to the approach to market definition that Ofcom has adopted above. As set out in paragraph 3.27, Ofcom has considered the impact of higher charges for MCT both on callers and subscribers (call recipients).³³
- 3.151 Third, Vodafone claimed that two-sidedness means that Ofcom should take into account outbound call competition between operators. Ofcom's understanding of Vodafone's argument is that, when competing to attract subscribers, MNOs take into account the fact that an additional subscriber yields additional revenue from the provision of MCT to that subscriber. Ofcom agrees that this consideration exists – indeed it is this mechanism that underpins the waterbed effect, which means that excess profits from termination are (at least partially if not fully) competed away in the provision of more competitive retail mobile services. If termination charges are raised to excessive levels, then MNOs are willing to offer lower prices to attract retail subscribers because of the termination profits that are thereby obtained. The waterbed effect is discussed in Section 7 below.
- 3.152 However, Ofcom disagrees with the implication that Vodafone draws from this mechanism (and the existence of the waterbed effect). The competitive constraints and competitive intensity in the retail mobile market fundamentally differ from the competitive constraints on MCT charges. This means that MNOs have the ability and incentive to set excessive MCT charges regardless of the degree of competition in the retail mobile market. That is, MNOs' unregulated charges would be excessive if the retail mobile market were perfectly competitive and they would be excessive if the retail mobile market were perfectly collusive, and any degree of competitiveness in between. This result is well-established in the economic literature.³⁴ Ofcom therefore disagrees that the degree of competition in the retail mobile market (or outbound call competition) is a necessary consideration when assessing the competitive constraints on MCT. The degree of retail mobile competition is, however, relevant elsewhere in this review – i.e. to the question of the extent of the waterbed effect – and it is considered by Ofcom in that context.

³³ Note that the welfare analysis in Annex 19 takes into account the interaction between the demands for different products.

³⁴ See, for example, Armstrong (2001), *The Theory of Access Pricing and Interconnection*, in *Handbook of Telecommunications Economics*, edited by Cave, Majumdar and Vogelsang.

- 3.153 In its response to the September 2006 Consultation, Vodafone asserted that it is generally accepted by Ofcom (and other regulators and economists) that MCT is provided in a two-sided market. This, however, is not the point that is in dispute. The difference of view is the nature of the implications of two-sided markets in the specific circumstances of mobile call termination. In Ofcom's view, its analysis of market definition already takes full account of the relevant economic factors as manifest in the specific circumstances of MCT, including the implications of two-sided markets. For example, in defining the markets for MCT, Ofcom carefully considers the behaviour of the customers on both "sides", i.e. both callers and called parties. Ofcom disagrees that other implications of two-sided markets put forward by Vodafone are in fact relevant to market definition, because they do not highlight any additional competitive constraints that have not already been discussed earlier in this section. Ofcom notes that there are implications of two-sided markets which are relevant to the analysis of other issues in this review and they are considered by Ofcom in that context, such as the waterbed effect which is analysed in assessing the benefits of regulation.
- 3.154 Thus, in conclusion, for the reasons set out in paragraphs 3.147-3.153, Ofcom does not accept that Vodafone's arguments correctly identified the implications of "two-sidedness" for the specific circumstances of MCT. Nonetheless, to the extent that the implications of viewing MCT as a two-sided market are relevant to the particular circumstances of MCT, Ofcom has taken them into account throughout its analysis (see paragraph 3.8).

Operators that have both a 2G and a 3G network

- 3.155 O2, Orange, T-Mobile and Vodafone have both 2G and 3G networks. Therefore it is necessary to consider whether or not this has any impact on market definition. For the reasons set out in paragraphs 3.160-3.161 below, Ofcom includes voice call termination on the 2G and 3G networks of the same MNO in the same market.
- 3.156 At present MNOs charge one price to originating operators for termination. MNOs cannot currently directly control which network they use to terminate calls to their subscribers on a call by call basis. This is determined by the subscriber's handset. Dual mode (2G/3G) phones cannot standby to receive calls in both modes simultaneously. Therefore they are programmed to default to the 3G mode where 3G coverage exists as, otherwise, the user would be unable to make and receive advanced 3G services. Therefore, whenever a dual mode phone is within 3G coverage any incoming voice call is terminated on the MNO's 3G network. All calls to 2G-only phones and all calls to dual mode phones which are outside the 3G coverage area are terminated using the MNO's 2G network. It is possible that MNOs may develop the technology that will provide them with discretion in deciding on which network to terminate a call and therefore may introduce different charges for originating operators for termination supplied using a 2G or 3G network. However Ofcom has no compelling evidence that this is likely to happen in the next four years.

Demand-side substitution between 2G and 3G networks

- 3.157 Subscribers to the 3G services of these operators are given a dual mode handset that works on both 2G and 3G networks and will receive voice calls on both networks. However, as noted above, the network on which the call is terminated is dictated by the terminating operator, currently with reference to the availability of 3G coverage. Neither the originating operator nor the calling party is able to affect this choice, and neither is likely even to be aware of whether the 2G or the 3G network has been used for termination.

- 3.158 Since callers are unable to choose the network on which calls terminate, voice call termination on the 2G network does not appear to be a demand side substitute if charges for termination of calls to 3G subscribers were raised above the competitive level. Equally, voice call termination on the 3G network does not appear to be a demand side substitute if charges for termination of calls to 2G subscribers were raised above the competitive level.

Supply-side substitution between 2G and 3G networks

- 3.159 With regard to potential supply-side substitution, the fact that the two networks are run by the same operator also indicates that termination on the 2G network will not be a supply-side constraint on the price of termination of calls to 3G subscribers. The fact that an MNO can offer termination on its 2G network for calls to its 3G subscribers will not impose any additional constraint on the level of the charges for termination on its 3G network. An MNO will not choose to impose a competitive constraint on itself, such as by undercutting its own charges. For the same reason, termination on the 3G network is not a supply-side constraint on the pricing of termination to 2G subscribers.

Common pricing across an operator's 2G and 3G networks to originating operators and homogeneity of competitive conditions

- 3.160 MNOs with both a 2G and a 3G network present a single price to originating operators for purchase of voice call termination to its subscribers. MNOs use both networks to terminate calls. As discussed above, currently this is not an active decision on a call by call basis, although this may change in future. This pricing policy means that the same charge is paid for voice call termination whether it is delivered using the 2G network or the 3G network. The key issue in this context is that originating operators pay the same price whether voice call termination is on a 2G or 3G network.
- 3.161 Ofcom notes that it might be feasible for MNOs to set different charges for each of 2G and 3G termination and to levy such charges depending on the network used for termination. Technology could be developed for such a purpose. There would, however, be some practical problems to be addressed, such as whether upgrades to billing systems would be needed and that originating operators may not know which network had been used for termination. In the absence of compelling evidence to the contrary, Ofcom considers it reasonable to assume that MNOs (absent regulation) would continue to levy the same or a blended charge for termination irrespective of whether they use their 2G or 3G network to connect the call. Ofcom, therefore, includes voice call termination on the 2G and 3G networks of the same MNO in the same market. Note that – as in the case of aggregating the supply to other Communications Providers of MCT to different subscribers by the same MNO (paragraph 3.131 to 3.137) – the inclusion of MCT on the 2G and 3G networks of the same MNO within the same market should not be taken to imply that these products are substitutes. Rather, it reflects the common pricing constraint and relatively homogenous competitive conditions affecting the supply of these products.

Geographic market definition

- 3.162 The relevant geographic market comprises an area in which the undertakings concerned are involved in the supply and demand of the relevant products, in which area the conditions of competition are similar or sufficiently homogenous and which can be distinguished from neighbouring areas in which the prevailing conditions of

competition are appreciably different.³⁵ MNOs charge the same price for termination to a mobile number (or subscriber) wherever the call is made from and wherever the called party receives the call throughout the UK. Ofcom considers that this evidence of a common pricing constraint and the relative homogeneity of competitive conditions of competition across the UK suggest therefore that the geographic market is UK-wide. For clarity, Ofcom has reordered the wording of its market definition proposed in the September 2006 Consultation from “Wholesale mobile voice call termination provided to other Communications Providers by ... in the UK” to “Wholesale mobile voice call termination provided in the UK to other Communications Providers by ...”.

- 3.163 The only way to terminate a mobile voice call where the call recipient is currently located in the UK is by terminating that call on the UK network serving the recipient (i.e. it is not possible to terminate that call on a network located outside the UK). Accordingly, Ofcom does not consider that the relevant geographic market is wider than the UK.

H3G and national roaming

- 3.164 H3G provides voice termination over its 3G network where it has coverage. Out of coverage, H3G uses termination on the 2G network of another MNO (“national roaming partner”). H3G effectively uses the supply of wholesale termination services by another MNO as an input into its own supply of termination services to originating operators. H3G controls the termination of all voice calls to its network. H3G does not currently charge a different price for termination which is carried purely over its 3G network or which utilises its national roaming partner’s network as an intermediate step. Ofcom considers that this is evidence of a common pricing constraint and the relative homogeneity of competitive conditions of competition. Ofcom is therefore of the view that the most appropriate market definition in this case is wholesale voice call termination provided by H3G.

Overall conclusions on market definition

- 3.165 On the basis of the analysis and evidence discussed above, Ofcom has concluded that (to summarise):
- No adequate wholesale demand or supply side substitutes for termination of calls to the subscribers of a specific MNO currently exist. Current technology does not allow the termination of a call to a mobile other than on the network of the MNO to which the called party subscribes. In Ofcom’s view, there is no compelling evidence to suggest that this will change during the period of the statement to 2011.
 - At the retail level, there are no effective alternatives for callers that could act as a competitive constraint on termination charges. In addition, callers continue to appear to have limited awareness of the cost of calling mobiles. It is only a relatively small proportion of mobile subscribers that are likely to show a higher sensitivity to the price of incoming calls. However the MNOs have to a large degree separated these subscribers by offering them special tariffs, thus preventing this group from putting any effective pressure on termination charges.

³⁵ *Commission guidelines on market analysis and assessment of significant market power under the Community regulatory framework for electronic communications networks and services*, paragraph 56.

- In principle, technological conditions (as discussed by respondents) and the behaviour of called and calling parties may, over time, change sufficiently to alter the analysis but Ofcom believes that there is currently no compelling evidence to suggest that that such change will occur during the period to 2011 covered by this statement.
- The market is not as narrow as calls to individual subscribers or numbers of a given MNO because it appears that when a termination charge is paid there is no discrimination between the off-net termination charge for calls to subscribers of a given network (with the exception of ported numbers). This is evidence of a common pricing constraint and the relative homogeneity of competitive conditions across different subscribers on the same network. Accordingly it is appropriate to widen the product market to include all wholesale voice call termination provided by each MNO to other Communications Providers.
- However, in Ofcom's view there is no common pricing constraint as between the supply of MCT to other Communications Providers and self-supply. Further, the conditions of competition relating to the self-supply of MCT and the supply of MCT to other Communications Providers are not relatively homogenous (indeed, Ofcom considers that the conditions of competition for the supply of these two products are particularly different). Accordingly, Ofcom does not consider that the relevant market is as wide as all wholesale mobile voice call termination provided by a particular MNO i.e. the relevant market does not include self-supply of MCT.

3.166 With exception of the minor change referred to in paragraph 3.162 above, Ofcom's conclusions thus remain unchanged from its proposals in the September 2006 Consultation, namely that there are five separate markets as follows:

- Wholesale mobile voice call termination provided in the UK to other Communications Providers by O2 ;
- Wholesale mobile voice call termination provided in the UK to other Communications Providers by Orange;
- Wholesale mobile voice call termination provided in the UK to other Communications Providers by T-Mobile;
- Wholesale mobile voice call termination provided in the UK to other Communications Providers by Vodafone; and
- Wholesale mobile voice call termination provided in the UK to other Communications Providers by H3G .

Section 4

Market power

4.1 This section, together with section 5, sets out Ofcom's conclusion that each of five MNOs has significant market power ("SMP") as defined in section 78 of the Act in its respective market for the provision of wholesale mobile voice call termination to other Communications Providers in the UK i.e. the markets identified in section 3 of this Statement.

Proposal set out in the September 2006 Consultation

4.2 The September 2006 Consultation proposed that each MNO has SMP in the market for terminating calls over its own network. The following reasons were set out in paragraph 4.48 of that consultation:

- It is only the terminating MNO that can terminate calls to its subscribers, and each MNO therefore has 100% market share in the market for wholesale termination that it supplies to other operators;
- Ofcom did not foresee any changes to the current CPP arrangements nor the introduction of new or developing technologies that would allow another provider to offer termination on another mobile network, other than the MNO providing that network;
- The combination of current and enduring high market share and absolute barriers to entry provides a strong presumption of market power; and
- Ofcom did not believe that fixed and mobile originating operators were able to exercise sufficient countervailing buyer power ("CBP") to prevent terminating MNOs charging excessively for MCT).

Responses to the September 2006 Consultation

4.3 BT and C&W agreed with Ofcom's proposed conclusion that all five MNOs have SMP. [3<].

4.4 Each of the MNOs, however, disagreed that they have SMP. Disagreement related in part to their different view of the appropriate market definition; as noted in section 3 above, all MNOs argued that MCT forms part of a wider cluster market which includes retail outbound services. In the context of that definition, all of the MNOs argued that they do not have SMP. Similarly, it was H3G's view that the ability of H3G customers with more than one mobile phone to receive calls on another mobile network imposes a competitive constraint on H3G's MCT charges. These arguments were considered in more detail in section 3 above in the context of market definition.

4.5 Vodafone also argued that Ofcom's powers to resolve disputes mean that SMP is constrained, as Ofcom is able to intervene to set prices at levels which would properly constrain SMP. T-Mobile too referred to Ofcom's dispute resolution powers and, while stopping short of explicitly arguing that these would constrain the exercise of SMP, noted that the exercise of such powers would not result in monopoly prices. These views are explored in more detail in the following section 5 which considers the relevance and impact of dispute resolution both in the context of CBP, and more widely.

- 4.6 H3G argued that Ofcom's approach to assessment of SMP is legally flawed, based on an inappropriate definition of SMP and incorrect analysis of CBP. In particular, H3G argued that Ofcom had equated SMP with the ability to persistently raise prices above costs (even by a "marginal" amount). However, in H3G's view, this may simply be evidence of *some* market power rather than SMP.
- 4.7 In the September 2006 Consultation, Ofcom noted that evidence of excessive pricing can support a finding of SMP and made various observations about the previous level of 2G MCT charges in relation to MNOs' costs and the current level of 3G MCT charges in relation to Ofcom's proposed view of the appropriate level of charges. Vodafone and H3G criticised these observations.
- 4.8 As discussed in section 3 above, Vodafone considered that the provision of MCT is best analysed within the framework of a two-sided market. Given this framework, Vodafone claimed that the "competitive" price for MCT was higher than the socially optimal price. Thus it did not consider that observing that unregulated MCT charges are higher than the socially optimal level is sufficient to show that MNOs possess SMP. In addition, Vodafone cited from the Cave-Stumpf-Valletti Report (see section 3). Vodafone considered that this report accepted that two-sidedness means that MNOs lack the independence of action that characterises dominance/SMP.
- 4.9 H3G argued that, in the September 2006 Consultation, Ofcom had not used the appropriate cost benchmarks for a 3G-only operator. H3G considered that Ofcom's approach for dealing with the underlying uncertainties was inappropriate. In H3G's view, the appropriate benchmark against which to assess excessive pricing is the price under perfect contestability (and H3G claimed that Ofcom had previously agreed with this position). H3G set out a view that an estimate of costs based on either Current Cost Accounting ("CCA") or perfect contestability does not indicate that H3G's present charges are above those cost measures. Indeed H3G's charges are only above these cost measures in 2009/2010 and 2010/2011 (and are broadly similar in 2008/2009) and H3G stated that the uncertainties and risk of forecast errors mean that the figures for these later years are insufficiently robust to support an SMP finding from April 2007. H3G also noted that its MCT charges are "substantially" below Ofcom's estimate of the monopoly price set out in the September 2006 Consultation.
- 4.10 H3G further argued that Ofcom erred by "beginning with" the prima facie presumption of SMP before considering if there is sufficient CBP to overturn that presumption. In H3G's view this approach increases the risk that the countervailing factors will not be sufficiently or appropriately analysed.
- 4.11 Finally, Orange noted that it is subject to a bilateral interconnection agreement which acts as a constraint on its ability to alter its charges without the consent of the other party, preventing Orange from setting MCT charges at the monopoly level.

Ofcom's response to specific points raised by stakeholders

- 4.12 The views of the MNOs in relation to market definition were addressed in section 3 above (including the MNOs' arguments concerning cluster markets and the implications of some (H3G) customers possessing more than one handset). In that section, Ofcom set out its reasoning for not agreeing with the MNOs' views as to the correct definition of the relevant market. It follows, therefore, that Ofcom does not accept arguments in relation to the existence of SMP which are predicated upon these alternative market definitions.

- 4.13 Ofcom has set out in section 5 below its conclusions on the relevance and impact of dispute resolution on SMP and, more narrowly, CBP.
- 4.14 Ofcom does not accept H3G's contention that Ofcom has equated SMP with the ability to persistently raise prices above costs by *any* amount (even if that amount is non-appreciable). Ofcom considers that the test to assess the existence of SMP is that set out in Article 14(2) of the Framework Directive; namely: whether an MNO has the "power to behave *to an appreciable extent* independently of competitors, customers and ultimately consumers" (emphasis added). In the context of assessing whether an undertaking has SMP, the European Commission's Guidelines (the "Commission's Guidelines") state that NRAs should take into account the constraint imposed by undertakings that may enter the market "following a *small but significant* non-transitory increase in price" (emphasis added).³⁶ Similarly, a working paper on SMP issued by the European Regulators' Group ("ERG") (the "ERG SMP Working Paper") suggested "the ability to price at a level that keeps profits persistently and *significantly* above the competitive level" as an indicator of market power (emphasis added).³⁷ Ofcom thus agrees with H3G that, where an undertaking charges a price that is above costs but only to a non-appreciable degree, this fact is unlikely to be good evidence to support a finding that that undertaking has SMP. In the context of this review, Ofcom considers that MNOs will have SMP if they are able to sustain charges to an appreciable extent above the competitive level in the market for MCT. As Ofcom has noted at paragraph 4.45 below, the underlying 3G charges proposed by the 2G/3G MNOs are substantially greater than Ofcom's estimate of costs (in some cases more than double). The underlying charges of three of the 2G/3G MNO are also substantially greater than H3G's charges.
- 4.15 A number of Vodafone's arguments in relation to two-sided markets are considered in the context of market definition in section 3 and are not considered further in this section.
- 4.16 Vodafone has also cited the Cave-Stumpf-Valletti Report, which stated that, in a two-sided market, it may be the case that an undertaking "cannot unilaterally" reduce MCT prices towards the socially optimal level without incurring "losses relative to ... rivals". Ofcom understands Vodafone's response to envisage a situation where an MNO "cannot unilaterally" lower prices (i.e. MCT charges) to one side of the market (i.e. callers) because the operation of the waterbed effect means that, as a consequence, that MNO's prices would have to increase to the other side of the market (i.e. call recipients). Ofcom does not consider that this observation is relevant to the assessment of whether a particular MNO has SMP in the supply of MCT:
- Vodafone is referring to constraints on a supplier reducing prices, rather than constraints on increasing them. Ofcom considers that it is the latter (constraints on raising prices above the competitive level) that are relevant to the assessment of whether an undertaking has SMP.³⁸

³⁶ Commission Guidelines on market analysis and assessment of significant market power under the Community regulatory framework for electronic communications networks and services, paragraph 74. (See http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/c_165/c_16520020711en00060031.pdf)

³⁷ Revised ERG Working paper on the SMP concept for the new regulatory framework, October 2004 (See http://www.erg.eu.int/doc/publications/public_hearing_concept_smp/erg0309rev1_smp_working_doc.pdf)

³⁸ The Commission's Guidelines state at paragraph 73 that "in an *ex-ante* environment, market power is essentially measured by reference of the power of the undertaking concerned to raise prices ... without incurring a significant loss of sales or revenues."

- Vodafone is referring to the intensity of competition on the ‘wrong’ side of the market, i.e. in the retail market, but not in the market for MCT. Vodafone’s argument appears to be that competition is very intense when supplying mobile subscribers (call recipients) with retail services (indeed, to such an extent that recipients are subsidised by high MCT charges levied on callers). Even if it were correct, this is of little relevance to whether an MNO faces constraints when supplying MCT to callers. Indeed, implicit in Vodafone’s argument appears to be the assumption that callers are subsidising call recipients – this might suggest that the MNO is behaving, to an appreciable extent, independently of callers (consumers).
 - Underlying Vodafone’s comment appears to be the same assumption that it made in the context of market definition, namely that (in Vodafone’s view) the appropriate competitive benchmark is a market characterised by “competitive bottlenecks” (see paragraph 3.148). For the reasons given in paragraph 3.149, Ofcom does not accept that it is appropriate to characterise the price that results where there is a “competitive bottleneck” as the “competitive” price for MCT. For the same reasons, Ofcom does not consider that a comparison to “competitive bottlenecks” is the appropriate benchmark against which to assess whether MNOs have SMP in termination.
 - As explained in section 3 (at paragraph 3.152), it is the lack of competitive constraints in the market for MCT that is the fundamental reason why each MNO has both the ability and incentive to set excessive termination charges. This ability and incentive exists regardless of the degree of competition in the retail market.
- 4.17 Ofcom addresses H3G’s arguments concerning the appropriate cost benchmark and treatment of risk in section 9. Similarly, for the reasons set out in Annex 5, Ofcom does not accept H3G’s argument that CCA or perfect contestability form the appropriate benchmark in this case. Secondly, Ofcom does not accept that if H3G’s charges are below the monopoly level this implies that H3G does not have SMP. The monopolistic price is an *extreme* excessive price, and a price can still be excessive even if it is below the monopolistic price. As noted in paragraph 4.14 above, Ofcom considers that MNOs will have SMP if they are able to sustain charges to an appreciable extent above the competitive level. Thirdly, consistent with this view, Ofcom notes that the Competition Commission concluded that the prevailing 2G termination charges in 2002/03 of 9.4ppm and 10ppm were against the public interest, because they were substantially above a reasonable estimate of 2G costs, even though such charges were well below the monopolistic price for 2G termination, or possible price in the absence of regulation, of 20ppm or more.³⁹ Furthermore and in any case, an observation of excessive pricing is not necessary for a finding of SMP, which is the *ability* to behave to an appreciable extent independently of competitors and customers, whether or not that ability is exploited, such as through excessive pricing. [X]
- 4.18 As noted in paragraph 5.34 below, Ofcom does not accept H3G’s view that, by considering the prima facie evidence of SMP before considering the existence of CBP, Ofcom has erred in law or assessment. As set out in paragraph 4.29 below, it is established case law that very large market shares (persistently in excess of 50%) are in themselves, save in exceptional circumstances, evidence of the existence of SMP. Thus, the fact that there is only one supplier of termination on each mobile network indicates that, on the basis of market shares alone, one would expect to find

³⁹ See, for example, paragraphs 2.429 and 2.445 of the Competition Commission’s 2003 Report.

dominance in this market. Having noted this prominent factor, Ofcom has then considered all other relevant factors, including the possibility that some or all purchasers have CBP (see section 5). Furthermore, Ofcom does not accept that, in practice, this approach has meant that Ofcom has not sufficiently analysed the countervailing factors. The detailed evidence presented in section 5 shows that Ofcom has analysed these factors in detail.

- 4.19 Ofcom notes Orange's observation that it is subject to a bilateral interconnection agreement which acts as a constraint on its ability to alter its charges without the consent of the other party. Ofcom discussed the nature and impact of such contracts in section 5 of the September 2006 Consultation (and in section 5 below). Ofcom notes the finding of the CAT, in respect of H3G's contractual commitments, that a party cannot contract out of a dominant position (see paragraph 138(a) of the CAT's judgment in *Hutchison 3G (UK) Limited and The Office of Communications* [2005] CAT 39). Ofcom also observes that the existence of a contractual provision requiring mutual consent to change charges, does not, of itself, prevent the exercise of SMP. Rather, the price (and other contractual terms) will reflect the parties' relative bargaining positions at the time that that contract was negotiated. If the supplier possesses SMP and the purchaser has insufficient CBP to constrain this SMP then the resulting price specified in the contract is likely to be appreciably above the competitive level. This outcome is unaltered by the fact that it is not contractually possible to subsequently change that (unduly high) price without the consent of both parties.

Ofcom's reasoning and conclusions with respect to market power

- 4.20 The rest of this section, together with section 5, sets out Ofcom's conclusion that each of the five MNOs has SMP as defined in section 78 of the Act in its respective market for the provision of wholesale mobile voice call termination to other Communications Providers in the UK (these markets were defined in section 3 above).

Definition of SMP

- 4.21 Under the EU Directives and section 78 of the Act, SMP has been defined so that it is equivalent to the competition law concept of dominance. Article 14(2) of the Framework Directive states that:

"An undertaking shall be deemed to have significant market power if, either individually or jointly with others, it enjoys a position equivalent to dominance, that is to say a position of economic strength affording it the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers."

- 4.22 Further, Article 14(3) of the Framework Directive states that:

"Where an undertaking has significant market power on a specific market, it may also be deemed to have significant market power on a closely related market, where the links between the two markets are such as to allow the market power held in one market to be leveraged into the other market, thereby strengthening the market power of the undertaking".

- 4.23 Therefore, in the relevant market, one or more undertakings may be designated as having SMP (single or collective dominance) where any undertaking, or

undertakings, enjoys a position of dominance. Also, an undertaking may be designated as having SMP where it could leverage its market power from a closely related market into the relevant market, thereby strengthening its market power in the relevant market.

- 4.24 In assessing SMP it is important to conduct the analysis under the assumption that no regulatory intervention currently or potentially exists in the relevant market (see paragraphs 5.78 to 5.106 below for a fuller explanation). This is because the outcome of the SMP assessment is to test whether or not any regulatory intervention is required. In the UK, mobile voice call termination has been subject to regulation since 1999. Therefore assessing SMP in this market requires consideration of a hypothetical market where regulation (or the threat of regulation) does not exist.

The criteria for assessing SMP

- 4.25 The European Commission has issued guidelines on market analysis and the assessment of SMP (i.e. the Commission's Guidelines, as defined above). In assessing whether an undertaking has SMP, this review takes the utmost account of the Commission's Guidelines as Ofcom is required to do when considering whether to make a market power determination under section 79 of the Act. Ofcom has also considered a working paper on SMP issued by the ERG that builds upon the Commission's Guidelines (the ERG SMP Working Paper, as defined above).

- 4.26 Specifically, the Commission's Guidelines state that:

“NRAs will assess whether the competition is effective. A finding that effective competition exists on a relevant market is equivalent to a finding that no operator enjoys a single or joint dominant position on that market.” [Paragraph 19]

- 4.27 The Commission's Guidelines go on to state that:

“NRAs will conduct a forward looking structural evaluation of the relevant market, based on existing market conditions. NRAs should determine whether the market is prospectively competitive, and thus whether any lack of effective competition is durable, by taking into account expected or foreseeable market developments over the course of a reasonable period. The actual period used should reflect the specific characteristics of the market and the expected timing for the next review of the relevant market by the NRA. NRAs should take past data into account in their analysis when such data are relevant to the developments in that market in the foreseeable future.” [Paragraph 20]

- 4.28 Given the market definitions set out in section 3, SMP cannot be held by more than one MNO in each market. Therefore this SMP assessment focuses on single firm dominance.

- 4.29 In the Commission's Guidelines, the European Commission discusses market shares as being an indicator of market power:

“...Market shares are often used as a proxy for market power. Although a high market share alone is not sufficient to establish the possession of significant market power (dominance), it is unlikely that a firm without a significant share of the relevant market would be

in a dominant position. Thus, undertakings with market shares of no more than 25 % are not likely to enjoy a (single) dominant position on the market concerned. In the Commission's decision making practice, single dominance concerns normally arise in the case of undertakings with market shares of over 40 %, although the Commission may in some cases have concerns about dominance even with lower market shares, as dominance may occur without the existence of a large market share. According to established case-law, very large market shares — in excess of 50 % — are in themselves, save in exceptional circumstances, evidence of the existence of a dominant position...” [Paragraph 75]

4.30 However, the European Commission notes further that:

“It is important to stress that the existence of a dominant position cannot be established on the sole basis of large market shares. As mentioned above, the existence of high market shares simply means that the operator concerned might be in a dominant position. Therefore, NRAs should undertake a thorough and overall analysis of the economic characteristics of the relevant market before coming to a conclusion as to the existence of significant market power. In that regard, the following criteria can also be used to measure the power of an undertaking to behave to an appreciable extent independently of its competitors, customers and consumers. These criteria include amongst others:

- overall size of the undertaking,
- control of infrastructure not easily duplicated,
- technological advantages or superiority,
- absence of or low countervailing buying power,
- easy or privileged access to capital markets/financial resources,
- product/services diversification (e.g. bundled products or services),
- economies of scale,
- economies of scope,
- vertical integration,
- a highly developed distribution and sales network,
- absence of potential competition,
- barriers to expansion.

A dominant position can derive from a combination of the above criteria, which taken separately may not necessarily be determinative.” [Paragraphs 78-79]

4.31 In ERG SMP Working Paper further criteria are explicitly considered:

- Excessive pricing;
- Ease of market entry;
- Cost and barriers to switching;
- Evidence of previous anti-competitive behaviour;
- Active competition on other parameters;
- Existence of standards/conventions;
- Customers' ability to access and use information;
- Price trends and pricing behaviour; and
- International benchmarking.

4.32 This section of the Statement considers the relevance of all these criteria in the assessment of SMP in the context of this market review.

Assessment of SMP against relevant criteria

4.33 This assessment first discusses the following relevant criteria for this market review, namely:

- Market shares;
- Absence of potential competition; the ease of market entry and the related criterion concerning the control of infrastructure not easily duplicated;
- Absence of countervailing buying power and the related criteria concerning the overall costs and barriers to switching; and
- Excessive pricing.

4.34 There then follows a discussion of why the other criteria listed in the Commission's and the ERG's guidance may be considered less relevant or material to the assessment of SMP in the relevant markets.

4.35 The criteria are set against a forward looking analysis of the markets starting from 1 April 2007 (when the current charge controls on 2G termination by 2G/3G MNOs expire) looking forward over the period to 2011. As discussed in section 3, Ofcom considers that there are no compelling factors which would indicate that the market definition will change during the period to 2011.

Market shares

4.36 All five MNOs have had (since launch of their voice services) a 100% share of terminating voice calls on their own respective networks, both when measured by volume of calls and by revenues. This applies to calls terminated over each operator's 2G and 3G network. This means that each MNO is, in effect, currently a monopolist in the supply of termination for voice calls to its customers. As discussed in section 3, MNOs do not control the charge for all the calls they terminate due to the current number portability arrangements. Nevertheless it is Ofcom's view that

porting has no impact on SMP in these markets as these arrangements do not constrain MNOs' ability to set MCT charges in respect of non ported numbers.

- 4.37 There has been no change in these 100% market shares and no evidence has been presented that these market shares will change during the period to 2011 (given the market definition). The probability of entry in the relevant markets is very low, for the reasons explained in paragraph 4.40 below in relation to ease of market entry.
- 4.38 H3G currently relies on O2's 2G network to terminate calls to its subscribers where its own 3G network does not offer coverage for a particular subscriber, and has announced that it has also awarded a contract to Orange for the provision of similar facilities. Calling parties and originating operators have no choice but to use H3G to terminate those calls (even if H3G uses O2 or potentially another MNO's network). Therefore, H3G has 100% of the market for voice termination to its subscribers. Whether or not H3G ultimately rolls out its own 3G network to offer its subscribers service coverage so that it no longer requires the use of another MNO's 2G network does not affect the proposed conclusions of this analysis of SMP.

Absence of potential competition, ease of market entry and control of infrastructure not easily duplicated

- 4.39 The threat of potential entry can prevent firms from raising prices above competitive levels and, for example, could lead a firm with a 100% market share to behave in a way that would be consistent with higher levels of competition existing in the market than its market share might suggest. However, this threat becomes weak when there are barriers to entry.
- 4.40 In this market, the infrastructure required to enable other providers to offer termination on a specific network apart from the provider of that network is not available. Nevertheless, in the Preliminary Consultation and the March 2006 Consultation Ofcom noted that at any time each mobile phone is generally within the coverage area of 4 or 5 different mobile networks. In theory, it might be technically possible for originating operators to choose which network terminates its calls, but this would be likely to require substantial technical changes and co-operation. As noted in paragraph 8.30 below, responses to the March 2006 Consultation all agreed that such competitive termination is unlikely to be practicable or cost efficient in the foreseeable future. For the reasons set out in 8.31, it is Ofcom's view that mandated technical change to enable competitive termination is neither currently feasible nor likely, in the medium term, to pass a cost-benefit analysis. Market led change of this kind is also highly unlikely to arise for the same reasons, and also because change would be reliant on the co-operation of the MNOs which currently each enjoy 100% market shares.
- 4.41 Therefore actual entry, or the threat thereof, does not provide competitive pressure on the MNOs. Moreover, as noted in paragraphs 3.123 to 3.127 above, even if a new mobile network operator were to start supplying mobile services, this would not undermine the SMP of existing MNOs due to the lack of competition between MNOs in supplying wholesale mobile termination on their respective networks.
- 4.42 In Ofcom's view, the absence of potential competition and the absolute barriers to entry reinforce the prima facie indicators, in respect of 100% market shares, that each MNO may have SMP in the market for termination of voice calls on its network(s).

Countervailing buyer power, cost and barriers to switching

- 4.43 CBP exists when a particular purchaser (or group of purchasers) of a good or service is sufficiently important to its supplier to influence the price charged for that good or service.
- 4.44 CBP is not an absolute concept but, rather, refers to the relative strength of the buyer in its negotiations with the prospective seller for the good or service in question. In considering whether an undertaking has SMP, it is not sufficient just for the buyer to have some CBP but, rather, it is necessary that the buyer can exert sufficient CBP such that the seller is unable to act independently of competitors, customers and consumers, resulting in prices that are not excessive (constrained to a level consistent with a competitive outcome). The seller can then be described as facing sufficient CBP. See Section 5 for Ofcom's analysis of CBP.

Excessive pricing

- 4.45 The ERG-SMP Working Paper stated that "the ability to price at a level that keeps profits persistently and significantly above the competitive level is an important indicator for market power." As noted in paragraph 4.14 above, in the context of this review, Ofcom considers that evidence that MNOs are able to sustain charges to an appreciable extent above the competitive level supports the view that the MNOs have SMP. It is not, however, a prerequisite to a finding of SMP. In the last market review Ofcom noted that 2G termination charges appeared to have been substantially above a reasonable estimate of each MNO's costs for a number of years (despite formal and informal regulation)⁴⁰. In the case of 3G mobile termination, the underlying 3G charges within the blended charges proposed by three of the four 2G/3G MNOs are substantially greater than the 3G charges being levied by H3G. Furthermore, the underlying 3G charges proposed by all 2G/3G MNOs are substantially greater than Ofcom's estimates of efficient 3G unit costs for these operators. In some cases, the MNOs' charges are more than double the level of Ofcom's view of a reasonable estimate of costs.

Other criteria for assessing SMP

- 4.46 The following paragraphs (which include quotations taken from the ERG SMP Working Paper) consider the remaining criteria listed earlier, explaining why Ofcom considers these less relevant to this assessment of SMP in the relevant markets.
- 4.47 Overall size of the undertaking – "the potential advantages, and the sustainability of those advantages, that may arise from the large size of an undertaking relative to its competitors". As discussed at paragraph 4.36 there is only one supplier of MCT in each of the markets defined in section 3. Therefore the size of these suppliers relative to its competitors in each market is not a relevant factor.
- 4.48 Technological advantages or superiority – "Such advantages may represent a barrier to entry as well as an advantage over existing competitors due to lower production costs or product differentiation". This criterion is not considered relevant in this market because the presence of absolute barriers to entry indicates that each MNO offering voice termination faces no effective existing or potential competitors. Hence, no comparison between technologies is relevant.

⁴⁰ See paragraphs 3.17 – 3.31 of Ofcom's *Proposals for the identification and analysis of markets, determination of market power and setting of SMP conditions*, December 2003 ("the December 2003 Consultation"), http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/mct_consultation/

- 4.49 Easy or privileged access to capital markets/financial resources – “Easy or privileged access to capital markets may represent a barrier to entry as well as an advantage over existing competitors.” This criterion is not considered relevant in this market, because the presence of absolute barriers to entry indicates that each MNO offering voice termination faces no effective existing or potential competitors. Therefore, the cost of capital an MNO faces does not give it any further special advantage in this market.
- 4.50 Product/services diversification (e.g. bundled products or services) – “Generally speaking there is a positive relation between product/services diversification and market power, which is due to the fact that increased differentiation in general will also hamper switching between suppliers if these are able to differentiate their products from their competitors and if others are not able to imitate the differentiation.” Note that each MNO sells termination to originating operators who request it on a stand-alone basis and it is not bundled with other services. This criterion is not considered relevant because each MNO has a 100% share of the relevant market (i.e. as there are no close substitutes, the issue of product differentiation between substitutes does not arise). The limited extent to which callers to mobile subscribers have been found to exercise demand-side substitution confirms that calls to mobiles are a much differentiated service from other forms of communication. Moreover, the actual buyers of voice call termination, namely other operators, have no demand-side alternatives.
- 4.51 Economies of scale – “Economies of scale arise when increasing production causes average costs (per unit of output) to fall.... If this is the case, economies of scale can act as a barrier to entry as well as an advantage over existing competitors”. This criterion is not considered relevant in this market because the presence of absolute barriers to entry indicates that each MNO offering voice termination faces no effective existing or potential competitors and, therefore, cost-advantages are not relevant in the markets defined in section 3.
- 4.52 Economies of scope – “Economies of scope exist where average costs for one product are lower as a result of it being produced jointly with other products by the same firm. ...If the existence of economies of scope requires entrants to enter in more than one market simultaneously, this may require additional expertise, more capital etc, which may sum up to higher costs, thus hampering ease of market entry.” This criterion is not considered relevant because the presence of absolute barriers to entry indicates that each MNO offering voice termination faces no effective existing or potential competitors.
- 4.53 Vertical integration – “Vertical integration while normally efficient can strengthen dominance by making new market entry harder due to control of upstream or downstream markets. As such, vertical integration may give an advantage to the integrated firm (over its competitors), as access to sales and supply markets might be more easily attainable for the integrated firm. Vertical integration makes it also possible to lever market power into upstream or downstream markets.” The MNOs are vertically integrated in the sense that they own both the upstream infrastructure that enables the provision of wholesale termination and other wholesale access and origination services whilst at the same time they are also downstream suppliers of retail services. However, the relevant question in this context is whether the position of any MNO in the retail market allows it to leverage market power into wholesale mobile call termination. This is not the case for two reasons. First, no MNO has been determined as having SMP in the downstream retail market. (See Oftel's consideration of the retail market for mobile outbound services, which formed part of its *Review of wholesale mobile access and call origination* - October 2003). Second,

for the reasons set out in section 3 above, one MNO is not in competition with another MNO with respect to mobile voice termination to their customers.

- 4.54 A highly developed distribution and sales network – “Well-developed distribution systems are costly to replicate and maintain, and may even be incapable of duplication. They may represent a barrier to entry as well as an advantage over existing competitors”. Ofcom does not consider this criterion relevant because the service in question is acquired only by purchasers at the wholesale level (other MNOs and fixed operators) and does not require a specialised or complex distribution network.
- 4.55 Barriers to expansion – “There may be more active competition where there are lower barriers to growth and expansion.” This criterion is not considered relevant, because the presence of absolute barriers to entry implies that competition in the market for MCT is not likely to extend beyond the MNO in question and thus the existence of barriers to expansion becomes irrelevant.
- 4.56 Evidence of previous anti-competitive behaviour – “Effectively competitive markets lack collusion among suppliers and anti-competitive behaviour.” Evidence of previous anti-competitive behaviour such as predatory pricing and other market foreclosure behaviour can be an indication that a market is not effectively competitive. Ofcom is not aware of relevant evidence of anti-competitive behaviour as a result of a dominant position in these markets.
- 4.57 Active competition on other parameters – The ERG proposed that market power can be obtained by successfully differentiating products, either vertically (on the basis of quality) or horizontally (on the basis of diversity). This criterion is not considered relevant in this market because mobile voice call termination does not seem to offer much scope for vertical or horizontal product differentiation. In addition, the presence of absolute barriers to entry implies that competition in the market is not likely to extend beyond the existing players and, thus, diversification, even if possible, is not relevant for the period covered by this review.
- 4.58 Existence of standards/conventions – “Useful background information not only for market delineation but also for the assessment of product homogeneity/heterogeneity, the existence of market barriers for potential entrants and for the assessment of dominance can be obtained by considering the existence and consequences of standards and conventions. The extent of technical standardization may determine the potential for product differentiation as well as the ease of market entry (availability of a certain technology; compatibility with other firms’ products/technologies). Conventions like the calling-party pays principle or standard international roaming agreements have to be taken into account in order to be able to correctly interpret the other indicators mentioned in this document and/or to understand the source of market failure and competition problems.” As discussed in section 3, the CPP arrangement plays an important role in conditioning mobile subscribers’ preferences and behaviour. It is a central component of the analysis leading to Ofcom’s proposed conclusion on market definition and market power.
- 4.59 Customers’ ability to access and use information – The ERG proposed that limited access to information on terms and conditions (especially prices), or access to information that is difficult to use, may reduce the capacity of consumers to act upon differences between providers. As a result firms acquire independence of action from consumers and competition. This criterion does not refer to the ability of consumers to switch between providers, but to the capacity of first time buyers to make an informed choice. Wholesale customers appear to have all the relevant information to

make an informed choice. However, they have no choice between providers, since each MNO is a monopolist in the provision of voice termination to its subscribers.

- 4.60 Since termination charges are an input to the retail price for calling mobile phones, the behaviour of retail consumers may have an impact on the MNOs' ability to set high termination charges. The information available to retail customers must, therefore, be considered. Better knowledge on their part about the price of calling each specific network may indirectly force MNOs to compete on the level of termination charges. The extent to which callers can apply pressure indirectly on mobile termination charges was discussed in detail in section 3. A number of links (not just better awareness of the cost of calling mobiles) would have to be satisfied so that the behaviour of callers to mobiles could constrain termination charges. Ofcom considered the extent to which consumers can access information on the cost of incoming calls, and how easy this information is to understand and use in the assessment of market definition, and has not considered these issues separately in the assessment of market power. With regard to the called parties, there is evidence that, as a consequence of the pricing arrangements, they are not sufficiently concerned about the cost of incoming calls when choosing their network.
- 4.61 Price trends and pricing behaviour – “Pricing patterns substantially determine the welfare of customers, and thereby overall welfare. The degree of competition in a relevant market (and its dynamic) might be observed through time series of price movements (possibly linked to international benchmarks), the reactions on price setting of single providers and prevailing differences in prices over time (for homogenous products). If for example competitors cut their prices whereas a particular undertaking (or group of undertakings) leaves its prices unchanged, economic theory would conclude that this should lead to a loss in sales to this (group of) undertaking(s). If therefore a (group of) undertaking(s) can sustain its (their) prices permanently at a higher level, this can be seen as an indication that this (group of) undertaking(s) is free to behave independently from its rivals. Further insights can be gained by an extension of the observation period, which may reveal whether a certain undertaking (group of undertakings) is forced to react to its competitors' price cuts with a lag. The shorter the lag and the sharper the price response in reaction to price cuts of rivals, the fiercer competition can be assumed to be. Pricing patterns might therefore provide important additional information on the effectiveness of competition and might be taken into account as pricing is central to economic conduct”. Given the absence of any effective actual or potential competition in MCT, it is not possible to observe any competitor response to the changes in price of its rivals and make inferences about the level of competition. Furthermore, charge controls have acted as the binding constraint on MNOs' pricing. The impact of other external competitive pressures has not imposed pressure on MNOs to reduce their prices below the charge controls. In the case of H3G, its MCT charges have been constant since first set. (As is noted in paragraph 4.45 above, according to Ofcom's analysis of costs, these charges are significantly above cost.)
- 4.62 International benchmarking – The ERG proposes that, for many of the criteria listed above, additional valuable information can be obtained by investigating benchmarks from comparable economies. International benchmarking can be a useful indication of the level of competitive prices and therefore allow inference of excessive pricing. Across the EU mobile termination is subject to regulation and specific price controls. This affects the interpretation of benchmark charges from outside the UK. According to data collated by the ERG, those termination charges in the UK which are subject to price control regulation are lower than termination charges in some other EU countries. However, since termination charges in the UK are subject to a price control on a LRIC basis whereas in other EU countries different regulation and cost

benchmarks apply, such a comparison should be treated with caution. Therefore, Ofcom is not relying on such benchmarks.

- 4.63 In this case international benchmarks for termination charges are also difficult to rely upon without significant understanding of key country differences in costs related to for example, geography, topology and underlying equipment and labour costs.

Ofcom's conclusions on SMP

- 4.64 The definition of the relevant market has led Ofcom to conclude that there are separate markets for wholesale mobile voice call termination provided to other Communications Providers by each of the five MNOs and that this will be maintained for the period to 2011. Each MNO is, in effect, a monopolist in the supply of termination to its own networks, and has a 100% market share, Ofcom does not foresee any changes to the current CPP arrangements nor the introduction of new or developing technologies that will allow another provider to compete effectively to offer termination on another mobile network, other than the MNO in question. This combination of current and enduring high market share and absolute barriers to entry provides a strong presumption of market power. Ofcom also notes that the 2G/3G MNOs have previously sustained 2G MCT charges significantly above a reasonable estimate of costs. Further, the underlying 3G charges proposed by the 2G/3G MNOs are substantially greater than Ofcom's estimate of costs (in some cases more than double). The underlying charges of three of the 2G/3G MNO are also substantially greater than H3G's charges.
- 4.65 Ofcom has set out in Section 5 below its assessment of whether any purchaser of MCT has sufficient CBP to constrain the exercise of SMP, and its wider conclusion, in the light of the evidence presented in this Section 4 and Section 5, on the existence of SMP.

Section 5

Assessment of countervailing buyer power

Introduction

- 5.1 As discussed at paragraphs 4.43 to 4.44 of Section 4, the question of whether each MNO providing MCT has SMP depends on the extent to which its position of SMP may be off-set by the buyer power of purchasers of MCT.
- 5.2 The Commission notes in its Explanatory Memorandum ('EC Memorandum') to its Recommendation on Market Definition,⁴¹ that a market definition of call termination on individual networks:
- “...does not automatically mean that every network operator has significant market power; this depends on the degree of any countervailing buyer power and other factors potentially limiting that market power.”⁴²
- 5.3 Countervailing buyer power ('CBP') is not an absolute concept but, rather, refers to the relative strength of the buyer in its negotiations with the prospective seller for the good or service in question. It exists when a particular purchaser (or group of purchasers) of a good or service is sufficiently important to its supplier to influence the price charged for that good or service. The Commission notes in its EC Memorandum that:
- “A market definition for call termination on each mobile network would imply that currently each mobile network operator is a single supplier on each market. However, whether every operator then has market power still depends on whether there is any countervailing buyer power, which would render any non-transitory price increase un-profitable.”⁴³
- 5.4 Ofcom considers that in this context, the test to assess whether CBP is sufficient to prevent the exercise of SMP is that set out in Article 14 (2) of the Framework Directive, namely: whether CBP can constrain an MCT provider from having the “power to behave to an appreciable extent independently of competitors, customers and ultimately consumers”.
- 5.5 In the context of this review, Ofcom considers that MNOs will have SMP if they are able to sustain charges to an appreciable extent above the competitive level.
- 5.6 The structure of this section is as follows.
- 5.7 First, at paragraphs 5.13 to 5.33, Ofcom summarises the responses received to the September 2006 consultation and replies to specific points raised.

⁴¹ Explanatory Memorandum to the Commission Recommendation on Relevant Product and 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services. (See http://europa.eu.int/information_society/policy/ecomms/doc/info_centre/recomm_guidelines/relevant_markets/en1_2003_497.pdf)

⁴² Page 20.

⁴³ Page 34.

- 5.8 Second, at paragraphs 5.34 to 5.75, Ofcom sets out evidence relevant to its enquiry. Ofcom considers BT's position as the largest purchaser of MCT, both for calls originating on its own network and for traffic which other originating operators pay it to transit via its network. Ofcom also considers evidence of:
- a. the contracts for MCT concluded by the MNO's with BT and with each other; and of
 - b. the negotiations of charge changes in respect of blended charges
- in order to determine to what extent it may assist in assessing CBP.
- 5.9 Third, at paragraphs 5.76 to 5.104, Ofcom identifies the regulatory factors relevant to the analysis of CBP.
- 5.10 Fourth, at paragraphs 5.105 to 5.162, Ofcom considers the economic factors relevant in assessing CBP, namely whether and to what extent BT and/or any other purchaser of CBP:
- a. represents an important outlet for terminating MNOs;
 - b. is well informed and price sensitive;
 - c. is able to exert bargaining strength by reason of reciprocity of trade;
 - d. is able to draw on alternative sources of supply; or
 - e. has the option not to purchase or to delay purchase.
- 5.11 Fifth, at paragraphs 5.163 to 5.168, Ofcom considers evidence with regard to the economic framework submitted to it on behalf of H3G.
- 5.12 Finally, at paragraphs 5.169 to 5.173, Ofcom sets out its conclusion that neither BT nor any other purchaser of MCT has sufficient CBP to constrain the MNOs' SMP in the relevant markets for wholesale mobile voice call termination.

Summary of responses

Proposal set out in the September 2006 Consultation

- 5.13 In the September 2006 Consultation, Ofcom set out the view that neither BT nor any other purchaser of MCT has sufficient CBP to constrain MCT charges to the competitive price level. Having considered the responses to the September Consultation, Ofcom still considers this to be the position.

Responses to the September 2006 Consultation

- 5.14 BT and C&W agreed with Ofcom's assessment that no purchaser of MCT has sufficient CBP to constrain MCT charges to the competitive level. BT stated that its regulatory obligations to provide fixed termination services, and provide Carrier Pre Selection ("CPS") and Indirect Access ("IA") services were also relevant to Ofcom's consideration of CBP. BT also provided a confidential annex setting out the commercial factors for Ofcom to consider. In BT's view, Ofcom had failed to give adequate consideration to these constraints. O2 agreed with Ofcom's analysis of CBP, given Ofcom's market definition.

- 5.15 The European Commission noted that in the September 2006 Consultation Ofcom had assessed SMP, including the existence of CBP, in accordance with the methodology set out in the Recommendation on relevant markets and in the Commission's Guidelines on market analysis and the assessment of significant market power. Further, the European Commission noted Ofcom's proposed view that no purchaser of call termination services, including BT, has been able and is unlikely over the period of assessment to be able to exert countervailing buying power through a threat either to purchase the service from an alternative source or to self-supply.
- 5.16 Vodafone, Orange, T-Mobile and H3G, however, each disagreed with Ofcom's analysis, in particular with Ofcom's analysis of the relevance of dispute resolution.
- 5.17 Vodafone disagreed with Ofcom's interpretation of the CAT's H3G Judgment, that it would be "illogical" to consider the impact of dispute resolution on the party whose SMP is being assessed. In Vodafone's view, Ofcom should take into account all existing regulation which is not reliant on a finding of SMP. Vodafone was also unconvinced by Ofcom's argument that in the exercise of its dispute resolution powers it could not (or would not choose to) set charges at a level which would properly constrain SMP. More broadly, Vodafone also noted that given the continued existence of regulation over many years of MCT charges there is some uncertainty about the impact of the legal and regulatory process on the setting of commercial charges. Vodafone considers that, with this in mind, it is too early to assess exactly how CBP might be exercised by operators absent SMP regulation.
- 5.18 H3G too questioned Ofcom's interpretation of the CAT's H3G Judgment with respect to whether dispute resolution should be taken into account when assessing SMP, and argued that it is clear from the judgment that Ofcom's dispute resolution powers must be taken into account when assessing BT's CBP. In H3G's view, the fact that BT can refer a pricing dispute to Ofcom in itself implies that BT constrains H3G's pricing independence. H3G also questioned Ofcom's view that in resolving a dispute, Ofcom's approach would vary according to whether an operator has SMP.
- 5.19 In H3G's view, there is no legal justification for adopting such a distinction in this context. Under Article 20 of the Framework Directive, Ofcom is required to resolve disputes in accordance with Article 8 of the same. H3G stated that no reference is made in Article 20 to a distinction between the method for resolving disputes where one party has SMP versus disputes where neither party has SMP. Indeed, H3G further stated that Article 8(2)(a) expressly refers to the need to ensure that there is no distortion or restriction of competition in the electronic communications sector. H3G also refers to Article 4(1) of the Access Directive, which it states makes no distinction between different types of operators, and recitals 5,⁴⁴ and 6,⁴⁵ of the same to support its arguments.
- 5.20 Further, H3G disagreed with Ofcom's view, that in resolving a dispute about end-to-end connectivity where neither party has SMP its main objective would be to ensure end to end connectivity (and, therefore, the outcomes generated may be different from a dispute where one or both parties have SMP). H3G further observed that it is

⁴⁴ H3G states that Recital (5) provides that, "undertakings which receive requests for... interconnection should in principle conclude such agreements on a commercial basis, and negotiate in good faith".

⁴⁵ H3G states that Recital (6) does not refer to SMP, only to differences in bargaining power, before going on to state, "National regulatory authorities shall have the power to secure, where commercial negotiation fails, adequate access and interconnection... of services in the interest of end-users."

difficult to see how the resultant charge in these circumstances can be 'excessive', and that in practice, Ofcom would necessarily take account of the results of its cost model. In H3G's view, were Ofcom to set an 'excessive' charge, it would be in breach of its duties to promote competition and efficiency.

- 5.21 H3G also questioned Ofcom's view of the degree of constraint which CBP would have to afford before it could be considered sufficient to counter SMP. H3G noted that, under competition law, dominance is considered to be the ability to sustain prices that "substantially" exceed costs, and the mere ability to exceed the competitive level is not a sufficient test. In H3G's view, the ability to constrain the exercise of SMP to prevent pricing above a LRIC-based competitive level is not the appropriate test.
- 5.22 More broadly, H3G also argued that Ofcom had erred by setting out the prima facie evidence of SMP before subsequently considering whether any purchaser is able to exercise sufficient CBP to counter that SMP. In H3G's view, this approach presents a risk that Ofcom would fail to give adequate consideration to the countervailing factors.
- 5.23 T-Mobile observed that while Ofcom had argued that its dispute resolution powers may not lead it to set charges at the same level as those that would follow a finding of SMP, Ofcom did not argue that in resolving a dispute it would set charges at monopoly levels. In T-Mobile's view, Ofcom's welfare analysis appeared to assume implicitly that charges would be set at the monopoly level. T-Mobile also noted the arguments of the Director General of Telecommunications in the 2003 High Court case⁴⁶ in which charge controls of a similar form to those proposed were ultimately put forward under interconnection powers rather than under an SMP finding.
- 5.24 In Orange's view, Ofcom had been overly dismissive of relying upon dispute resolution and had relied on an overextension of the CAT's view about the definition of SMP.

Ofcom's response to specific points raised by stakeholders

- 5.25 Ofcom has first set out a short summary of its views on the responses made to the September 2006 Consultation in respect of CBP. A more detailed account of Ofcom's conclusions and reasoning is to be found in the remainder of this Section.
- 5.26 Ofcom notes the European Commission's statement that Ofcom's assessment of SMP, including as to the existence of CBP, is in accordance with the methodology set out in the Recommendation on relevant markets and in the Commission's Guidelines on market analysis and the assessment of significant market power. Ofcom also notes that BT and C&W agree with Ofcom's conclusions as regards CBP; and that O2 agrees with Ofcom's analysis of CBP, given Ofcom's market definition.
- 5.27 As regards the comments received from the MNOs on the relevance of regulation when analysing CBP, Ofcom sets out its approach in detail at paragraphs 5.76 to 5.104 below.
- 5.28 In response to Vodafone, H3G and T-Mobile's comments as to how Ofcom would resolve a dispute between an MNO and a purchaser of MCT, Ofcom explains at

⁴⁶ R (on the application of T-Mobile (UK) Ltd and others v Competition Commission and others, 27th June 2003

paragraphs 5.154 to 5.167, if a charge appreciably above the competitive level were in dispute, Ofcom considers it unlikely that it would impose a charge in the context of such a dispute that was not appreciably above the competitive level.

- 5.29 In this way, the resolution of a dispute by Ofcom would not constrain the ability of terminating operators to behave to an appreciable extent independently of competitors, customers and ultimately consumers. Therefore, Ofcom disagrees with Vodafone's, H3G's and T-Mobile's view that, in resolving such a dispute, Ofcom would set charges at a level which would properly constrain SMP.
- 5.30 Further, Ofcom does not accept as suggested in H3G's responses that such an approach would be contrary to Ofcom's statutory duties under Article 8 of the Framework Directive, and the Act. For example, Ofcom notes that Article 8 (2) mentions as a subset that Ofcom shall ensure that users derive maximum benefit in terms of choice, price and quality. Therefore, the purpose of BT's obligation to meet reasonable requests to purchase MCT is to ensure end-to-end connectivity (and thus ensuring users can contact each other) and any dispute would be considered in that light.
- 5.31 Ofcom considers that the relevant test for SMP relates to an ability to sustain charges appreciably above the competitive level, as envisaged by Article 14 (2) of the Framework Directive (though Ofcom notes that H3G has used the term 'substantially' rather than 'appreciably'). Ofcom notes that this was set out in the consultation document.⁴⁷ In Ofcom's view, no purchaser of MCT is able to exercise sufficient CBP to prevent MNOs from sustaining charges appreciably above the competitive level.
- 5.32 Ofcom does not accept H3G's view that there is any error involved in considering the *prima facie* evidence of SMP before considering the existence of CBP. The fact that there is only one supplier of termination on each mobile network indicates that, on the basis of market shares alone, one would expect to find dominance in this market. Having noted this prominent factor, Ofcom has then fully considered all other relevant factors, including the possibility that some or all purchasers have CBP (see Section 4 and the rest of this Section 5).
- 5.33 Finally, in response to T-Mobile's point that charge controls of a similar form to those being proposed were ultimately put forward under interconnection powers, Ofcom notes that such charges were put in place under the previous Telecommunications Act 1984, as amended. Since then, new EU Communications Directives have come into force, and the Telecommunications Act 1984 has been replaced by the Act.

Background

BT's position as provider of transit services

- 5.34 MNOs are not able to identify in all cases, on a call by call basis, from which operator a call originates. This is because BT transits a significant amount of traffic to MNOs on behalf of a number of different originating operators. Cable & Wireless also transits a limited amount of traffic to MNOs. Ofcom estimates (based on confidential information from MNOs and FNOs collected during the consultation) that of all calls to mobiles, about 43% is transited by BT and Cable and Wireless on behalf of other originating operators (34% on behalf of other FNOs and 66% on behalf of MNOs originating calls to other MNOs). BT carries [x] and Cable & Wireless [x] of this transited traffic. The remaining 57% of calls to mobiles is directly conveyed to MNOs,

⁴⁷ See for example, paragraph 4.2, paragraphs 5.12 *et seq.*

29% by FNOs (of which BT accounts for [x%] and Cable & Wireless [x%]) and 28% by MNOs. Calls transited by BT (and Cable and Wireless) appear to a MNO as if they had been originated by BT (or Cable and Wireless) when in fact they may have originated from a wide variety of different operators. The figure below sets out the share of total MCT minutes purchased by BT and other purchasers, after transit arrangements have been taken into account. The figure therefore sets out the shares of the direct purchasers of MCT.

Figure 5.1 Share of total MCT minutes purchased by different operators

| Purchasing operator | Share of total MCT minutes purchased (including minutes purchased to offer transit and termination to others) |
|----------------------------|--|
| BT | [x%] |
| Cable & Wireless | [x%] |
| Other FNOs | [x%] |
| MNOs | [x%] |
| <i>Orange</i> | [x%] |
| <i>Vodafone</i> | [x%] |
| <i>T-Mobile</i> | [x%] |
| <i>O2</i> | [x%] |
| <i>H3G</i> | [x%] |

Source: Information from operators and Ofcom analysis

5.35 The Figure above shows that BT is the largest purchaser of MCT with other purchasers accounting for significantly lower shares. In offering transit services BT provides other originating operators with the options to either:

- directly interconnect with a terminating MNO and negotiate an interconnection charge directly, or
- indirectly interconnect, transiting its traffic via BT and effectively allowing BT to negotiate on its behalf alongside all other originating operators who transit traffic via BT.

5.36 This provides originating MNOs with a commercial trade-off, between the two options. The option that is best depends on

- the termination charge BT agrees with the terminating MNO and BT's charge for transit, compared to
- the termination charge the originating operator agrees with the terminating MNO and the costs associated with establishing direct interconnection.

5.37 The MCT charge to which BT agrees with each MNO (plus transit charge) therefore acts as a ceiling to the MCT charge that other originating operators would be willing

to accept from a terminating MNO. If an MNO sought to charge an originating operator a higher charge than the charge BT has secured with that MNO, the originating MNO would have the option to transit its traffic via BT rather than directly interconnect. In practice there is no compelling evidence of originating operators seeking to transit traffic via BT for this reason. However, this may be because MNOs have always charged the same MCT charge to all originating operators.

- 5.38 Moreover, the MCT charge that BT agrees with each MNO may also act as a floor on the MCT charge that the terminating MNO will agree to with other originating operators. If an originating operator sought to secure a lower MCT charge with an MNO than the one BT had secured with that MNO, the MNO can refuse direct interconnection and force the originating operator to transit traffic via BT. This ensures that the originating operator pays the same termination charge as BT. For this to be the case the originating operator must be unwilling to accept a situation in which it does not interconnect with the MNO. As discussed later in paragraphs 5.141 to 5.147 Ofcom considers that it is unlikely that an originating operator could credibly threaten not to interconnect and in practice there is no evidence that an originating operator has sought to use its bargaining power to secure a lower charge compared to that paid by BT.
- 5.39 These considerations are evidenced by the fact that, where termination charges are not regulated, MNOs do not charge each customer a different termination charge (as discussed in Section 3). Data received from each of the MNOs confirms that they charge the same for termination to all originating operators. [3<]
- 5.40 Therefore Ofcom considers that BT's charge (as a transit operator) conditions negotiations and effectively sets the charge for all other agreements between suppliers and purchasers of MCT. Even if this were not the case, the fact that BT is by far the largest purchaser of MCT means that if it were found not to have a level of CBP sufficient to negate SMP of the MNOs, it would follow that neither would any other purchaser of MCT.
- 5.41 While Ofcom has therefore considered primarily whether BT has CBP sufficient to negate the SMP of the MNOs, Ofcom has also considered below the position of other purchasers of MCT.

Review of evidence - Contracts for MCT

- 5.42 Contracts for interconnection between BT and each of the 2G/3G MNOs, and between each of the 2G/3G MNOs, were first agreed between eight and ten years ago. Although amendments to terms and conditions have subsequently been agreed from time to time (as noted below), the basic form of the contracts is substantially unchanged. In 2001 Vodafone instigated perhaps the most fundamental changes to its contracts with parties other than BT, when it initiated a lengthy process to replace its bilateral contracts (which had provided for both purchase and supply of termination services by Vodafone) with a series of mostly paired contracts each separately providing for purchase or supply by Vodafone (but not both). BT's Standard Interconnection Agreement ("SIA"), the terms of which apply to a very wide range of different interconnection services purchased and supplied by BT, has also been subject to change over the years, perhaps most significantly in 1998 when changes were made to reflect Oftel's decision that BT's charges would no longer be determined annually by Oftel but, instead, regulated via a series of charge control baskets. By contrast, contracts between H3G and BT and each of the 2G/3G MNOs were agreed as recently as 2002. Although contracts exist between H3G and all 2G/3G MNOs, mobile voice call termination is supplied by H3G only to [3<].

- 5.43 When the contracts which apply to mobile voice call termination were first agreed variously between BT and the 2G/3G MNOs and between the 2G/3G MNOs, the relevant circumstances were very different to those of today. The regulatory frameworks applicable to BT and to the 2G/3G MNOs were not the same, in that the MNOs' charges for voice call termination were not generally controlled (with the exception of charges payable by Mercury Communications) whereas BT's interconnection charges were subject to regulation. Similarly, penetration and usage of mobile telephony (and direct interconnection between MNOs) was far less extensive than today, and (with the exception of Vodafone) the corporate ownership and structure of the 2G/3G MNOs was very different from today. In Ofcom's view, an analysis of the process by which these interconnection agreements were first negotiated up to 10 years ago would serve little purpose (even if the parties were able to retrieve archived correspondence sufficient to take an accurate view; [§<]).
- 5.44 In respect of BT's interconnect agreement with H3G, Ofcom has undertaken a detailed review of available evidence in respect of negotiations between H3G and BT prior to the establishment of the interconnection agreement in January 2002 in order to identify factors which remain relevant in undertaking the assessment of the extent to which BT can exert CBP in the relevant period. From the evidence it is clear that the balance of the relationship between BT and H3G has evolved over time, for example as H3G has grown and become more established. Ofcom makes its assessment in relation to the relationship as it existed and is likely to continue during the period of this statement. Ofcom's consideration of the relationship between BT and H3G up to March 2007 is contained in the Reassessment of H3G's SMP also published today.
- 5.45 Ofcom has also reviewed the terms of the present interconnect agreements between BT and each of the MNOs, as well as the contracts between the MNOs, and has considered the circumstances in which recent charge changes have been agreed. Ofcom recognises that, as Orange noted in its response to the March 2006 Consultation, where contracts for the supply of MCT are already in place, these may impose some constraints on the ability of either of the parties unilaterally to alter charges.
- 5.46 In Ofcom's view, the form of BT's SIA (which applies to mobile voice call termination purchased by BT and almost all other interconnection supplied or purchased by BT) is still influenced strongly by regulation, reflecting the extensive regulatory constraints on BT's ability to agree bespoke terms and conditions and BT's obligation to comply with charge controls and regulatory directions and determinations. Importantly, the SIA is also set against the background of the ability of interconnected parties (BT and third parties) to take disputes to Ofcom for resolution. While the SIA may appear to provide greater freedom for BT to alter unilaterally its charges for interconnection, and for BT to propose changes to termination charges of the MNOs, while failing to provide contractual provision for MNOs to propose changes to BT's interconnection charges, Ofcom does not believe this is a reflection of CBP held by BT. Rather, it is a reflection of regulatory constraints which prevent BT from negotiating bespoke charges, and other terms and conditions in respect of many services. It should also be noted that paragraph 4.14 of the Guidelines published by Oftel in 1997 (*Guidelines on the operation of the Network Charge controls*⁴⁸), when Oftel altered the regulatory provisions for setting BT's charges for providing interconnection, stated that, subject to specified changes (which were subsequently incorporated within an amended SIA), terms and conditions reflecting those "in BT's Standard Agreement for

⁴⁸ See http://www.ofcom.org.uk/static/archive/oftel/publications/1995_98/pricing/ncc1097.htm

interconnection in effect on 30 September 1997 will generally be reasonable". These conditions remain, substantially unchanged in the BT SIA currently in force today.

- 5.47 The terms of the interconnection agreements between MNOs for the provision of MCT are either reciprocal within each contract (the same terms applying to both parties in their capacities of either purchaser or supplier) or, in the case of current contracts to which Vodafone is party, are mirrored in a pair of contracts providing for the same, or very similar, terms to apply where Vodafone is the purchaser or the provider.
- 5.48 The terms relating to charge changes vary between the contracts, although, as noted above, they are symmetrical between the parties to the contract, or pair of contracts. However, as already discussed Ofcom recognises that, all contractual arrangements must be viewed against this regulatory backdrop which provides a unifying factor.
- 5.49 Ofcom has reviewed the process by which Vodafone implemented fundamental changes to its contracts with parties other than BT during the period 2001 to 2003. While the exercise appears to have been initiated on a unilateral basis by Vodafone, negotiation of the revised contract terms appears to have been conducted with a high degree of interaction between the parties and with a sense that it would be mutually beneficial to agree pragmatic and efficient contractual arrangements for managing the relationship. Furthermore, the fact that, where the parties both purchase interconnection services from each other, the texts of each of the two new contracts almost precisely mirror each other, tends to support the view that the outcome was achieved through genuine negotiation between parties.
- 5.50 As noted in paragraph 5.46 above, the terms and conditions applicable to the supply of MCT by H3G to BT are those of BT's SIA and, given the regulatory constraints under which BT operates, reveal little about the bargaining position of the parties. The contracts between H3G and the other MNOs are broadly similar to those agreed by those other MNOs with other purchasers of MCT.

Review of evidence - Negotiation of charge changes

- 5.51 As charges for the supply of MCT on the 2G networks of the 2G/3G MNOs have been regulated (or under the threat of regulation) since 1998/9, changes by these MNOs during that time have all been made within the regulatory framework, reflecting either a change to the charge control imposed by Ofcom or changes to traffic profiles which have triggered changes to charges by time of day/week (within the scope of the charge control). The documentary evidence obtained from MNOs by Ofcom, indicates that, until very recently, these changes have been infrequent and uncontested (being within the established regulatory framework). [§].
- 5.52 The existence of charge controls has, therefore, meant that, until recently, no attempt has been made to exercise any CBP in respect of purchases of MCT from the 2G/3G MNOs by any third parties.
- 5.53 As Ofcom has noted at paragraph 4.45 above, in the assessment of SMP, the underlying 3G charges proposed by the 2G/3G MNOs are substantially greater than Ofcom's estimate of cost (in some cases more than double). The underlying charges of three of the 2G/3G MNO are also substantially greater than H3G's charges. Furthermore, [§].
- 5.54 The process of blending unregulated implicit charges for 3G MCT with regulated charges for 2G MCT was first adopted by Vodafone in 2005 but, in view of the very

low volumes of voice call minutes forecast to be terminated on Vodafone's 3G network (and assumed by the blending), blending does not seem to have been apparent to purchasers until the early part of 2006. Vodafone's charge changes implemented on 1 June 2005, therefore, passed uncontested, as they were assumed by purchasers to be fully constrained by charge controls. When the basis of Vodafone's charges became more fully apparent during January 2006, purchasers expressed serious concern to Ofcom and it was questioned whether the charges applied were in breach of the charge control condition. In January 2006 Ofcom said that Vodafone (and any other MNOs which chose to blend distinct charges for 2G and 3G termination) should ensure that the basis of such charges was made apparent to purchasers.

- 5.55 Five months later, in July 2006, O2, Orange and T-Mobile each, within a space of 3 days, separately notified Ofcom that they intended to blend distinct charges for 2G and 3G MCT, thereby increasing their blended charges. A week earlier Vodafone had notified Ofcom of a proposal to reduce its blended charges from 1 September 2006. Having subsequently obtained documents from BT and the 2G/3G MNOs, it became apparent that the following sequence of events had occurred;

Orange's MCT charges

5.56 [redacted]

5.57 [redacted]

Vodafone's MCT charges

5.58 [redacted].

5.59 [redacted].

O2's MCT charges

5.60 [redacted]

T-Mobile's MCT charges

5.61 [redacted].

5.62 [redacted].

5.63 [redacted].

H3G's MCT charges

5.64 [redacted]

Ofcom's observations on the conduct of negotiations

- 5.65 Ofcom recognises, as do BT and the MNOs concerned, that these attempts to increase (and decrease) charges, and the response of purchasers to the proposals, may be considered significant in the context of an assessment of whether suppliers have SMP and whether any purchasers have CBP. However, in Ofcom's view, the timing of the recent proposals to vary MCT charges, means that it is very difficult to determine to what extent the behaviour of the parties (suppliers and purchasers) has

been affected by awareness of the significance which might be read into such behaviour.

- 5.66 Having reviewed the documentation obtained by Ofcom from BT and the five MNOs, it is Ofcom's view that negotiation in respect of charges for MCT is focussed largely on the regulatory constraints under which each party operates [§]. Purchasers and suppliers of MCT appear to be strongly aware of their own obligations and the obligations of the other party, whether as a consequence of ex ante regulation or competition law, not to unduly discriminate when negotiating supply or purchase of MCT. As a consequence, much of the recent negotiation appears to have been concerned with establishing whether the other party (purchaser or supplier) was treating other parties differently; suppliers being concerned with whether purchasers (typically BT) had accepted charge changes from other suppliers, and purchasers being concerned to establish whether the proposed charge changes had been proposed to and accepted by all other purchasers. Suppliers frequently attempted to justify the revised level of their blended charges by drawing comparisons with the charges of other UK MNOs.
- 5.67 The parties generally appear to have been unfamiliar, at least at the outset of negotiations, with the operation of the commercial contracts for supply of MCT and frequently unsure how an attempt to impose or resist a charge change would be played out under the terms of those contracts. In some instances, this unfamiliarity (more obvious amongst some parties than others) has been exploited as one of the very few means to establish a degree of advantage, albeit short-lived, over the other party.
- 5.68 One of the more common means to obstruct the imposition of charge changes appears to have been by exploiting administrative failures by the other party, typically, failure to meet the letter of the minimum notice periods set out in the relevant contract, or failure to deliver proposals using the mechanism required by the contract (e.g. fax. email or post). Added complexity is sometimes achieved by playing out such strategies in the light of the other party's anxiety about claims that they are acting in an unduly discriminatory fashion. In such cases, the supplier's attempts to comply with contractual notice periods (which vary between purchasers) while simultaneously attempting to impose uniform charges on all purchasers, can have the effect of bringing progress to a halt.
- 5.69 These, essentially bureaucratic, strategies can hinder the imposition of charge changes but, ultimately, appear to be viewed by all parties as no more than short term delaying tactics.
- 5.70 Further complexity has been generated by BT's practice of offering transit services including mobile termination (see paragraph 5.34 above) and also by arrangements for billing in respect of termination on numbers ported in from other another MNO. In the case of BT's transit business, it appears that BT and the MNOs have been aware that where BT refuses initially to accept MCT charge increases but is subsequently forced (whether by contract or regulation) to accept these charges with retrospective effect, BT may be unable to recover the charge differential from transit customers (in addition to being unable to pass on increases to its own retail customers). [§] appears to have attempted to use this exposure to apply pressure to BT to accept blended charges rather than face the wider commercial risk. In respect of MNP billing arrangements, several MNOs appear to have calculated their invoices for termination on ported in numbers (invoices levied between the donor and recipient of the ported number as a consequence of present porting arrangements) on the basis of the donor network's increased blended charges, which they had refused to pay when

seeking termination of calls to the customers of that other MNO. In some instances the donor network has attempted to cite such behaviour as implied acceptance of the blended charges.

- 5.71 Internal discussion, within suppliers and purchasers, intended to identify sources of commercial leverage, appears largely confined to consideration of whether outright refusal to accept charge changes, or unilateral insistence on such changes, might be successful. With the exception of [X], Ofcom has found no material evidence that any of the parties believe they have any tools with which to bargain for a commercially acceptable intermediate outcome, as might be expected in a competitive market. Recognition of the absence of conventional bargaining tools appears to prompt early consideration of regulatory and legal factors, including whether the behaviour of one or other party would be considered as evidence of CBP or would be viewed by Ofcom as being in breach of prohibitions of undue discrimination.
- 5.72 Familiarity, or lack of familiarity, with the regulatory regime on the part of those involved in discussion of negotiating options, often seems to be a key determinant of the views of the different managers involved in these internal discussions. For example, a proposal by one purchaser [X] that the MCT charges of [X] should be reduced was viewed by one member of the supplier's team as unacceptable because the proposal was "purely for commercial reasons" and the purchaser had "put forward no substantive legal or regulatory reasons for proposing a reduction". Another manager employed by the same MNO took the different view, in the context of a proposed increase in MCT charges by another MNO, that "...we have no obligation to enter into this discussion .. the fact that our rate is [X] than [X]'s is not an issue if the service is not regulated." A manager with another supplier of MCT [] asked whether the purchaser has "got grounds to reject our blended rates or can we simply advise [him] of the rate change". A senior manager of yet another supplier of MCT asked his team, about a purchaser which had indicated unwillingness to accept a charge change, "does [X] actually have a choice?", to which the relevant operational manager responded "I cannot be 100% clear on that yet". It is interesting to note that, 2 weeks later, the focus of that particular supplier was strongly directed towards an assessment of the possible regulatory outcomes of different strategies, including the impact on Ofcom's assessment of the purchaser's CBP. In summary, while different managers appear to have recommended different strategies when attempting to impose or reject charge changes, none appears to have taken the view that a negotiated settlement could be achieved.
- 5.73 Ultimately, when the wider legal and regulatory resources of the company have been brought to bear on the issue, BT and the five MNOs each appear to have concluded that the outcome will be strongly influenced by regulation. Furthermore, none of the parties appear to have a clear view of whether other parties would take a dispute to Ofcom or, if they did, what would be the outcome. As one party put it [X] "it is a moot point whether we would refer this to Ofcom, but [X] needs to believe we will". Another party [X] appears to have taken the view that there might be merit in referring a complaint to Ofcom, not in order to see a dispute resolved but, rather, to ensure that "Ofcom ropes in 3G from 1 April 2007". A senior manager with the same party, when faced with intransigence by another party, asked his team "what are the implications for Ofcom's term rate review (and responses to H3G's SMP challenge/CAT verdict) of this development". A regulatory manager with [X] speculated that it might be advantageous to [X]
- 5.74 As mentioned below at paragraph 5.151, Ofcom is currently considering a number of disputes in relation to MCT charges.

Review of evidence - bargaining in the absence of regulation (or the threat of regulation)

5.75 As noted above, any analysis of the existence of SMP in a given market must be undertaken within a framework which assumes, for the purpose of the assessment that the market is not subject to regulation or the threat of regulation arising from a finding of SMP in the market. Ofcom considers that the behaviour of purchasers and suppliers of MCT, in respect of the recent proposals to increase or decrease MCT charges has been strongly conditioned by the existence or threat of regulation in these markets, and by the expectation that these markets may be subject to further regulation from April 2007. Ofcom's March 2006 Consultation set out the prima facie evidence of SMP and expressed a preference for using a technology neutral form of charge control which would apply to both 2G and 3G MCT. Similarly, BT's agreement (and the agreement of other purchasers) to Vodafone's proposal to increase charges in June 2005 seems to have been influenced by a belief that the charge was fully constrained by regulation. As such, Ofcom does not believe that the behaviour of BT or the MNOs mirrors the behaviour likely to be observed absent regulation or the threat of regulation.

Regulation of the party being assessed for SMP

5.76 As Ofcom set out in the September 2006 Consultation, in assessing whether a given provider has SMP, it is necessary to conduct the analysis on the basis that no SMP related regulation currently exists on that provider in the market being reviewed. However, regulation which will continue to exist throughout the period of the forward-looking assessment independently of an SMP finding on the market concerned, must be taken into account.

5.77 This approach is consistent with the analysis adopted by the European Commission in its decision requiring the German regulator, RegTP, to withdraw notified draft measures in respect of fixed call termination. The Commission accepted the appropriateness of discounting regulatory constraints upon the market power of the party being assessed for SMP, a mode of analysis described as "the Modified Greenfield Approach":

"The purpose of a Greenfield approach is indeed to avoid circularity in the market analysis by avoiding that, when as a result of existing regulation a market is found to be effectively competitive, which could result in withdrawing that regulation, the market may return to a situation where there is no longer effective competition. In other words, any Greenfield approach must ensure that absence of SMP is only found and regulation only rolled back where markets have become sustainably competitive, and not where the absence of SMP is precisely the result of the regulation in place. This implies that *regulation which will continue to exist throughout the period of the forward-looking assessment independently of a SMP finding on the market concerned, must be taken into account.*" (Emphasis added)

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5.78 The CAT adopted the same approach in its judgment in the H3G case and explained the above passage in the following terms:

⁴⁹ Commission Decision of 17 May 2005, Case DE/2005/0144, C(2005) 1442 final Paragraph 23.

“In other words, a potentially regulated person cannot claim that it does not have SMP because regulation has procured a situation in which it no longer has it. So long as it is regulation which is bringing about competitive outcomes, the markets are not competitive independently of that regulation. It follows that the potentially regulated person cannot say that it does not have SMP because the threat of regulation means that it does not have the necessary power. That would be circular and illogical.”⁵⁰

5.79 The CAT went on to state that:

“The effect of this is that the possibility of regulation being brought to bear on H3G is a factor that cannot be prayed in aid by H3G as militating against its having SMP. We reiterate that H3G’s submissions would give rise to an illogical and unattractive, if not an unprincipled, position, and we consider them to be wrong. The correct position is as found in the RegTP decision, namely that regulatory obligations on a market counterparty can be taken into account, but not the potential for regulation on the party whose market position is under consideration.”⁵¹

5.80 When dealing with Ofcom’s power to resolve disputes as to the terms and conditions of MCT under the interconnection agreement between BT and H3G, the CAT also stated that:

“[Ofcom’s] intervention would... be as regulator, and would be a form of regulation. It therefore falls to be disregarded, as a matter of principle, just as Ofcom’s general presence as a regulator with a potential effect on the conduct of the putatively regulated person falls to be disregarded for the reasons given above.”⁵²

Regulation of the party being assessed for CBP

5.81 The issue of which regulation Ofcom should take into account also arises in determining whether any undertaking has CBP and the same principles apply i.e. pre-existing SMP regulation in the market being reviewed should be disregarded and regulation which will continue to exist throughout the period of the forward-looking assessment independently of a SMP finding on the market concerned should be considered. Given this, Ofcom has identified the following regulatory factors which are relevant to an assessment of CBP:

- control of fixed termination rates and other services;
- carrier pre-selection and indirect access obligations;
- General Condition 1.1; and
- BT’s end-to-end connectivity obligation and Ofcom’s dispute resolution powers in relation to this obligation (pursuant to section 185(2) of the Communications Act 2003).

⁵⁰ H3G Judgement paragraph 98

⁵¹ H3G Judgement paragraph 99

⁵² H3G Judgement paragraph 138

Controls on supply of fixed termination services and other services by the purchasers of MCT

- 5.82 Telephone networks generally negotiate termination charges with each other on a bilateral basis. This is because customers on one network would look unfavourably on a situation where they were either not able to make calls to customers on another network, or were able to make calls to customers on another network but were unable to receive calls from them. However, when considering the impact such reciprocity may have on CBP in this market, it is important to note that the termination charges of BT and other FNOs are constrained by regulation.
- 5.83 Absent regulation, the extent of BT's buyer power, and the buyer power of other FNOs, when purchasing MCT will be influenced by the extent to which it can take into account the prices it charges for its own services as part of the negotiations. For example, BT, with a market share of around three-quarters of fixed network exchange lines⁵³, might potentially be able to exert significant bargaining power in respect of an MNO's price for MCT by varying, or threatening to vary, its charge for fixed network termination in response to proposals for mobile termination charges. However, BT's termination rate is determined by regulation⁵⁴. As a consequence, the price BT charges an MNO for termination on BT's network cannot influence the negotiations of the price the MNO charges BT for MCT on its network. It cannot therefore be considered to be a source of BT's bargaining strength.
- 5.84 Similarly, where BT sells other services, for instance certain high bandwidth retail leased lines, to an MNO, it might be able to adjust the terms on which it sells those services in the course of negotiation of the mobile call termination rate with the MNO. However, where BT has SMP (such as for example in the markets for certain forms of Traditional Interface Symmetric Broadband Origination) it is constrained at a minimum by regulation from unduly discriminating.
- 5.85 FNOs other than BT are required by regulation to offer termination on their networks on fair and reasonable terms, which Ofcom has defined by reference to BT's charges.⁵⁵ As a consequence, the price they charge an MNO for termination on their network cannot influence the negotiations of the price the MNO charges them for MCT on their networks and cannot therefore be considered to be a source of bargaining strength for FNOs.
- 5.86 Such controls imposed on both BT and other FNOs constrain the exercise of SMP in fixed network call termination markets, both by preventing the providers from setting excessive charges in those markets and by preventing them from leveraging that power into other markets (for example through reciprocal bargaining). The effect on BT's CBP in the market for MCT is considered in paragraphs 5.122 to 5.135 below.
- 5.87 The appropriateness of taking account of such regulation on purchasers of MCT when determining the extent, if any, of their CBP is confirmed by the Commission's decision in the RegTP case, cited above at paragraph 36:

"It is generally considered that countervailing buyer power of a large operator is essentially lost if its call termination rates are additionally

⁵³ Source: Ofcom Telecommunications Market Data Tables Q1 2006.
<http://www.ofcom.org.uk/research/cm/sep06/tablesep06.pdf>

⁵⁴ See <http://www.ofcom.org.uk/consult/condocs/charge/statement/>

⁵⁵ See further the fixed geographic call termination market review statement -
http://www.ofcom.org.uk/consult/condocs/narrowband_mkt_rvw/Eureviewfinala1.pdf

regulated in the separate market for call termination on that operator's individual public telephone network. DTAG's call termination rates are currently regulated and it is the Commission's understanding that they will continue to be regulated as a consequence of RegTP's finding that DTAG has SMP on the market for call termination on its network. In view of DTAG's own termination rates being regulated and given that it cannot realistically threaten to stop purchasing termination services (as set out above), DTAG would therefore be deprived of any bargaining tool in the form of a corresponding increase in its own tariffs when negotiating termination rates on that ANO's network."

Carrier Pre Selection and Indirect Access

- 5.88 BT is obliged by existing regulation to provide CPS and IA services to other Electronic Communications Providers who wish to offer retail call services to consumers. The purpose is to stimulate competition in the calls market and enhance competition in areas with limited direct access competition.
- 5.89 CPS is a mechanism that allows users to select, in advance, alternative communications providers to carry their calls without having to dial a prefix. The customer subscribes to the services of one or more CPS operators ("CPSOs") and chooses the type of calls (e.g. all national calls) to be routed through the network of the alternative operator. A customer can over-ride the CPS service at any time by dialling a prefix before the number they wish to dial, as long as they have an agreement with the operator to whom the prefix code belongs.
- 5.90 IA is a mechanism that allows users to select alternative communications providers to their access line provider on a call-by-call basis by dialling a short pre-fix before each number they wish to dial.
- 5.91 While the purpose of these conditions is to promote competition in a range of markets downstream from wholesale call origination, they also have a specific impact on the retail market for calls to mobiles. The ability of consumers to switch to alternative CPS or IA based providers of such calls may weaken BT's ability to threaten to cease purchasing wholesale MCT. The effect on BT's CBP in the market for MCT is considered in paragraph 5.144 below.
- 5.92 The appropriateness of taking account of such regulation is confirmed by the Commission's decision requiring the withdrawal of draft measures notified by RegTP, cited above. At paragraph 28, the Commission notes as a relevant factor when assessing the CBP of DTAG that:

"... if DTAG were to cease to purchase termination from ANOs, this may have the effect of stimulating substitution via carrier selection. There are several long distance carrier (pre-) select operators on the German retail calls markets which are eager to capture market share. In the presence of such carrier (pre-) select operators, a refusal by DTAG to offer its customers certain retail calls services – namely calls to the subscribers of ANOs which DTAG no longer wants to purchase termination services from – could lead DTAG's retail customers to switch to these carrier (pre-) select operators for making such calls. DTAG's retail customers could thus use such carrier (pre-) selection operators to by-pass calls – whose ubiquitous coverage is no longer guaranteed by DTAG – provided of course

that those operators are directly or indirectly interconnected with the ANO in question. In such a case, DTAG would lose market share in a core area of its business.”

General Condition 1.1

5.93 Ofcom has also considered whether General Condition 1.1 should be viewed as relevant existing regulation. However, as this is a condition which imposes an obligation on providers of Public Electronic Communications Networks to *negotiate* interconnection rather than to interconnect, it is Ofcom’s view that it would not have material impact on the level of CBP held by purchasers of MCT.

End to end connectivity

5.94 End-to-end connectivity describes the ability of consumers to make calls to other customers or services on the same network or other providers’ networks. This is a key feature that customers expect; they want to be able to call everyone with a telephone and not just a subset of that group.

5.95 With the objective of ensuring end-to-end connectivity, Ofcom has imposed on BT an access related condition⁵⁶ which requires BT:

- To purchase wholesale narrowband (fixed and mobile voice and narrowband data) call termination services from any provider of public electronic communications networks (‘PECN’) that reasonably requests in writing that BT purchases such services;
- To ensure that the purchase of the wholesale narrowband (fixed and mobile voice and narrowband data) call termination services shall occur as soon as reasonably practicable and shall be on reasonable terms and conditions (including charges), and on such terms and conditions (including charges) as Ofcom may from time to time direct;
- To ensure that after purchasing wholesale narrowband (fixed and mobile voice and narrowband data) call termination services, BT will not be able to unreasonably change, withdraw or restrict access to an applicable Normal Telephone Number; and
- To comply with any direction Ofcom may make from time to time under this Condition.

5.96 When Ofcom imposed this condition on BT, Ofcom noted that it did not consider that it was proportionate to impose a similar obligation on other providers of Public Electronic Communications Services. However, Ofcom considered that all providers should provide end-to-end connectivity and therefore if Ofcom became aware that this was not being provided Ofcom would consider whether such an obligation were appropriate and proportionate in that case.⁵⁷

5.97 If the obligation on BT was to provide end-to-end connectivity whatever the terms proposed by MNO’s, it would eliminate any CBP on BT’s part. However, the obligation on BT is to purchase MCT on reasonable terms and conditions. If BT and

⁵⁶ See Ofcom Statement “End-to-end connectivity” published on 13 September 2006.

http://www.ofcom.org.uk/consult/condocs/end_to_end/statement

⁵⁷ See paragraph 3.25 “End-to-end connectivity” Statement 13 September 2006.

an MNO are unable to agree the terms and conditions on which MCT is to be provided, either party may refer the matter to Ofcom to resolve under the statutory dispute resolution powers (s185 (2) of the Act).

5.98 The position was set out by the CAT in the H3G judgment:

“[End-to-end connectivity] is an obligation with some room for manoeuvre on negotiation, because the terms are to be reasonable and ultimately any dispute will be settled by someone else (the regulator). It is an obligation in those terms which has to be considered in the context of an assessment of CBP. To look just at the obligation is not to consider the true facts of the case.”

5.99 Now we turn to assess CBP by reference to all the relevant factors.

Assessment of CBP

Introduction

5.100 The CAT in its H3G Judgment notes that CBP is not a binary issue:

“...CBP is the power of counterparties to offset the powers of the party whose allegedly superior powers are under consideration, and the important question is what degree of CBP is there, and (bearing in mind all the circumstances) does it operate to a sufficient extent so as to mean that there is no SMP? CBP is not an absolute concept in terms of its strength. It is a concept which embodies a possible range of strengths. In any case where it is relevant, the relevant question is likely to be not whether there is CBP or not, but whether there is any CBP, and if so how much and what effect does it have.”⁵⁸

5.101 The OFT has set out relevant guidance,⁵⁹ which states that the strength of buyers and the structure of the buyers’ side of the market may constrain the market power of a seller. The OFT Guidance notes that the relevant consideration in assessing the impact of buyer power on the ability of the seller to set a price is whether a buyer would have choice, or, in other words, the benefit of an ‘outside option’.

5.102 The OFT Guidance notes that the analysis of buyer power requires an understanding of the way that buyers interact with suppliers. Buyer power can be thought of as the degree of bargaining strength in negotiations. Analysis of buyer power normally becomes relevant only where there are a few relatively important buyers in terms of share of supply as opposed to a large number of buyers who are price takers. The OFT sets out a number of conditions which might imply that an undertaking’s bargaining power could be enhanced:

“the buyer is well informed about alternative sources of supply and could readily, and at little cost to itself, switch substantial purchases from one supplier to another while continuing to meet its needs;

⁵⁸ Paragraph 110c of the judgment.

⁵⁹ Assessment of market power, understanding competition law, OFT, 2004.

(See <http://www.of.gov.uk/NR/ronlyres/A92F91BC-B556-4724-8D2B-7002F6CDEA65/0/oft415.pdf>)

the buyer could commence production of the item itself or 'sponsor' new entry by another supplier (e.g. through a long-term contract) relatively quickly and without incurring substantial sunk costs;

the buyer is an important outlet for the seller (i.e. the seller would be willing to cede better terms to the buyer in order to retain the opportunity to sell to that buyer);

the buyer can intensify competition among suppliers through establishing a procurement auction or purchasing through a competitive tender (see Part 4)..."⁶⁰

5.103 A further criterion is considered by the ERG, namely factors determining whether the buyer is price sensitive.⁶¹

"The higher the portion of the costs for a service in relation to their total expenditure and the better informed, the more sensitive consumers are as to the price and quality of the service and the more ready they might be to switch suppliers or to reduce demand."⁶²

5.104 Finally, in the context of wholesale mobile voice call termination, there is a further relevant factor, namely whether or not reciprocity exists in negotiations between parties. Telephone networks generally negotiate termination charges with each other on a bilateral basis. This is because customers on one network would look unfavourably on a situation where they were able to make calls to customers on another network, but were unable to receive calls from them.

5.105 This section continues with a discussion of the economic factors that are relevant to Ofcom's analysis of CBP, sets out a description of the different buyers of MCT and sets out Ofcom's assessment of purchasers' CBP based on the following criteria which incorporate the criteria set out by the OFT and the ERG as discussed in paragraphs 5.100 – 5.104 above:

- The purchaser as an important outlet for the seller;
- The purchaser as a well-informed and price sensitive buyer;
- Reciprocity of trade between the purchaser and seller; and
- Lack of alternative sources of supply - including inability to switch purchases to another supplier, inability to sponsor new entry or self supply, and inability to intensify competition through auctions and tenders (i.e. the importance of the seller to the purchaser); and,
- Option not to purchase and option to delay.

⁶⁰ Ibid. page 24

⁶¹ "Revised ERG Working paper on the SMP concept for the new regulatory framework", October 2004, (See http://www.erg.eu.int/doc/publications/public_hearing_concept_smp/erg0309rev1_smp_working_doc.pdf)

⁶² Ibid. paragraph 11

Assessment of purchasers' CBP

5.106 This section assesses for the period 1 April 2007 to 31 March 2011 the extent to which purchasers of MCT may exert sufficient CBP so that charges for MCT are constrained to the competitive level.

Assessment of purchasers' CBP - the purchaser as an important outlet for the seller

5.107 For the buyer to be able to affect the seller's terms of trade, the buyer must be an important outlet for the seller. In this context, the ERG suggests a number of factors which determine the scale of the countervailing power on the part of buyers:

“...The higher the amount of purchase of services by customers or the higher the proportion of the producer's total output that is bought by a certain customer, the stronger the countervailing power might be. ...

... Further to this, the higher a seller's locked-in investment in specific customers (asset specificity), the more willing he will be to negotiate. Overall, this criterion is more meaningful in wholesale markets, because providers purchasing network services from other providers are in general more visible and powerful than retail customers.”⁶³

5.108 Being an important customer may confer a degree of buyer power on the buyer, because the seller will be more willing to negotiate with a customer it cannot afford to lose.

5.109 The various direct purchasers of MCT are unlikely to be perceived as equally important by terminating MNOs, and different terminating MNOs may take a different view of the various purchasers of MCT on their network(s). For example, some terminating MNOs receive a larger proportion of inbound voice traffic directly from originating operators than do others (reflecting the varying reliance on direct interconnection as opposed to BT transit).

5.110 BT is an important customer for all terminating MNOs. BT continues to purchase more than half of all UK off-net termination on mobile networks. This is because BT buys termination for its own subscribers originating calls on its networks and also acts as a transit operator for other FNOs and MNOs. Furthermore, BT has always had a significantly larger subscriber base than any of the MNOs. BT has approximately 28m subscriber lines. In contrast, each of the 2G/3G MNOs has between 12 million and 18 million customers (those figures are believed to be somewhat inflated by churn management practices which, for a period of time, leave some non active customers on an MNO's subscriber records). H3G reports that its currently registered subscriber base is over 3.5 million [X].

5.111 As a consequence, it is necessary for all MNOs to maintain an interconnect agreement with BT. Current and prospective subscribers of each MNO would see relatively little value in a network which precluded making calls to and receiving calls

⁶³ See paragraph 11 “Revised ERG Working paper on the SMP concept for the new regulatory framework”, October 2004, (See http://www.erg.eu.int/doc/publications/public_hearing_concept_smp/erg0309rev1_smp_working_doc.pdf)

from BT's retail customers and customers of other providers which rely on BT to provide transit services to and from MNOs.

- 5.112 Whether any FNOs other than BT are perceived by terminating MNOs as important outlets for MCT is less obvious. Many originating FNOs rely entirely on transit services offered by BT (or, in some cases, by C&W), purchasing no MCT directly from any MNO. Some have direct interconnection with one or more MNOs, but all rely to some extent on transit services. No UK FNO other than BT purchases MCT directly from H3G [X].
- 5.113 As all originating FNOs have the option to purchase transit services from BT, terminating MNOs will be aware that, in the event of failure to reach agreement on terms for direct interconnection, the FNO is likely to purchase transit services instead, resulting in no loss of MCT revenue to the terminating MNO and no loss of incoming calls valued by the terminating MNO's own retail customers. On this basis it might be considered that none of the FNOs other than BT are perceived as important direct outlets (actual or potential). Furthermore, Ofcom has no evidence that any FNOs consider themselves sufficiently important outlets that they have attempted to obtain directly from MNOs terms which are better than those obtained by BT, for example by threatening to cease both direct purchases and purchases via BT's transit service if improved terms are not offered. Even where the extent of direct purchases of MCT increases, the availability of BT transit services is likely to continue to reduce the importance of other FNOs as purchasers of MCT.
- 5.114 As discussed above, to a large extent, the importance of originating MNOs as outlets for MCT is similarly affected by the availability of BT transit services, even though a much larger proportion of MNO originated voice calls are terminated via direct termination arrangements with terminating MNOs than is the case with FNOs other than BT. Each of the 2G/3G MNOs now sells MCT directly to each of the other 2G/3G MNOs. Other than to BT, H3G sells MCT [X]. Whether H3G has plans to use direct interconnection with a wider range of other fixed and mobile networks is not known. Nevertheless, the availability of BT transit is likely to continue to condition H3G's views of the importance of other MNOs as outlets for MCT, as it continues to condition the views of other terminating MNOs.
- As such, Ofcom considers that BT is an important outlet for all sellers. Given the availability of transit services, however, whether other purchasers are also important outlets is less clear. They are unlikely to be as important as BT.

Assessment of purchasers' CBP - The purchaser as a well-informed and price sensitive buyer

- 5.115 As discussed in paragraph 5.107, the better informed a purchaser is as to the price and quality of the service the more ready they might be to switch suppliers or to reduce demand.
- 5.116 Information, for example on the importance of the deal to the seller or the level and type of costs incurred by the seller in providing the service, may improve the buyer's bargaining position and allow it to better substantiate and defend its negotiating strategy vis-à-vis the seller.
- 5.117 However, knowledge and price sensitivity alone are insufficient to constrain prices: it is also necessary for the prospective buyer to have the ability to act on its knowledge or sensitivity.

- 5.118 A buyer's credibility in negotiations with a seller is enhanced where the buyer understands how important his custom is to the seller, and has some insight into the seller's operations and negotiating strategy. It may reasonably be assumed that all purchasers of MCT, being major commercial undertakings, are well informed and price sensitive buyers with extensive commercial expertise.
- 5.119 Wholesale termination charges (whether paid directly to the MNO or through BT as part of the cost of BT's transit services) make up a significant proportion of the cost base for originating operators in providing calls to mobiles. Therefore, to the extent that they impact on the retail price for these calls and therefore on the customers of originating operators, originating operators will be sensitive to wholesale termination charges.
- 5.120 Whilst, during the start-up phase of its business, H3G's charges for MCT represented only a very small proportion of any purchaser's total expenditure on MCT, this has changed as H3G's subscriber base has grown. As termination on H3G's network represents an increasing cost, purchasers are likely to become increasingly sensitive to the price it pays for that service. The evidence cited in paragraphs 4.30 to 4.34 of the Reassessment of H3G's SMP supports the view that BT, the largest purchaser of MCT, is sensitive to the level of H3G's charges, and this sensitivity is likely to continue to grow with the growth in H3G's customer base. Therefore, it can be assumed that all purchasers of MCT have an incentive to try and negotiate competitive prices with all five MNOs.
- 5.121 Moreover, originating operators face five terminating MNOs and therefore can make price comparisons across MNOs for what their customers would likely perceive to be the same service i.e. calling a mobile. It appears, therefore, that originating operators have the ability and incentive to compare the charge offered by one seller with that offered by another; to consider other wider repercussions an agreement with one supplier may have for similar agreements with others; and to recognise the implications of MCT charges for the retail prices faced by its subscribers for calls to mobile networks.
- As such, Ofcom considers that all purchasers of MCT are well informed and price sensitive buyers.

Assessment of purchasers' CBP- Reciprocity of trade between the purchaser and seller

- 5.122 As noted in paragraph 5.82 above, telephone networks generally negotiate termination charges with each other on a bilateral basis. This is because customers on one network would look unfavourably on a situation where they were able to make calls to customers on another network, but were unable to receive calls from them. However, when considering the impact such reciprocity may have on countervailing buyer power in this market, it is important to note that the termination charges of BT and other FNOs are constrained by regulation. This regulation exists independently of a finding of SMP on any of the MNOs supplying MCT and therefore, as discussed above, should be taken into account. However, it must also be assumed that mobile termination charges are unregulated since MNOs are subject to ex ante regulation on MCT that would not exist independently of an SMP finding in the market under review. Therefore analysis of reciprocity is different as between fixed and mobile operators and mobile operator to mobile operator.
- 5.123 The extent of BT's buyer power, and the buyer power of other FNOs, will be influenced by the extent to which those counterparties can take into account the

prices they charge for their own services as part of the negotiations. For example, absent regulation, BT, with a market share of around three quarters of fixed network subscribers, might potentially be able to exert significant bargaining power in respect of an MNO's price for MCT by varying, or threatening to vary, its charge for fixed network termination in response to proposals for mobile termination charges. However, BT's termination rate is constrained by regulation⁶⁴. As a consequence, the price BT charges an MNO for termination on BT's network cannot influence the negotiations of the price the MNO charges BT for MCT on its network. It cannot therefore be considered to be a source of BT's bargaining strength.

- 5.124 Where BT sells other services, for instance leased lines, to an MNO, it might be able to adjust the terms on which it sells those services in the course of negotiation of the mobile call termination rate with the MNO. However, where BT has SMP it is constrained, at a minimum⁶⁵, by regulation from unduly discriminating.
- 5.125 FNOs other than BT are required by regulation to offer termination on their networks on fair and reasonable terms, which Ofcom has defined by reference to BT's charges.⁶⁶ As a consequence, the price they charge an MNO for termination on their network cannot influence the negotiations of the price the MNO charges them for MCT on their networks and cannot therefore be considered to be a source of bargaining strength for FNOs.
- 5.126 By contrast, absent regulation, an originating MNO faced with a high price for termination provided by another (unregulated) MNO may threaten to charge a similarly high (unregulated) price for termination on its network to that MNO. However, whether or not this is a credible threat depends on the impact this would have on the profitability of both MNOs.
- 5.127 If traffic between MNOs is balanced then the threat is not effective as a means of constraining the charges of a terminating MNO. The threat of higher reciprocal charges does not change the profitability of the terminating MNO. In this situation, as noted by respondents to the March 2006 Consultation, the outcome for charges could be that MNOs agree to charge each other relatively high or low charges. However, the evidence and theory in this area is not conclusive.
- 5.128 However, if the originating MNO is a net receiver of calls the terminating MNO will face a net cost associated with such a reciprocal agreement. Therefore the threat, to respond to a high termination charge by setting a similarly high termination charge in return, is a credible one for an MNO engaged in a reciprocal negotiation with another MNO from which they are a net receiver of calls.
- 5.129 Nevertheless in practice Ofcom does not consider that this threat is particularly strong. MNOs do not know whether they are net receivers of traffic from each other because at present incoming traffic is often from operators who have used BT as a transit operator. In addition, mobile subscriber churn is significant and this may lead to a lack of stability in the calling behaviours of subscribers (and in whether an MNO is a net receiver of calls from another MNO).
- 5.130 Moreover, as discussed above and by respondents to the March 2006 Consultation, where charges have already been agreed between BT and other MNOs for mobile

⁶⁴ See <http://www.ofcom.org.uk/consult/condocs/charge/statement/>

⁶⁵ In respect of other network services where BT has SMP it also faces charge controls or cost-orientation obligations.

⁶⁶ See note 10 above

termination, if any originating MNO threatens to charge a higher termination charge in order to improve its negotiating position with a terminating MNO, the terminating MNO can simply transit traffic via BT and nullify the threat of a high termination charge.

- As such, Ofcom considers that this constraint on reciprocal bargaining removes from those purchasers a key bargaining counter.

Assessment of purchasers' CBP - Lack of alternative sources of supply

5.131 The ERG explains that in order to constrain the seller's price effectively, the purchaser must be able to bring some pressure to bear on the supplier to prevent a price rise:

“...The extent of countervailing buyer power largely depends on whether customers can credibly threaten to switch to other suppliers, to self-provide the service, to significantly reduce consumption or to cease to use the service at all in case of a price increase...”⁶⁷

- 5.132 Where the buyer may be able to induce competition between sellers, for example via a procurement auction, the buyer can be expected to have considerable power to determine the terms of trade. Where there are no alternative sources of supply, as is the case here, this is clearly not the case.
- 5.133 A further consideration is the extent to which the buyer may be able to self-provide the good or service in question. If so, this would present the buyer with an alternative to purchasing from the prospective seller, thereby presenting the buyer with a bargaining mechanism.
- 5.134 As discussed in paragraph 4.2 above, it is only the terminating MNO that can terminate calls on its own network and therefore competitive entry by an alternative supplier cannot be expected; there are absolute barriers to entry.
- As such, Ofcom considers that no originating operator (buyer of termination) can seek to enhance its bargaining position by relying on competition between sellers. Nor can it opt to self-supply.

Assessment of purchasers' CBP - Option not to purchase (or to delay)

- 5.135 Absent other potential sources of supply (i.e. third party or self-supply), a buyer may bring pressure to bear on the seller in the event that it can threaten credibly not to purchase the service (or, to a lesser extent, to threaten to reduce the amount it purchases). This source of negotiating strength is not based on the buyers' capability to substitute the service - even if at some cost - for a similar service but, rather, on the relative importance to the buyer and the seller of reaching a deal and the ability of the buyer credibly to threaten not to purchase.
- 5.136 In the context of the establishment of an initial agreement between the buyer and seller, a further relevant consideration is the extent to which the buyer can threaten credibly to delay. However, this is not a relevant factor in this case because

⁶⁷ See paragraph 11 “Revised ERG Working paper on the SMP concept for the new regulatory framework”, October 2004, (See http://www.erg.eu.int/doc/publications/public_hearing_concept_smp/erg0309rev1_smp_working_doc.pdf)

interconnection agreements with all of the MNOs (as providers of termination) have been agreed with all existing direct purchasers (including other MNOs).

- 5.137 While, as BT noted in its response to the September 2006 Consultation, all of these contracts require the parties to observe minimum notice periods in the event that either party wishes to terminate or modify a contract, none require the purchaser to buy a minimum quantity of MCT and none require the purchaser to ensure that his retail customers are able to call mobile phones connected to the supplier's network. Thus, the contracts do not prevent purchasers from ceasing to purchase MCT, or threatening to cease purchasing MCT, permanently or temporarily, while renegotiation of prices or other terms and conditions takes place.
- 5.138 It is therefore relevant to assess the extent to which a threat to refuse to continue purchasing MCT would provide an originating operator with buyer power such that it could influence in its favour the price charged by a terminating MNO for MCT. In this respect Ofcom has identified two issues:
- Commercial constraints; and
 - BT's end-to-end connectivity obligation.
- 5.139 From a commercial perspective, the credibility of a threat to cease purchasing is related to how important it is for an originating operator to provide calls for its subscribers to the subscribers of a particular mobile network. It is also related to how important it is for the terminating MNO to offer its customers the ability to receive calls from the originating operator in question.
- 5.140 In the case of BT, its obligation to provide end-to-end connectivity is also a relevant consideration. BT's end-to-end connectivity obligation requires BT to purchase termination from each of the MNOs. If the obligation on BT to purchase termination were absolute, BT would not have any buyer power at all. However, as noted by the CAT the obligation on BT is not an absolute one; the request to purchase must be reasonable. If BT does not consider a request is reasonable, it can bring a dispute to Ofcom, to determine whether the request is reasonable and whether, consequently, BT has an obligation to purchase at that price. This is considered further at paragraphs 5.152 to 5.162 below.

Commercial constraints

- 5.141 In general, the larger an MNO, the greater the likely value to the customers of another originating operator of being able to call the subscribers of that MNO network; conversely, the greater the commercial damage to the originating operator if its subscribers cannot call that network.
- 5.142 All five MNOs have significant numbers of subscribers on their networks and H3G, the smallest MNO, continues to grow its subscriber base. Indeed, as BT noted in its response to the September 2006 consultation, ensuring that its customers are able to call the 65 million mobile phones is crucially important to BT. Therefore Ofcom considers that there would potentially be a significant commercial imperative for all originating operators to provide their subscribers with the opportunity to call each of the mobile networks. Although it might be thought that this may not be the case where a new entrant MNO (with few, if any, customers) wishes to sell call termination to a large incumbent network, Ofcom notes that the evidence suggests that BT, the largest purchaser of MCT, regarded the entry of H3G in 2001 as an opportunity for incremental income from its retail customers rather than a potential threat to its own

access and origination revenue.^[1] In this case BT therefore judged that it had a commercial incentive to purchase call termination services from H3G.

- 5.143 It is theoretically possible to envisage an originating operator offering calling services to its subscribers that do not enable them to call mobiles or a specific mobile network, in particular if that network were a start-up or very small. Such a strategy would afford this operator the ability to threaten not to purchase termination. However, the operators today have not positioned themselves in this way. They generally seek to offer their customers the ability to call anyone on any network. Furthermore, a provider which failed to offer a comparable level of service is likely to be viewed by consumers as deficient.
- 5.144 As BT noted in its response to the September 2006 consultation, BT's wholesale regulatory obligation to offer Carrier Pre Selection and Indirect Access would mean that, in the event that BT ceases to purchase MCT from one or more MNOs (and, therefore, is unable to continue offering its retail customers calls to those MNOs) it would be exposed to the risk that CPS and IA operators would offer BT's retail customers alternative means to call mobiles (and, in addition, the means to call other number ranges). How fast alternative providers (including those with their own local network infrastructure) could offer calls to mobiles without continuing reliance on BT transit services, would depend on how quickly they could either establish direct interconnection with MNOs and how quickly C&W (which already provides transit) and others could offer additional transit capacity. BT would also face a material risk that, in the absence of the ability to call mobiles from BT fixed lines, customers would resort to using mobile originated calls (notwithstanding that the price differential, in the case of a small non transitory increase in price, would normally mean that mobile originated calls to mobiles are not a substitute for fixed originated calls to mobiles).
- 5.145 Although MNOs are not subject to obligations to offer CPS and IA, any originating MNO which ceased to provide calls to one or more other MNO would similarly be likely to face loss of market share as retail customers migrate to MNOs which offer full end-to-end connectivity. FNOs other than BT which failed to offer calls to the customers of all MNOs would face similar commercial pressure as retail customers migrate to those providers which do provide full end-to-end connectivity.
- 5.146 BT noted in its response to the September consultation that even if it could refuse to purchase mobile termination from a particular operator, the effectiveness of such a strategy would be undermined by the existence of the number portability obligation. This would mean that when a customer ported from a donor network to a recipient network, BT would be unaware that the number was now hosted on a network to which they otherwise might not provide termination. Similarly BT would be unable to provide connection to customers who had ported from the "excluded network" because it would be unaware that they were no longer hosted on that excluded network.
- 5.147 As BT also noted in its response to the September consultation, the level of consumer dissatisfaction in the event that BT (or any other FNO or MNO) ceased to offer retail calls to one or more MNO is likely to be exacerbated by mobile number portability. It is unlikely to be practicable for originating operators to cease providing calls to the customers of a subset of MNOs without also disabling the ability to call customers who had ported their numbers from those MNOs. The reputational

^[1] WPAG paper "Proposed termination rates for calls to H3G's mobile services", Internal BT paper dated 10 January 2002.

damage to any originating operator in these circumstances might be yet higher (than without the effect of mobile number portability).

- In Ofcom's view, therefore, all originating operators face strong commercial pressure to purchase MCT from the existing MNOs.

BT's end-to-end connectivity obligations

- 5.148 As discussed at paragraph 5.95 above, BT is subject to end-to-end connectivity obligations, which constrain its ability to refuse to purchase MCT.
- 5.149 However, those obligations are not absolute. BT is required to purchase on reasonable terms and conditions. If BT and an MNO were unable to agree upon terms for the supply of MCT, either party could refer the dispute about the application of the regulatory obligation on BT to Ofcom to resolve. Therefore, the extent to which any CBP that BT would otherwise possess is negated by its end-to-end connectivity obligation could depend in part on the expectation of the parties to a dispute as to Ofcom's resolution of that dispute.
- 5.150 The negotiations between BT and an MNO may therefore be partly conditioned by the range of prices which those parties consider that Ofcom would be likely to regard as reasonable in applying BT's end-to-end connectivity obligation. The range of prices would affect BT's "freedom of manoeuvre" in negotiating the price of MCT, and should therefore be taken into account in determining whether, and to what extent, BT may have CBP.⁶⁸
- 5.151 Ofcom is currently considering various disputes as to the charges that BT pays T-Mobile, O2, H3G, Orange and Vodafone for terminating voice calls on their respective networks, and Ofcom will not be in a position to determine these disputes prior to the publication of this Statement.⁶⁹
- 5.152 In resolving a dispute relating to the application of BT's end-to-end connectivity obligation, Ofcom would consider each dispute on its merits, in the light of the specific facts and circumstances and the arguments put to it by the parties to the dispute, including the reasonableness of any resolution on both parties.
- 5.153 As explained at paragraph 5.100 of the September Consultation, a number of alternative approaches would be open to Ofcom in dealing with a dispute between BT and an MNO as regards whether a price proposed for MCT is a reasonable one for the purposes of applying BT's end-to-end connectivity obligation. However, Ofcom would consider the question of what is reasonable by reference to the purpose underlying BT's end-to-end connectivity obligation. The end-to-end connectivity obligation was imposed on BT to remove the risk of a potential market failure from BT refusing to buy call termination. While in principle, BT's customers value calling customers of smaller networks and customers of smaller networks may value receiving such calls, BT may have an incentive not to provide such calls under some circumstances.⁷⁰
- 5.154 On this basis, a reasonable charge for BT to purchase MCT with a view to ensuring end-to-end connectivity may be at a price appreciably above the competitive level. As

⁶⁸ See the judgment of the CAT in the H3G case, at paragraph 126.

⁶⁹ http://www.ofcom.org.uk/bulletins/comp_bull_index/comp_bull_ocases/open_all/cw_942/ .

⁷⁰ See for example, paragraphs 2.12, of Ofcom's *End-to-end connectivity statement*, dated 13 September 2006.

such, if a charge appreciably above the competitive level were in dispute, Ofcom considers it unlikely that it would insist on a strictly cost based charge (such as used in deriving cost benchmarks in Section 9 to set efficient regulated charges in the charge control) ie a charge that was not appreciably above the competitive level.

- 5.155 It should be noted, however, that the fact that Ofcom had resolved a dispute about end-to-end connectivity in a particular way, would not preclude Ofcom from considering subsequently whether the charge offered (or other factors) indicates that there might be a competition problem in the market for the supply of MCT.
- 5.156 In contrast, Ofcom considers that where a dispute relating to the provision of network access for MCT is referred to it by the parties, and there is no pre-existing regulatory obligation, then the outcome of that dispute should not be taken into account in any assessment of a supplier's SMP.
- 5.157 This position is consistent with the CAT's finding in the H3G judgment, that Ofcom's role in resolving disputes under clause 13 of the interconnection agreement between BT and H3G should be disregarded when assessing H3G's market power because it amounted to regulation of H3G (at paragraph 138(b)). The CAT stated that:
- "The sort of dispute that clause 13 contemplates is a form of interconnection dispute, which OFCOM would resolve as regulator, not as a third party dispute resolver. Its intervention would therefore be as regulator, and would be a form of regulation. It therefore falls to be disregarded, as a matter of principle, just as OFCOM's general presence as a regulator with a potential effect on the conduct of the putatively regulated person falls to be disregarded, for the reasons given above."
- 5.158 In any event, because there is no *ex ante* obligation to lend a structure to Ofcom's role, it is not possible to specify what approach Ofcom would apply in resolving a dispute. Ofcom's determination would depend on the facts of each case and the submissions made to it. A broad range of options and methodologies would be available to Ofcom.
- 5.159 Additionally, Ofcom would have to consider, as a matter of policy, whether it would be appropriate to assess the market power of the parties and impose cost-orientated charges where no such obligation previously existed because, for example, there had not yet been a market review, or there had been a market review but the dispute revealed that market circumstances had since changed.
- 5.160 In Ofcom's view, this suggests that neither party in a negotiation over MCT, where the MNO had not been found to have SMP, can assume that Ofcom (when resolving such a dispute) would impose a charge for MCT that was not appreciably above the competitive level.
- 5.161 Ofcom therefore concludes that a purchaser and supplier of MCT, properly apprised as to Ofcom's approach to dispute resolution, would therefore negotiate on the basis that if a charge appreciably above the competitive level were in dispute, Ofcom would be unlikely to impose a charge for MCT in the context of such a dispute that was not appreciably above the competitive level.
- 5.162 Further, Ofcom considers that certain limitations exist in relation to dispute resolution such that dispute resolution should not be seen as a substitute for the appropriate regulatory processes for addressing the question of market power as set out in

Articles 15 and 16 of the Framework Directive. In addition, dispute resolution is of limited assistance in curbing pricing appreciably above the competitive level as it is aimed at resolving a dispute between two (or more) parties and regulators can only act in the context of that dispute - which may not address the “regulatory” issue i.e. general pricing issues. Moreover, it is only a mechanism that Ofcom can rely on when asked to do so by one or more of the parties in dispute. It is therefore not necessarily the case that: an MNO would bring a dispute; or, another provider would refuse to purchase interconnection at a charge appreciably above the competitive level

Review of H3G’s evidence with regards to the economic framework

- 5.163 H3G has submitted that two papers by Harbord and Binmore should form the starting point for any further analysis to be undertaken by Ofcom. These papers set out a proposed economic framework for assessing CBP. In this section, Ofcom considers the arguments presented by Harbord and Binmore in their published paper, as well as David Harbord’s submission to the CAT dated 28 July 2004.
- 5.164 Binmore and Harbord state that their model predicts that incumbent fixed network operators (BT) will never agree to pay H3G a termination rate which exceeds the cost of termination, and that it is likely that charges will lie between average 2G rates and the entrants’ (3G) cost (assuming that the regulated 2G rates lie below the 3G cost of termination).⁷¹
- 5.165 As with every economic model, this result is based on a number of assumptions on the parties’ incentives and their ability to act upon them. As explained in the following paragraphs, those assumptions are not justified by the facts of the present situation and therefore lead to erroneous conclusions.
- 5.166 Critical to the results of Binmore and Harbord’s model are the assumptions as to how Ofcom would resolve a referred dispute. The assumptions underlying Binmore and Harbord’s results are that the regulator would either set a charge based on the average 2G rates or would set a charge based on H3G’s costs. Were these assumptions correct, Ofcom would agree that it is probable that the outcome of a negotiation would be likely to lie in this range. However, it is clear from the explanation of Ofcom’s dispute resolution policy above that the assumptions made by Binmore and Harbord in respect of dispute resolution in the context of the end-to-end connectivity obligation are erroneous. As explained in paragraphs 5.148 to 5.162 where it was set out how Ofcom might resolve a dispute in the context of end-to-end connectivity, Ofcom has a broad range of options. Importantly, the range of potential charges set in the context of an end-to-end dispute is wide, and if a charge appreciably above the competitive level were in dispute, it would be unlikely that Ofcom would impose in the context of such a dispute a charge that was not appreciably above the competitive level.
- 5.167 Furthermore, as noted at paragraph 4.45 in the case of 3G mobile termination, Ofcom’s cost modelling, set out in Section 9, indicates that the 3G charges presently levied by H3G are significantly above Ofcom’s view of the appropriate cost-based charges for MCT.
- 5.168 In summary, Harbord and Binmore reached their conclusions based on erroneous assumptions about what Ofcom would do in the event of a dispute. Harbord and

⁷¹ “Bargaining over Fixed-to-Mobile Termination Rates: Countervailing Buyer Power as a Constraint on Monopoly Power”, published in *Journal of Competition Law and Economics*.

Binmore erroneously assume that the best assumption about the outcome of such a process is that it would yield charges at cost or at the level of charges of the 2G operators. However, as Ofcom has explained in paragraphs 5.148 to 5.162 above, this is unlikely to be the case absent a finding of SMP on H3G. As a consequence, Ofcom does not find Harbord and Binmore's arguments persuasive: their assumptions do not accord with the characteristics of the case and therefore their conclusion that dispute resolution constrains H3G to charge no more than cost is flawed.

Conclusions on CBP

- 5.169 In light of all the factors explored above, it is Ofcom's view that BT does not have sufficient CBP to constrain an MNOs' ability to behave to an appreciable extent independently of competitors, customers and ultimately consumers, such that MNOs are unable to sustain charges appreciably above the competitive level.
- 5.170 While BT is an important outlet for all suppliers of MCT and is a well informed and price sensitive buyer, the absence of reciprocity in negotiations between BT and suppliers of MCT means that BT has significantly less CBP than would be the case in the presence of reciprocity. Moreover, there are no alternative sources of supply and BT is unable to self supply. BT also faces a strong commercial incentive to purchase MCT (heightened by its CPS and IA obligations). BT is subject to an end-to-end connectivity obligation and, in Ofcom's view, this means that BT has insufficient CBP to negate MNOs' SMP, even taking into account that it is not an unbounded obligation on BT and that disputes (where relevant) can be referred to Ofcom for resolution.
- 5.171 It is also Ofcom's view that no other purchasers of MCT (whether FNOs or MNOs) have sufficient CBP to constrain an MNOs' ability to behave to an appreciable extent independently of competitors, customers and ultimately consumers, such that MNOs are unable to sustain charges appreciably above the competitive level.
- 5.172 The other purchasers of MCT are well informed and price sensitive buyers as well. There are, however, no alternative sources of supply and no originating operators are able to self supply. All face strong commercial pressure to purchase MCT (whether directly or through a transit provider). The absence of reciprocity in negotiations between FNOs and suppliers of MCT reduces the CBP of such purchasers by comparison with purchasing MNOs.

Conclusions on SMP

- 5.173 With the evidence set out in Section 4 and in this Section 5, Ofcom has concluded that each MNO has SMP in the market for terminating calls over its own network. This is because:
- It is only the terminating MNO that can terminate calls to its subscribers, and each MNO therefore has 100% market share in the market for wholesale termination that it supplies to other operators;
 - Ofcom does not foresee any changes to the current CPP arrangements nor the introduction of new or developing technologies that will allow another provider to compete effectively to offer termination on another mobile network, other than the MNO in question;

- This combination of current and enduring high market share and absolute barriers to entry provides a strong presumption of market power;
- Ofcom does not believe that fixed and mobile originating operators are able to exercise sufficient CBP to overcome the terminating MNO's position (i.e. to prevent terminating MNOs charging appreciably above the competitive level for MCT); and
- Ofcom's conclusion is reinforced by the evidence presented at paragraph 4.45 above, namely that the 2G/3G MNOs have previously sustained 2G MCT charges significantly above a reasonable estimate of costs. Further, the underlying 3G charges proposed by the 2G/3G MNOs are substantially greater than Ofcom's estimate of costs (in some cases more than double). The underlying charges of three of the 2G/3G MNO are also substantially greater than H3G's charges.

Section 6

Impact assessments - Introduction

- 6.1 The analysis presented in sections 6 to 9 below, when read in conjunction with the rest of this document, and with the March 2006 Consultation and September 2006 Consultation, represents an impact assessment, as defined in section 7 of the Communications Act 2003 (the “Act”).
- 6.2 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. This is reflected in section 7 of the Act, which means that generally Ofcom has to carry out impact assessments where its proposals would be likely to have a significant effect on businesses or the general public, or when there is a major change in Ofcom’s activities. However, as a matter of policy Ofcom is committed to carrying out and publishing impact assessments in relation to the great majority of its policy decisions. For further information about Ofcom’s approach to impact assessments, see the guidelines, Better policy-making: Ofcom’s approach to impact assessment, which are on the Ofcom website:
http://www.ofcom.org.uk/consult/policy_making/guidelines.pdf

Ofcom’s duties under the Communications Act 2003

Section 3 – Ofcom’s general duties

- 6.3 When considering the appropriateness of the remedies proposed in this section, Ofcom has had regard to its duties under the Act.
- 6.4 Section 3(1) of the Act sets out the principal duty of Ofcom, in carrying out its functions under the Act:
- to further the interests of citizens in relation to communications matters; and,
 - to further the interests of consumers in relevant markets, where appropriate by promoting competition.
- 6.5 Ofcom has also considered when carrying out its functions, amongst other things, the requirements in section 3(2) of the Act to secure the availability throughout the UK of a wide range of electronic communications services and section 3(4) of the Act, namely that in performing its duties Ofcom must also have regard to such of the following as appears to be relevant in the circumstances, in particular:
- The desirability of promoting competition in relevant markets;
 - The desirability of promoting and facilitating the development and use of effective forms of regulation;
 - The desirability of encouraging investment and innovation in relevant markets; and
 - The opinions of customers in relevant markets and of members of the public generally.

Section 4 – European Community requirements for regulation

6.6 Section 4 of the Act requires Ofcom to act in accordance with the six European Community requirements for regulation. In summary these requirements are to:

- Promote competition in the provision of electronic communications networks and services, associated facilities and the supply of directories;
- Contribute to the development of the European internal market;
- Promote the interests of all persons who are citizens of the European Union;
- Take account of the desirability of carrying out Ofcom's functions in a manner which, so far as is practicable, does not favour one form of or means of providing electronic communications networks or services, i.e. to be technologically neutral;
- Encourage the provision of network access and service interoperability for the purpose of securing:
 - Efficient and sustainable competition; and
 - The maximum benefit for customers of Communications providers; and
- Encourage compliance with certain standards in order to facilitate service interoperability and secure freedom of choice for the customers of communications providers.

6.7 In regard to Ofcom's conclusions set out in the present document, Ofcom has considered its duties in those sections, as set out below.

Ofcom's objectives in this statement

6.8 Ofcom considers that there are a number of relevant considerations to be borne in mind when deciding on appropriate remedies for SMP in this market, including, amongst others, the following:

- seeking to promote the interests of consumers by ensuring prices are not excessive and resources are efficiently allocated;
- ensuring technological neutrality and avoiding regulatory distortion of MNO decisions about delivery of mobile termination – seeking to ensure MNOs' incentives to use one technology (for example, 2G) over another (for example, 3G) are not distorted by regulation;
- encouraging investment and innovation in existing and new mobile services – seeking to ensure operators recover efficiently incurred costs; and
- ensuring competitive neutrality and avoiding economic distortions, for example in the downstream retail market

The options considered before reaching the conclusions set out in this Statement

6.9 In Section 7 of the September 2006 Consultation, Ofcom assessed the detriment likely to arise from the exercise of SMP in the absence of ex ante regulation. Ofcom

concluded from this analysis that the option to “do nothing” is not appropriate. (The inadequacy of an ex post competition law approach was explored in paragraphs 8.13 to 8.18 of the September 2006 consultation). Ofcom’s conclusions with respect to these issues are set out again in Sections 7 and 8 below.

- 6.10 Ofcom has also taken into consideration the ERG common position on the approach to appropriate remedies in the new regulatory framework⁷² (“Revised ERG common position on remedies”). The ERG sets out that in the case of termination markets the following remedies should be considered:
- Obligation to interconnect
 - Transparency;
 - Non-discrimination; and
 - Price control and cost accounting⁷³
- 6.11 In Section 8 of the September 2006 Consultation, Ofcom revisited a number of different options for addressing the identified detriments, including the possibility of technical intervention, a reliance on charge transparency obligations, retail tying, obligations requiring that charges are “fair and reasonable” or cost oriented, and charge controls. These options had been explored extensively in the March 2006 Consultation and, having considered responses to that consultation, the September 2006 Consultation proposed that charge controls should be imposed. In Section 9 of the September 2006 Consultation, Ofcom presented a number of options for determining the appropriate level of charges in each of the four years of the charge control, and Ofcom proposed to determine those levels following consideration of responses.
- 6.12 Having considered responses to the September 2006 Consultation, Ofcom sets out in Section 8 below its conclusion that charge controls should be imposed on all five MNOs. In Section 9 below Ofcom has set out its conclusions and reasoning with respect to the appropriate level of the charge controls.
- 6.13 In the September 2006 Consultation, Ofcom also proposed additional conditions including transparency conditions, a prohibition of undue discrimination and an obligation to meet reasonable demand for MCT on fair and reasonable terms. Having considered responses to the September 2006 consultation Ofcom has also set out in Section 8 its conclusions with regard to these proposals. In summary, Ofcom has concluded that it should impose conditions which prohibit undue discrimination, require MNOs to meet reasonable demand for MCT on fair and reasonable terms and require publication of charges. Ofcom has concluded that MNOs should not, however, be required to publish their contracts. Ofcom’s reasons for reaching these conclusions are set out in Section 8 below.

⁷² Revised ERG Common Position on the approach to appropriate remedies in the ECNS regulatory framework. (http://www.erg.eu.int/doc/meeting/erg_06_33_remedies_common_position_june_06.pdf)

⁷³ The ERG also notes that an accounting separation obligation may also be required in particular to assist in the estimation of costs. However, Ofcom does not consider that it requires an accounting separation obligation in order to estimate costs. Ofcom has undertaken detailed cost modelling in order to estimate the costs of termination set out in Annex 5.

- 6.14 Ofcom has attached at Annex 20 Notifications of the appropriate market definition, SMP finding and SMP conditions which implement the charge controls and further conditions considered in Sections 8 and 9.

Section 7

Impact Assessment: Part 1 – Benefits of regulation vs no regulation

Introduction

7.1 As discussed in Sections 4 and 5, Ofcom has concluded that each of the five MNOs has SMP in supplying MCT. This section (Section 7) discusses the detrimental effects that arise absent any regulation. Ofcom believes that absent regulation, or the threat of regulation, MNOs would have the ability and incentive to set excessive charges for MCT. Ofcom considers that excessive charges result in detrimental impacts on consumers and, therefore, given Ofcom's objective to promote the interests of consumers, regulation of MCT is appropriate (and, as discussed in Section 8 below, Ofcom considers that a number of remedies are necessary to address these detrimental effects).

Detriments likely to arise absent regulation

7.2 In Section 7 of the September 2006 consultation, Ofcom set out the detrimental impact on consumers that is likely to result in the absence of regulation (or the threat of regulation), and the benefits of regulation which ameliorates these detriments and realises gains for consumers. The detrimental impact of excessive CTM charges were, broadly, summarised as follows;

- Excessive prices; to the extent that the waterbed effect is not complete, the excess profit on termination is not fully competed away in competition for mobile consumers so that, overall, MNOs may generate excess profits and consumers pay too much for inbound call services.
- Even if the waterbed effect is complete and MNOs do not retain excess profits, the resulting structure of prices is inefficient. This inefficiency would lead to over-consumption of mobile network services and under-consumption of fixed network services. Consumers would face too high a price for calling a mobile and other fixed network services whilst mobile services would be priced too cheaply. Rectifying this inefficient structure of prices brings welfare benefits to consumers.
- A related factor is that if MNOs set excessive prices for mobile termination whilst FNOs are only able to charge regulated (cost orientated) prices for fixed termination, this would result in a transfer of rents from fixed to mobile operators. This transfer is not an efficient allocation of resources and, in a situation where fixed and mobile operators may begin to compete with each other, could result in a competitive distortion with mobile prices being subsidised at the expense of fixed operators.
- Under the waterbed effect, excessive prices result in transfers between different types of consumers. This raises equity concerns. There will be groups of consumers who pay excessive prices for calling a mobile and other fixed network services but who do not benefit from cheaper (subsidised) mobile network services and mobile phones. There will also be transfers within the group of mobile users, some of whom may benefit, or lose, disproportionately from those subsidised services and handsets.

- Setting excessive prices may increase the risk of other anticompetitive behaviour such as undue discrimination

Responses to the September 2006 consultation

- 7.3 BT agreed that regulation is needed to protect the interest of consumers and, in particular, fixed phone users. In BT's view, consumers must rely wholly on the regulator to ensure a fair outcome. C&W argued that MCT charges are too high and that this results in an inefficient transfer of funds from the fixed telephone industry to the mobile industry which, if left unchecked, will result in a lack of investment and innovation in fixed markets to the detriment of consumers. In C&W's view this results in an inefficient use of scarce spectrum resources and will discourage investment in next generation fixed networks. [3<].
- 7.4 In its response to the September 2006 Consultation, T-Mobile referred to an academic paper (the "Hausman-Wright paper").⁷⁴ T-Mobile stated that this paper found, firstly, that unregulated termination charges will be set below the monopoly level and, secondly, that unregulated termination charges may result in higher social welfare than where regulated termination charges are set at (or close to) costs. Although T-Mobile did not explain what it considered to be the implications of the Hausman-Wright paper in the context of the current review, Ofcom notes that this paper appears to question whether regulating MCT charges is appropriate.
- 7.5 T-Mobile also argued that, in any event, the unregulated level of charges assumed by Ofcom in its welfare model are not plausible, being higher than any which existed before charge regulation was imposed. In T-Mobile's view, Ofcom cannot be confident that its charge controls would lead to higher welfare than no regulation. Furthermore, T-Mobile noted the limited levels of direct pass through of MCT charge reductions to the retail price of calls to mobiles, and argued that limited pass-through is not consistent with Ramsey pricing principles (unless unrealistic elasticity assumptions are used). More broadly, T-Mobile argued that, even if Ofcom does not have sufficient information to set welfare maximising charges, Ofcom should instead use what T-Mobile referred to as a "partial Ramsey" approach to allocating fixed and common costs.
- 7.6 H3G argued that Ofcom's proposals were inconsistent with its statutory duty to promote competition, to further the interests of citizens by ensuring that high speed mobile data services are made available across the UK, and to encourage investment and innovation. In H3G's view, Ofcom's proposals would reduce competition, to the detriment of consumers. H3G also argued that, as H3G currently has only a [3<5%] share of active UK subscribers, the impact of any reduction in MCT charges on callers to H3G's network will be small, and unlikely to balance the negative impacts on competition which H3G envisages flowing from reduced MCT charges. In H3G's view the impact on consumers of reductions in H3G's MCT charges will also be further diluted by MNOs' practice of offering bundles of "any network" calls, and also by the practice of FNOs not directly reflecting differences in MCT charges in their retail prices for calls to mobiles.
- 7.7 H3G claimed that Ofcom had failed to give proper consideration to these issues and had failed to conduct a proper cost-benefit analysis which assesses the relative size of these effects, particularly when considering the merits of the three glide path options set out in respect of H3G. H3G also argued that Ofcom's welfare analysis,

⁷⁴ Hausman and Wright, "Two Sided Markets with Substitution: Mobile Termination", June 2006 (see http://econ-www.mit.edu/faculty/download_pdf.php?id=1366).

being based on a global analysis of all MNOs, fails to consider the specific position of H3G as a 3G-only MNO. H3G noted, however, that Ofcom's analysis indicated that there are still significant welfare gains to be made from reducing 2G rates, particularly given the relative volume of calls.

- 7.8 H3G also questioned Ofcom's stated concern that, where the waterbed effect does operate, there may be undesirable distributional effects. H3G noted that consumers in general will benefit from the waterbed effect, and warned that charge controls may cause greater distortions in competition between MNOs (typically by impacting on the ability of some MNOs to compete) than they address.
- 7.9 Orange, O2 and Vodafone did not comment explicitly on the benefits of regulation versus no regulation, but noted that an unduly low charge control would have an adverse impact on consumer welfare by reducing investment in 3G services.

Ofcom's response to key points raised by stakeholders

- 7.10 Ofcom has set out, in the paragraphs which immediately follow, a short summary of its views on the responses made to the September 2006 Consultation in respect of the benefits of regulation versus no regulation. This said, a more detailed response to them is contained within the body of the text of this Section, which sets out Ofcom's conclusions and reasoning

The Hausman-Wright paper

- 7.11 Ofcom has considered the Hausman-Wright paper. The conclusion of this paper that was cited by T-Mobile is that unregulated termination charges *may* result in higher social welfare than termination charges that are set at (or close to) cost, although it is important to recognise that this is not necessarily the case in the Hausman-Wright paper.
- 7.12 In the Hausman-Wright paper the welfare optimal termination charge is above cost because of the network externality. There are two aspects to the increase in the number of mobile subscribers when the termination charge is raised above cost:
- Termination profits are competed away in the retail mobile market via the waterbed effect, such as through lower prices, which attracts more mobile subscribers. The Hausman-Wright paper *assumes* that the waterbed effect is complete i.e. that 100% of termination profits are competed away.
 - The price of fixed-to-mobile calls is increased, which induces an increase in the number of mobile subscribers by people who are seeking to avoid such high prices by substituting to mobile-to-mobile calls, i.e. people who do not have mobile phones are induced to become subscribers so that they can make cheaper mobile-to-mobile calls.
- 7.13 The Hausman-Wright paper *assumes* that MNOs set their termination charges to other MNOs for off-net mobile-to-mobile calls equal to cost. Two implications of this assumption can be observed:
- The price of (and profit from) off-net mobile-to-mobile calls does *not* increase when the termination charge rises for fixed-to-mobile calls.
 - There is no difference between on-net and off-net mobile call prices (Hausman-Wright paper, page 7).

- 7.14 The unregulated termination charge in the Hausman-Wright paper reflects the potential for consumers to substitute from fixed-to-mobile calls to mobile-to-mobile calls. Given the assumption set out in the preceding paragraph, MNOs face the following two constraints when they raise termination charges:
- Existing mobile subscribers substitute calls from fixed-to-mobile calls to mobile-to-mobile calls.
 - People who do not have mobile phones are induced to become subscribers in order to take advantage of cheaper mobile-to-mobile calls to avoid the higher price of fixed-to-mobile calls.
- 7.15 Therefore, the following conditions are relevant to whether the result noted by T-Mobile – i.e. that the unregulated termination charge results in higher social welfare than the regulated termination charge – arises:
- The crucial necessary condition is that the regulated charge does not take account of the network externality, so that it is set inappropriately low by the regulator; in addition
 - The result cited by T-Mobile is more likely to occur if the following conditions apply:
 - The network externality effects are sufficiently large, so that the welfare optimal termination charge is well above cost; and
 - The constraints on unregulated charges are sufficiently strong, so that the unregulated termination is well below the monopoly level.
- 7.16 In Ofcom's view, for the reasons set out below, in the UK none of these conditions is likely to be satisfied. Hence, Ofcom does not consider that the result noted by T-Mobile is of practical relevance in the UK.

Regulated charges take account of the network externality

- 7.17 Ofcom has included an allowance for network externalities in the regulated termination charges. That is, Ofcom has set regulated termination charges above cost through the inclusion of a network externality surcharge, as set out in detail in Annex 16.⁷⁵

Network externality effects not sufficiently large in the UK

- 7.18 In the Hausman-Wright paper there is a calibration of the theoretical model using data from the Australian mobile phone market, which concludes that setting regulated charges equal to costs reduces welfare compared to unregulated charges. It is reported that the welfare maximising price is 18 (Australian) cents per minute ("cpm") compared to costs of 5cpm and an actual price of 21cpm. Note that the simulated welfare maximising price is much closer to this unregulated price than to costs, although the unregulated price is still too high.⁷⁶ So the Hausman-Wright paper implies that in Australia a network externality surcharge of 13cpm is appropriate, i.e.

⁷⁵ A network externality surcharge is also part of the current regulated charges, despite the incorrect suggestion to the contrary in the Hausman-Wright paper (at page 13).

⁷⁶ Hausman-Wright Paper, pages 17 and 23.

260% of costs or 72% of the welfare maximising price, and argues that ignoring such a large surcharge leads to inappropriately low regulated charges.

- 7.19 Ofcom does not accept that this evidence is relevant to the UK, given that its estimate of the externality surcharge is much lower at 5-6% of costs. In section 9, Ofcom concludes that a reasonable efficient charge level in 2010/11 for 2G/3G operators is 5.1ppm and for a 3G-only operator is 5.9ppm (2006/07 prices). Ofcom has estimated the efficient network externality surcharge as 0.3ppm. More generally, Ofcom is cautious about the relevance of the calibrated model in the Hausman-Wright paper to the UK, given that a number of the assumptions in that paper are not justified in the UK,⁷⁷ as well as the likely factual differences between the UK and Australia.⁷⁸

Ofcom's analysis takes account of substitution to mobile-to-mobile calls

- 7.20 In its market analysis Ofcom has taken into account the potential for substitution from fixed-to-mobile calls to both off-net and on-net mobile-to-mobile calls.
- 7.21 As set out in detail in section 3, the potential for callers to substitute to off-net mobile-to-mobile calls imposes little effective constraint on termination charges for fixed-to-mobile calls. This is, for example, because the same MNO controls the termination charge. At least in the UK, off-net termination charges have been set at the same level as fixed-to-mobile termination charges. This was the case both before regulation of charges and after the imposition of regulation. Indeed it is notable that the charge controls imposed following the previous market review specifically permitted MNOs to set different charges for termination of fixed-to-mobile and off-net mobile-to-mobile calls (by having two separate price caps for these two types of termination), but no MNO has exercised this option.
- 7.22 This brings out the inappropriateness in the UK context of the assumption in the Hausman-Wright paper noted in paragraph 7.13, that unregulated termination charges for mobile-to-mobile calls are set at cost and at a lower level than fixed-to-mobile termination charges. Since the MNOs in practice set these two termination charges at the same level, substitution by a consumer from a fixed-to-mobile to an off-net mobile-to-mobile call imposes no constraint on the MNO's termination charge, since it obtains the same profit with and without the substitution.
- 7.23 As set out in detail in section 3, on-net prices impose a weak constraint in practice. MNOs, by offering lower on-net call prices, can segment the market by type of customer and separate the more price-sensitive customers from the others who are less price-sensitive. They can then set high termination charges for others (i.e. off-net termination charges). Thus, Ofcom is of the view that the nature and extent of this type of call substitution is not sufficient to act as a competitive constraint on termination charges.⁷⁹

⁷⁷ For example, Hausman-Wright's assumption that unregulated termination charges for off-net mobile-to-mobile calls are set equal to cost (unlike unregulated termination charges for fixed-to-mobile calls), and their assumed absence of a retail price differential between off-net and on-net mobile-to-mobile calls. Neither of these assumptions reflects the situation in the UK (indeed Ofcom understands that they do not reflect the situation in Australia either).

⁷⁸ For example, the Hausman-Wright paper reports that the "mobile penetration rate" in Australia is 72%. In contrast, a recent Ofcom survey reported that approximately 81% of the UK adult population had at least one mobile phone. Source: Ofcom third quarter of 2006 tracking survey.

⁷⁹ Ofcom notes that a similar conclusion was recently reached in another academic paper. Section 3.4 of "Mobile Call Termination in the UK", Armstrong and Wright (March 2007) stated that substitution of

Conclusion on the Hausman-Wright paper

- 7.24 Thus, for the reasons given above, in Ofcom's view the possible implication of the Hausman-Wright paper, namely that under certain circumstances unregulated charges are welfare superior to regulated charges, is not relevant to the circumstances of the UK. The network externality effect is not likely to be sufficiently large, nor the constraints on unregulated charges sufficiently strong, and in any case Ofcom has set termination charges above cost to reflect network externality effects by including a surcharge.

Ofcom's response to the points raised by T-Mobile

- 7.25 In response to T-Mobile's concern that Ofcom's welfare analysis wrongly assumed that, absent regulation, charges would be at the monopoly level, Ofcom maintains that MNOs continue to have the incentive and ability to price at the profit maximising level for termination. Ofcom has already noted at paragraph 4.45 the high underlying 3G charges proposed as part of the 2G/3G proposed blended rates. Moreover, these rates have been proposed with the clear threat of future regulation, even if 3G charges (prior to 1 April 2007) have not been controlled. Ofcom's updated welfare analysis (Annex 19) also considers a sensitivity on the level of unregulated termination charges and shows that even if the unregulated charge were mid-way between the potential monopoly level and the regulated level, the welfare gains from regulation at the proposed charge level would remain significant.
- 7.26 With regard to pass-through, T-Mobile is correct in observing that, historically, changes in the wholesale termination charge have not been fully (i.e. 100%) reflected in the retail price of fixed-to-mobile calls. Nevertheless, as noted in Annex 7 to the March 2006 consultation, a significant amount of pass-through has actually been observed on fixed-to-mobile calls (of the order of two-thirds). Moreover, as noted in Annex 19, Ofcom reiterates that this evidence of less than full pass-through is not inconsistent with efficient Ramsey pricing of fixed-line communications services and is not necessarily suggestive of the full extent of pass-through of a reduction of mobile termination charges onto consumers. Given the evidence on BT's pass-through of reductions in MCT charges and the competitive position of other operators, there are not compelling reasons for Ofcom to be concerned about pass-through (see paragraph 7.47 et seq. for further details).
- 7.27 Regarding T-Mobile's partial Ramsey suggestion in place of an EPMU allocation of common costs, Ofcom maintains that this is not appropriate in this case. As argued in Annex 17, given that Ofcom's approach is not EPMU, T-Mobile's comparison between partial Ramsey and EPMU it is not relevant. Nevertheless, even if it were a question of deciding between EPMU and partial Ramsey, Ofcom has concerns with the approach suggested by T-Mobile. These are discussed in the annex on common costs and Ramsey prices (Annex 17).

Ofcom's response to the points raised by H3G

- 7.28 Ofcom is not persuaded by H3G's argument that, because it has relatively few subscribers, regulation will be of limited net benefit. First, H3G will grow over the

on-net mobile-to-mobile calls for fixed-to-mobile calls does not necessarily mitigate a mobile network's incentive to set high fixed-to-mobile termination charges. This paper is available at:
<http://else.econ.ucl.ac.uk/papers/uploaded/255.pdf>

period of the control and Ofcom does not consider that the consequent volume of terminated minutes will be insignificant. Second, Ofcom's analysis of the financial effect on H3G at paragraphs 9.204 et seq. suggests that the proposed remedy will not undermine H3G's overall financial position and, moreover, H3G's reduced MCT termination revenue would be small compared to its overall revenues. Therefore, for the reasons argued here and in section 9 Ofcom considers that there are material overall welfare gains from the regulation of H3G.

Ofcom's reasoning and conclusions with respect to the detrimental impact on consumers that is likely to arise in the absence of regulation (or the threat of regulation)

- 7.29 In this first section of the regulatory impact assessment, having considered stakeholders' responses to the September 2006 Consultation, Ofcom summarises the detrimental impact on consumers that is likely to result in the absence of regulation (or the threat of regulation) of MCT, and the benefits of regulation which ameliorates these detriments and realises gains for consumers.
- 7.30 In Sections 8 and 9, the detailed options for regulation are assessed in the context of the objective of realising gains for consumers. This consideration assumes that regulation (in whatever form) constrains MNOs' behaviour such that charges are not excessive.
- 7.31 It is important to note the counterfactual against which the benefits of regulation are measured is a situation where no regulation or threat of regulation exists. This is largely a hypothetical situation because, with the exception of MCT supplied by H3G and 3G MCT supplied by 2G/3G MNOs, MCT is currently regulated and has been regulated for a number of years.
- 7.32 The detrimental impact of excessive MCT charges were identified in the September 2006 consultation and were repeated for reference at paragraph 7.2 above. Many of these concerns are closely inter-related and, in the following paragraphs, Ofcom considers these under five headings;
- Excessive prices overall
 - Inefficient structure of prices
 - Distortion of consumer choice
 - Inequitable distributional effects
 - Risk of anticompetitive behaviour

Excessive prices overall

- 7.33 If MNOs set excessive prices for MCT they may be able to earn excess profits at the expense of consumers, as discussed below. It has been argued by the MNOs that Ofcom should not be concerned if mobile termination charges are set above the competitive level if the waterbed effect is complete. This is because excess profits arising as a result of excessive termination charges will be returned to mobile consumers in the form of lower retail prices for mobile services. Therefore whilst MNOs make excess profits from termination they will not make excess profits overall across their whole business. In responding to the March 2006 Consultation, O2, T-Mobile and Vodafone each argued that retail competition is such that the waterbed

effect is complete, and T-Mobile also expressed the view that the UK mobile market is the least concentrated in Europe. In addition, T-Mobile presented data to support its view that the UK mobile industry is not making its cost of capital, and that average ARPU and EBITDA have fallen (in the fourth quarter of 2005).

- 7.34 Ofcom's high level analysis of MNOs' profitability, set out in paragraphs 2.21 to 2.26 above, illustrates that estimating profitability robustly is complicated and sensitive to assumptions made about the relevant capital base and the time horizon over which profitability is assessed. Under different assumptions Ofcom has found MNOs could be considered to be earning returns variously in excess of and below their cost of capital. In Ofcom's view this evidence does not confirm whether or not the waterbed effect is complete.
- 7.35 However, with regard to the presence of excess profits, Ofcom considers that for all excess profits earned from MCT to be competed away, the mobile retail (access and origination) market in which MNOs operate would need to be sufficiently competitive. Ofcom notes that although no MNO has been found to have SMP in the retail market for mobile services⁸⁰, conditions may not be such as to ensure that the MNOs would always compete away the entirety of any excessive profits earned in supplying MCT by offering lower prices for retail mobile services.
- 7.36 As Ofcom noted in the March 2006 Consultation, SMP is a threshold for assessing a firm's market power in relation to ex ante regulation. Consequently, there is a wide range of firm behaviours and outcomes consistent with finding that none of the firms in a market have SMP. Ofcom maintains, therefore, that full pass-through of termination profits to retail customers is not a necessary consequence of the finding that no MNO has SMP in the mobile access and call origination market. T-Mobile, in responding to the March 2006 Consultation, argued that Ofcom's remarks indicated discomfort with the SMP threshold for regulation. In Ofcom's view, however, although the SMP threshold is an appropriate threshold for assessing the need, or otherwise, for ex ante regulation, it is, indeed, only a threshold. Ofcom considers that it is still possible for firms to earn excess returns (i.e. returns above their cost of capital) in markets where no firms have SMP because these firms may still experience a degree of market power. However, the degree of market power experienced is not sufficient to be characterised as SMP and therefore warrant ex ante regulation in its own right.
- 7.37 Ofcom acknowledges, however, that the retail market has become more competitive in recent years (and has seen the entry of a fifth MNO) and it has become less likely that MNOs will be able to retain excess profits earned in supplying termination services. However, the way in which profits are competed away is also relevant. If excess profits are used to lower mobile retail prices this will benefit mobile consumers directly. If, for example, they are used to increase expenditure on marketing then this may have a less direct benefit for consumers. Nevertheless, Ofcom remains of the view that, in a market with a limited number of network competitors, complicated retail tariffs and significant entry barriers (due to factors including the high level of sunk costs involved in entry and the historic scarcity of spectrum), the waterbed effect is unlikely to be complete.
- 7.38 In responding to the March 2006 Consultation, Vodafone argued that MNOs are concerned about the relative levels of termination charges, as these may create

⁸⁰ See Oftel's consideration of the retail market for outbound mobile services contained within its assessment of the market for wholesale mobile outbound services; Oftel statement *Mobile access and call origination services market review* – published August 2003.

competitive distortions. As Vodafone noted, Ofcom is strongly aware of this risk of retail distortions arising from the ability of some MNOs to set MCT charges without facing the constraint of charge regulation.

- 7.39 Ofcom recognises that the relative levels (between MNOs) of regulated MCT charges are important. If certain MNOs are able to earn greater excess profits than others (by charging a relatively higher margin over the cost of MCT than others) this has a potential to create a competitive distortion in the retail market to the detriment of consumers. This is discussed in further detail in Section 9 below where Ofcom discusses the appropriate level of charge controls to apply to each of the MNOs.
- 7.40 In conclusion, while the practical evidence is not conclusive, Ofcom remains of the view that the waterbed effect is unlikely to be complete. Given the inconclusive nature of the evidence, however, Ofcom has decided not to rely heavily on this view when determining what conditions should be imposed on MNOs to address the detriment arising from excessive MCT charges. As explained in the following paragraphs, even if the waterbed effect were fully effective, excessive termination charges may give rise to other detriments.

Inefficient structure of prices

- 7.41 In Ofcom's view, however, even if MNOs do not make excess profits from setting excessive termination charges (i.e. the waterbed is fully effective), the resulting structure of prices in retail and wholesale markets is inefficient and has a detrimental impact on consumers. This is because MNOs do not have the incentives to set efficient prices as the competitive conditions (as discussed in paragraphs 3.139 to 3.142 above) between MCT and other mobile retail services are different.
- 7.42 If MNOs set excessive charges for MCT, even if they do not earn excessive profits overall, a structure of prices will result that is inefficient. The inefficient structure of prices would lead to over consumption of mobile retail services and under consumption of other retail services that use MCT, such as fixed retail services. Consumers would face too high a price for calling a mobile and potentially too high a price for other fixed retail services (whilst mobile retail services would be priced too cheaply). This point was also emphasised by C&W in its response to the September 2006 consultation, where C&W warned that, if left unchecked, the consequent inefficient transfer of funds from the fixed telephone industry to the mobile industry would result in a lack of investment and innovation in fixed markets (including investment in new generation networks), to the detriment of consumers.
- 7.43 In its response to the March 2006 Consultation and September 2006 Consultation, T-Mobile also argued that, in determining regulated charges, unless Ofcom followed Ramsey principles to achieve the efficient structure of charges then regulation to set a more efficient structure of prices would not be effective. Issues of Ramsey pricing and common cost recovery are dealt with in Annex 17. Ofcom has taken into account the principles of economically efficient pricing in deriving regulated charges for MCT, such as in the derivation of the network externality surcharge.
- 7.44 As explained in Annex 17, Ofcom has not explicitly identified the level of network common costs because of the difficulties in deriving robust estimates. As a result, it is not appropriate to conduct a Ramsey or partial Ramsey analysis in order to estimate service mark-ups.
- 7.45 To the extent that network common costs might exist, in Ofcom's new cost model, these are allocated to service increments according to routing factors. Compared to

EPMU, which would entail allocating any network common costs on all services including subscription, this approach leads to a relatively higher mark-up on mobile termination.

- 7.46 Ofcom set out in the March 2006 Consultation evidence that approximately two thirds of cost savings generated for providers of fixed to mobile calls as a consequence of MCT charge reductions, had been passed through directly to lower fixed to mobile retail call prices. In noting this finding, T-Mobile and Vodafone both argued, in their response to the March 2006 Consultation (and T-Mobile reiterated in its response to the September 2006 consultation), that these levels of direct pass-through indicate that the objective of addressing inefficient price structures is not being achieved by wholesale charge regulation, calling into question the value of such charge regulation.
- 7.47 Ofcom does not agree with this conclusion. First, it is to be recalled that a significant proportion of wholesale charge changes are passed through directly to fixed to mobile calls. Second, reductions in termination charges may be used by fixed network operators to reduce prices of other fixed network services such as line rental, local and national calls, and broadband and television services. From a consumer welfare perspective this could be more efficient than the full reduction being passed through directly to fixed-to-mobile calls. Therefore, the observation that fixed network operators have not passed on the full reduction in wholesale termination charges directly to fixed-to-mobile calls is not a significant concern. The issue is whether fixed network operators have the incentive to set an efficient structure of prices for fixed network prices which depends on competitive conditions. Ofcom has found that no fixed operator, other than BT, has SMP in fixed retail markets and Ofcom's 2006 review of BT's retail price controls⁸¹ suggested that competition in fixed retail markets is likely to increase going forward.
- 7.48 T-Mobile argued in its response to the March 2006 Consultation that Ofcom's view, set out in the March 2006 Consultation, that pass-through of savings made on MCT charges would be efficiently distributed across a broad basket of fixed services according to Ramsey principles, is incorrect. T-Mobile argued that under Ramsey principles a relatively larger reduction in retail prices of calls to mobile would be expected given a reduction in the marginal cost of calling a mobile, and that this was not being experienced in practice. As set out in the September 2006 Consultation, however, Ofcom considers that T-Mobile's argument holds only under the strict assumption that the elasticity of demand for fixed to mobile calls is constant at all prices. In Ofcom's view this is an extreme assumption and it is more likely that elasticity of demand is not constant, which is consistent with Ofcom's view of pass-through. In its response to the September 2006 Consultation, however, T-Mobile argued in turn that Ofcom's argument holds only under a restrictive range of assumptions in which the demand for fixed to mobile calling rapidly becomes inelastic at lower price levels.
- 7.49 Ofcom's reasoning on the subject of observed pass-through and Ramsey pricing is set out further in Annex 19 at paragraphs 19.31 et seq. While Ofcom does not accept T-Mobile's general proposition, it is also important to recall the circumstances and purpose of Ofcom's welfare analysis. Ofcom has estimated the welfare gains from regulating call termination by comparing a situation with unregulated (excessive) termination charges against regulated termination charges. This exercise only seeks to derive an order-of-magnitude quantification of the benefits of a more efficient structure of prices and does not include quantification of the benefits to consumers

⁸¹ See <http://www.ofcom.org.uk/consult/condocs/retail/>

from addressing the other detriments of excessive MCT charges discussed elsewhere in this section. The analysis compares an unregulated termination charge of 23.9ppm (based on an estimated monopoly termination charge) and a regulated termination charge of 5.2 ppm based on the weighted average (by termination volumes) of Ofcom's proposals for charges set out in Section 9. The assumptions underpinning Ofcom's welfare analysis are set out in Annex 19.

- 7.50 The estimated welfare gain amounts to £1.4 billion in 2010/11 and over four years of a hypothetical charge control assuming a smooth industry average glidepath down to the target charge from the monopoly charge amounts to approximately £3.2 billion in present value terms at the beginning of 2007/08. Ofcom reiterates that the purpose of this exercise is to derive an order of magnitude estimate and not a precise estimate of the overall gains from regulation compared to no regulation (or threat of regulation). Even if the unregulated termination charge were significantly less and fell mid-way between the potential monopoly level and the regulated level, the welfare gains remain positive and large. In this sensitivity, the welfare gain amounts to £0.4 billion in 2010/11 which translates to a gain of £0.9 billion in present value terms.
- 7.51 In their response to the March 2006 Consultation, T-Mobile and Vodafone both commented that the economic efficiency gains from regulation are smaller than estimated by Ofcom. However, this view related to movements from current (regulated) charges to different (lower) regulated charges. This does not mean, as is argued by T-Mobile, that the welfare gains from regulation compared to no regulation (or threat of regulation) are small, rather that small changes in the regulated termination charge do not have large impacts on welfare in the model used. Nevertheless, Ofcom notes that while reductions in termination charges from current levels to the proposed levels are not as large as the gains from the hypothetical monopoly level, it is important to note that the gains from a more efficient structure of prices remain significant in absolute (i.e. £M) terms.⁸² This is because even small interventions in large markets can deliver large £M static welfare gains.

Distortion of consumer choice

- 7.52 To the extent that direct pass-through operates, excessive termination charges feed through into higher retail prices for fixed to mobile and mobile to mobile (off-net) calls. However, mobile to mobile (on-net) calls incur no explicit termination charge, and mobile to fixed calls face a regulated termination charge as part of their cost base. Moreover, excessive MCT charges enable reductions in prices of mobile retail services. Therefore, Ofcom considers that consumer choices will be distorted between mobile and fixed calling due to distortions in the relative prices of fixed and mobile services, as the relative prices do not reflect the underlying resource costs. Consumers are potentially driven to use the higher resource cost mobile technology (higher cost because mobile networks involve higher usage-dependent costs compared to fixed networks) and this is inefficient and may be detrimental to consumers.
- 7.53 In its response to the September 2006 Consultation, H3G argued that Ofcom should accept that under the waterbed effect consumers generally benefit, and Ofcom should not be concerned by the way in which MNOs compete away excessive

⁸² For example, using Ofcom's welfare model from the September 2006 consultation, T-Mobile (in its correspondence to Ofcom of 15 January 2007) noted that in moving from a 6ppm industry benchmark to Ofcom's average rate proposed in the September 2006 consultation (i.e. 5.4ppm) gives a welfare gain in 2010/11 of £2.9m. (Note that this represents only the final year gain and ignores gains in prior years of the charge control.)

termination charges. In H3G's view, intervention to address such concern risks creating further more significant distortions of competition between MNOs.

- 7.54 As Ofcom noted in the September 2006 Consultation, however, while fixed termination charges are regulated at cost, excessive mobile termination charges amount to a transfer of rents from fixed to mobile operators. This is not an efficient allocation of resources and, in a situation where fixed and mobile operators may compete with each other more closely, could result in a competitive distortion with mobile retail prices subsidised at the expense of fixed operators. As Ofcom discussed in the last calls to mobile market review, Ofcom does not consider that it would be sensible to promote competition between mobile and fixed operators by providing MNOs with a more favourable regulatory treatment. Ofcom considers that sustainable competition between mobile and fixed operators should be driven by the underlying costs of the technologies, facilitated by a neutral regulatory environment consistent with Ofcom's duties under Section 4(6) of the Act. There would be serious doubts as to the sustainability of competition between mobile and fixed operators if it were underwritten by excessive pricing of mobile termination services at the expense of fixed operators and callers to mobiles. As such, Ofcom does not agree with H3G that it should be unconcerned how MNOs compete away excessive profits from termination charges.
- 7.55 T-Mobile argued in the response to the March 2006 Consultation that this view is heavily focused on static efficiency gains. In its view, if a dynamic long run efficiency perspective is considered, Ofcom should note that mobile networks represent the key means by which BT's control over the local loop bottleneck can be overcome. As set out in the September 2006 Consultation Ofcom considers that MNOs may in the future prove to be strong competitors to BT in providing access to consumers in their homes. However, as discussed, it is not efficient for this competition to be based on excessive charges for MCT.
- 7.56 For the same reason, Ofcom does not accept H3G's view that increased competition in mobile markets, founded on the unique ability of one player with SMP to set MCT charges without regulatory constraints, should be pursued as a regulatory objective. Neither does Ofcom accept H3G's view that the objections to this approach may be set aside in the case of an MNO with a relatively small market share as the distortions between fixed and mobile sectors remain material – particularly as H3G grows.

Inequitable distributional effects

- 7.57 As Ofcom noted in the March 2006 Consultation, as mobile termination charges are a major component of the price of calls to mobiles, if the former are excessive, callers to mobiles can face an excessive price for fixed-to-mobile and mobile off-net calls, and, given some level of pass-through (via the waterbed effect), lower prices for other retail mobile services. Therefore callers to mobiles may face excessive charges while mobile subscribers may benefit through lower prices for mobile services. Different consumers will face a different distribution of these effects. At a high level there are three categories of consumers to which these distributional benefits are important (date based on Quarter 4 2005 data from Ofcom's Residential Tracker Survey):
- Fixed only consumers i.e. those not personally using mobile phones and living in households with fixed line phones. This group accounts for approximately one in ten (9%) of adults;

- Mobile only consumers i.e. those personally using a mobile and living in a household without a fixed line phone. This group accounts for approximately one in ten (10%) of adults; and
 - Mobile and fixed consumers i.e. those who have been found to use mobile phones and live in household with fixed line phones. This group accounts for approximately four-fifths (80%) of adults.
- 7.58 Fixed only consumers are adversely affected by the negative impact of excessive termination charges. However, the proportion of fixed only consumers is declining and is now slightly smaller than the number of mobile only users. Ofcom's January 2006 survey (see paragraph 3.35 above) also suggests that many fixed only consumers are not frequent callers of mobiles; for example, only 7% of this group reported calling a mobile daily (compared with 34% of consumers with both a fixed and a mobile phone).
- 7.59 Other types of consumers face a tradeoff, higher prices for calling a mobile compared to lower prices for mobile services. Within the population of mobile users ("mobile-only" and "mobile and fixed"), it is highly likely that some consumers will be adversely affected by high termination charges; this will depend on the extent to which they consume calls to mobiles relative to other services. For example those who frequently change their (subsidised) mobile phone and also make few fixed to mobile calls are more likely to benefit from subsidies funded by high termination charges than those who do not change their handset from year to year and are frequent callers from fixed to mobile phones.
- 7.60 Given the existence of SMP, the difference between the cost of MCT and the wholesale charge in the absence of any intervention (or the threat thereof) is likely to be large. The transfers between different sets of customers are unlikely to be 'undone' by compensation from those made better off to those worse off. In the context of these transfers arising from the exploitation of SMP, Ofcom therefore believes that distributional factors should legitimately be taken into account in the decision as to whether there is a justification for regulation of termination charges, as an adjunct to the basic efficiency rationale, set out in the previous section.
- 7.61 In responding to the March 2006 Consultation, T-Mobile, O2 and Vodafone each noted Ofcom's finding that there is now roughly the same number of mobile-only households as fixed-only households, and took from this that any distributional concerns that excessive MCT charges are detrimental to fixed-only households are of less importance than hitherto. Vodafone draw similar conclusions from Ofcom's observation that fixed-only households are not particularly frequent callers of mobiles.
- 7.62 T-Mobile presented further data and analysis of its own relating to the incomes of fixed-only and mobile-only households. This indicated that mobile-only households are also, broadly, less prosperous than fixed-only households. T-Mobile took from this finding that, as it is the poorer and marginally more numerous group (mobile-only households) which benefits from relatively high MCT charges, any reduction in these charges would not have a positive redistributive effect.
- 7.63 Ofcom acknowledged in Section 5 of the March 2006 Consultation that the demographics of fixed and mobile users had changed, and Ofcom recognises that there is no longer a clear argument that lower MCT charges particularly benefit disadvantaged groups. However, as noted in that Section 5, it remains the case that excessive MCT charges which are used to subsidise particular retail mobile services

are disadvantageous to certain groups of consumers (defined by their relative levels of spending on the affected services). To the extent that this disadvantage arises from the exercise of SMP, rather than an economically efficient structure of prices, it remains Ofcom's view that the overall effect is likely to be detrimental to consumers.

Risk of anticompetitive behaviour

- 7.64 The ability to set excessive charges for MCT enjoyed by the MNOs could also be used to distort and reduce competition in retail mobile markets. Each MNO is a monopolist in the provision of termination services to originating operators for calls to that MNO's subscribers. These services are an input into retail products sold by the MNO and competitors in both the outgoing and access market and other retail markets. Hence, an MNO may be able to exploit its position in the termination market to impair its rivals' ability to compete for customers. Similar concerns may also arise in respect of anticompetitive behaviour towards fixed network operators where these are close competitors.
- 7.65 Where all MNOs are of similar size in terms of revenues or subscribers, they may have similar levels of market power in the retail mobile market, so distortion of existing competition in retail mobile markets might be limited. However, with the entry of H3G and possible future entry associated with the liberalisation of spectrum, there is potential for anticompetitive pricing by larger MNOs to the detriment of smaller MNOs and therefore competition.
- 7.66 In particular, the larger MNOs could charge higher termination charges to smaller MNOs than they charge to each other. A new entrant, given its asymmetric position in the retail market with respect to the incumbent MNOs could find itself at a disadvantage in offering retail access and outgoing call services if, for example, its incoming and outgoing traffic were not balanced. Ofcom therefore believes that the competitive distortions that may arise if MNOs were free to exploit their SMP in the market for mobile voice termination should also be considered in the decision whether to regulate.
- 7.67 However, Ofcom notes that if an MNO (such as a small new entrant) is unable to negotiate reasonable terms for mobile call termination (or is unable to establish direct interconnection), it may instead seek to use another operator (such as BT) to transit the call to the relevant mobile network. The call will then be terminated under the terms of that transit operator's mobile termination agreement. BT offers such services and, therefore, the termination rate paid by BT to the other MNOs effectively acts a ceiling on the maximum charge any new entrant would have to pay. As T-Mobile argued in its response to the March 2006 Consultation, a concern such as this does not necessitate charge controls but rather could be addressed with an obligation to prevent undue discrimination. Regulatory remedies are discussed in the next part of the impact assessment.
- 7.68 In its response to the March 2006 Consultation, T-Mobile presented reasons why this issue does not justify regulation. In particular it argued that if excessive termination charges lead to lower mobile prices and greater competition with BT and other fixed operators this should be welcomed given BT's SMP in the fixed retail market. However, as discussed earlier, in relation to the distortion of consumer choice, Ofcom does not consider that competitive distortions between fixed and mobile operators due to asymmetric regulation should be encouraged as T-Mobile suggests. Competition promoted by excessive pricing is not an efficient form of competition.

- 7.69 A final issue raised by T-Mobile in its response to the March 2006 Consultation was the consideration that it is regulation itself that is currently distorting the competitive process by allowing H3G to set unregulated termination charges almost double those of the other MNOs. It argued that H3G is using higher termination charges to undercut the retail prices of the other operators and grow its customer base, regardless of relative efficiency. This last point is not related to Ofcom's general analysis of detriments in this section but to the current particular application of regulation of mobile termination across MNOs. As discussed below, Ofcom considers that it is appropriate to impose charge controls on all MNOs, thereby addressing the concern raised by T-Mobile. Ofcom has also taken the issue of competitive distortions into account when assessing the appropriate glide path for H3G (see paragraph 9.183). In any event, any adverse impacts from the present absence of charge controls on H3G are not a sound reason for Ofcom to refrain from regulating *any* MNOs.

Summary

- 7.70 In summary it is Ofcom's view that, in the absence of regulation, the resulting structure of prices in retail and wholesale markets would be inefficient and would have a detrimental impact on consumers, which would warrant regulatory action. Furthermore, Ofcom remains of the view that the waterbed effect is unlikely to be complete. Thus, some excessive profits generated by MCT charges may be retained by MNOs at the expense of consumers paying excessive prices, since the mobile retail market may not be sufficiently competitive for all excess profits to be competed away.
- 7.71 The level of MCT charges has an impact on prices, and consumption, of a wider range of fixed network retail services, and, more broadly, on the relative extent to which fixed and mobile networks are invested in and used. In Ofcom's view, the importance of this issue is likely to continue to grow as fixed and mobile services continue to converge.
- 7.72 Ofcom also recognises that demographic changes are such that concerns expressed in previous reviews of this market, that low income groups may be particularly disadvantaged by high MCT charges, are now less relevant. As T-Mobile noted in its response to the March 2006 Consultation, where additional weight has been placed on the need to address social disadvantage, the distributive benefits arising from reductions on MCT charges may be lower than hitherto. It remains the case, however that certain groups (defined by their telecoms consumption patterns rather than their broader demographic identity) are materially disadvantaged by the inefficient structure of prices arising from certain retail mobile services being subsidised by excessive MCT charges.
- 7.73 It also remains Ofcom's view that the risk of anticompetitive behaviour increases in the presence of excessive MCT charges as excessive charges can be used to distort and reduce competition. Ofcom acknowledges that charge controls are not the primary means to address such behaviour. A concern that MNOs may discriminate between different purchasers of MCT may be remedied with an undue discrimination obligation. However, to the extent that a reduction in MCT charges lessens this risk, this represents a further benefit to be derived from charge controls.

Section 8

Impact Assessment: Part 2 – Regulatory options for realising the benefits of regulation

8.1 In this section Ofcom sets out its conclusions with respect to the nature of the remedies which should be imposed to address the detriments identified in section 7 above.

Proposal set out in the September 2006 Consultation

8.2 In the March 2006 and September 2006 Consultations, Ofcom considered a number of different ways in which it might address detriment arising where SMP is exercised to set high MCT termination charges. Having considered responses to the March 2006 consultation, Ofcom proposed in the September 2006 Consultation that it should impose the following conditions on each of the five MNOs;

- A charge control on mobile to mobile MCT to apply until 31 March 2011.
- A charge control on fixed to mobile MCT to apply until 31 March 2011
- A prohibition of undue discrimination
- An obligation to meet reasonable requests for MCT on fair and reasonable terms,
- An obligation to publish charges and contracts for the supply of MCT

Responses to the September 2006 consultation

Broad views

8.3 BT, C&W [§<] each agreed that Ofcom was correct in its proposal to impose on each of the five MNOs a charge control, a prohibition of undue discrimination, a requirement to meet demand for MCT on reasonable terms and an obligation to publish charges. C&W noted, however, that a prohibition of undue discrimination should cover all users of MCT, including own supply. [§<].

8.4 The four 2G/3G MNOs were broadly supportive of Ofcom's proposals for addressing the identified detriment (assuming that Ofcom's market definition is correct and the finding of SMP is robust). Orange, however, argued that Ofcom had been too quick to dismiss reliance on Ofcom's dispute resolution powers, instead of a charge control.

8.5 H3G, however, argued that Ofcom's proposals were inconsistent with its statutory duty to promote competition, to further interests of citizens by ensuring that high speed mobile data services are available across the UK and to encourage investment and innovation. In H3G's view, the proposal to regulate H3G's supply of MCT would weaken competitive pressures in other mobile markets by reducing H3G's ability to act as a "maverick new entrant driving innovation".

The charge control conditions

- 8.6 As noted above, the 2G/3G MNOs broadly agreed that, if regulatory constraints on MCT charges can be demonstrated to be appropriate, then charge controls are the best option for realising the benefits of regulation. Orange however argued that Ofcom had been too quick to dismiss reliance (in the presence of SMP) on Ofcom's dispute resolution powers, instead of a charge control, and wished to understand more clearly Ofcom's reasoning.
- 8.7 H3G presented the view that a condition requiring either cost orientation or that charges are "fair and reasonable" ("F&R") would afford suppliers of MCT greater flexibility to alter charges in response to unexpected changes to costs as and when these become apparent. In H3G's view, the uncertainty with respect to future costs is such that, while a charge control might afford certainty about the future level of the regulated charge, it provides no certainty that suppliers will be able to recover efficiently incurred costs
- 8.8 BT, C&W and [X] agreed that charge controls are the appropriate means to realise the benefits of regulation.

Publication of access contracts

- 8.9 Vodafone, O2 and T-Mobile all argued that such an obligation would be burdensome and unnecessary, as these contracts are usually the result of bilateral negotiation. Vodafone proposed that it would be sufficient to supply a sample copy and affirm, in writing, that it does not differ in any material respect from the other agreements. Orange, while not objecting in principle to the proposal, sought clarification about the scope of proposed obligation. H3G did not comment explicitly on this proposal, but expressed the view that none of the proposed remedies are proportionate. BT and C&W [X] agreed that this, and the other proposed remedies are appropriate.

Prohibition of undue discrimination

- 8.10 O2 argued that the proposed prohibition of undue discrimination would be otiose as, in O2's view, MNOs have neither the ability nor the desire to discriminate between purchasers. In O2's view, the possibility that, absent a prohibition of undue discrimination, an MNO might charge a new entrant a higher termination charge to distort competition is fanciful as the new entrant could, instead, use BT as a transit operator. O2 also believed that behaviour of the type envisaged by Ofcom is likely to be a breach of the Competition Act, and could be addressed by ex post action. Other stakeholders did not comment explicitly on this proposed remedy although, as noted in the preceding paragraph, H3G expressed the view that none of the proposed remedies are appropriate and BT and C&W [X] commented that all of the proposed remedies are appropriate.

Obligation to meet reasonable requests for MCT

- 8.11 Stakeholders did not comment directly on the proposal to impose a condition requiring that MNOs meet reasonable requests for MCT on fair and reasonable terms.

An obligation to publish charges

- 8.12 Orange questioned the need for such an obligation in the presence of a charge control. In Orange's view, the charge control itself will provide transparency and, in

addition, rates will be published in BT's price list. O2, while not objecting in principle to an obligation to publish charges, expressed concern that the application of this condition in conjunction with the proposed charge control conditions might allow MNOs to blend unpublished charges (this concern is considered more fully in Section 10 below).

Notification of call volumes

- 8.13 O2 and Orange requested clarification of Ofcom's proposals with respect to a condition requiring notification of volumes of call termination. It was noted that the summary of consultation questions at Annex 4 to the September 2006 consultation included reference to a condition requiring publication of call volumes as well as call charges, whereas no such draft condition was appended at annex 21 for comment. Ofcom can confirm that the reference to notifying call volumes was erroneous and there is no such SMP condition.

Ofcom's response to specific points raised by stakeholders

- 8.14 Ofcom has set out, in the paragraphs which immediately follow, a short summary of its views on the responses made to the September 2006 Consultation in respect of the proposed options for realising the benefits of regulation set out in paragraph 8.2 above. This said, a more detailed response to them is contained within the body of the text of this Section, which sets out Ofcom's conclusions. Where stakeholders have commented on the drafting or detailed application of a condition proposed in the September 2006 consultation, Ofcom has addressed this in section 10 below. Ofcom's reasons for proposing that reliance should not be placed solely on an F&R condition were set out in paragraphs 8.32 to 8.45 of the September 2006 Consultation and are set out more fully in paragraphs 8.41 to 8.54 below.
- 8.15 Ofcom has considered the objections raised by some MNOs in respect of the proposal to require publication of access contracts. Having considered those objections, Ofcom has concluded that the benefits of contract publication in ensuring non discrimination are outweighed by the loss of commercial confidentiality and the administrative burden of publishing contracts. Ofcom has therefore concluded that MNOs with SMP should not be required to publish their access contracts. Ofcom notes that where there is doubt that contract conditions are fair and reasonable and non discriminatory (as required by the other SMP conditions proposed) Ofcom has statutory powers to require the terminating MNO to disclose contract terms to Ofcom.
- 8.16 Ofcom also recognises, as O2 points out, that purchasers of MCT have the option to purchase MCT from BT (packaged with transit services), and this option might be used where a less favourable and potentially discriminatory offer is made directly by the terminating MNO. It remains Ofcom's view, however, that MNOs with SMP absent regulation have the ability to discriminate unduly in circumstances where the option of relying on BT transit is unattractive to the purchaser, whether because of technical considerations, issues of timing or otherwise. In Ofcom's view, it is important that all purchasers of MCT, including new entrants, can have confidence that MNOs with SMP may not unduly discriminate against them. Ofcom's reasons are set out more fully in paragraph 8.82 below. Ofcom accepts that, as proposed by O2, it might in some cases be feasible to take action under the Competition Act. Ofcom has, however, set out in paragraphs 8.13 to 8.19 of the September 2006 Consultation some of the limitations of solely relying upon ex post competition law. Furthermore, the effects of undue discrimination could be severe, but the compliance costs of an ex ante condition prohibiting undue discrimination are likely to be low. Ofcom has

concluded, therefore, that a prohibition of undue discrimination is appropriate and proportionate for the reasons sets out in paragraph 8.82 below.

- 8.17 Ofcom has considered Orange's view that there is no need to require MNOs to publish their charges, and that reliance should be placed on BT's price list. In Ofcom's view, however, it is essential that MNOs with SMP are required to publish their charges as, absent charge publication, purchasers would have no means of judging whether the charges which they are offered are unduly discriminatory. While BT presently publishes the charges which it pays for MCT, there is no guarantee that this arrangement will continue and, in any event, publication of the charges paid by BT does not address concern that charges agreed with other purchasers may be different.
- 8.18 As noted in paragraph 8.13 above, Ofcom can confirm that reference in Annex 4 of the September 2006 Consultation to a proposal that MNOs with SMP should be required to notify call volumes was erroneous. Ofcom does not intend to require MNOs routinely to notify call volumes. In the event that Ofcom has reason to require such data, it may use statutory powers to require provision of such information.
- 8.19 [X]

Ofcom's reasoning and conclusions with respect to the options for realising the benefits of regulation

- 8.20 In the March 2006 and September 2006 Consultations Ofcom considered a wide range of possible remedies to address the identified detriments arising from excessive MCT charges. These possible remedies were divided broadly into two types; structural change to address the underlying causes of SMP and remedies to prevent MNOs from exercising SMP to set excessive charges.
- 8.21 Ofcom's reasoning and conclusions with regard to these possible remedies is set out below. Ofcom has set out the detriments of excessive MCT charges, and the benefits to be derived from charge controls, in section 7 above and in Annex 19. In this section 8, Ofcom has not attempted to quantify the relative benefits of the different approaches to addressing SMP in this market as, with the exception of the structural option to require technical change to enable competitive termination, the different benefits of each option have to do, mainly, with certainty and market stability, which are difficult, if not impossible, to quantify with any useful degree of accuracy. The cost of the option to require technical change to enable competitive termination is very difficult to quantify, as considerable development work would be required before even the technical feasibility of such intervention could be assessed. As set out in paragraph 8.2 of the September 2006 consultation, it is Ofcom's view that the administrative cost of implementing a charge control and complying with obligations to notify and publish charges and contract terms are unlikely to be material given the scale of the welfare gains noted in paragraphs 7.50 to 7.51 above.

Structural change

- 8.22 In the March 2006 consultation, two alternative kinds of structural change were explored; a mandated move to a RPP billing arrangement and technical intervention to enable more than one mobile network to terminate calls to any given handset. Ofcom did not favour either of these approaches, for reasons set out in the March 2006 Consultation. Responses to the March 2006 Consultation were almost unanimous in agreeing that neither was attractive (BT was the exception in presenting a more agnostic view of the possible longer term benefits of a mandated

move to RPP). The September 2006 Consultation set out Ofcom's view that a mandated move to RPP (or Bill and Keep) would currently be to the detriment of consumers, and the costs of any mandated form of technological change to remove the underlying causes of SMP would exceed the benefits.

8.23 Stakeholders made no specific comments on this option when responding to the September 2006 Consultation and Ofcom maintains its view set out in the September 2006 Consultation.

Option 1 Mandated RPP

8.24 Ofcom remains of the view, as set out in the March 2006 Consultation and September 2006 Consultation, that a move from CPP to RPP would currently be to the detriment of consumers in the UK, for the following reasons:

- Consumer response: there is considerable uncertainty as to consumer response to a move to a RPP system in the context of an established market with tens of millions of subscribers currently facing a familiar and well established charging structure;
- Short-term regulatory intrusion and uncertainty of net benefits: whilst RPP per se represents a framework within which repeated regulatory intervention to set charges may no longer be necessary (charges, typically, being set at zero for the long term) the extent of regulatory intervention in moving from CPP to RPP – and potentially mandating such a move – is significant, and with a high degree of uncertainty that the net benefits will outweigh the associated costs;
- Associated costs: it is likely that the costs incurred by operators, subsequently passed on to end users, would exceed the benefits to consumers.

8.25 Ofcom's position is consistent with that of the UK Competition Commission which considered the issue in 2003⁸³. This view was broadly shared by responses to the Preliminary Consultation and the March 2006 Consultation which, with the exception of BT's undecided view expressed in its response to the March 2006 Consultation, all expressed a strong sentiment against its introduction, on the grounds of disruption, customer confusion, lack of clarity over extent of benefits and (in the case of MNOs) distortion of competition absent the introduction of similar regulation to apply to termination of calls on fixed networks.

8.26 Ofcom is aware that there remains academic support for a move to RPP, particularly in the form of Bill and Keep, where the termination charge is set at zero and the cost of mobile termination might be recovered from a wide range of outbound mobile services. Ofcom recognises that such an approach might create less disruption in retail markets than one where customers pay a distinct fee to receive calls.

8.27 Ofcom considers that while the theoretical case for RPP has some merit, the evidence that RPP would lead to better prices for mobile customers today is not convincing. Compulsory RPP or Bill & Keep would be equivalent to very low or no wholesale termination charges. Requiring average charges to fall to zero, or near zero would not be deregulatory but equivalent to much stricter charge controls. The removal of fixed to mobile MCT revenues is unlikely to lead to lower charges for mobile customers.

⁸³ See paragraph 2.112 of the CC's 2003 Report referred to at footnote 22 above.

- 8.28 Industry observers who support some form of Bill & Keep often cite relative data on penetration, call usage and prices in countries with RPP and CPP billing arrangements. In Ofcom's view, in making cross country comparisons it is difficult to be consistent and control for key country specific differences. Such evidence does not provide reliable evidence that consumer outcomes would be improved if Ofcom were to mandate RPP (or set MCT charges close to zero across all operators). Ofcom notes that this situation may change over time, and in the event that fresh evidence on the matter is brought to it, Ofcom will consider any such evidence and any potential implications for structural remedies.

Option 2 Technical intervention

- 8.29 Ofcom noted in the March 2006 Consultation that, at any point in time, each mobile device is generally within the coverage area of 4 or 5 different mobile networks and, in theory, it is conceivable that callers or originating operators might be enabled to choose which network should terminate any call, thereby facilitating competition for the provision of such termination services.
- 8.30 However, responses to the Preliminary Consultation and the March 2006 Consultation confirmed Ofcom's view that this would require substantial technical changes. All respondents agreed that such change is not feasible at this time and the costs are unlikely to be proportionate to the benefits. For example, MNOs might need to develop a common home location register ("HLR") to which they would connect via visiting location registers. This approach might obviate the need for major changes to phones or the need for consumers to switch between SIMs, but design and implementation of a shared HLR would take time and be expensive. The alternative, of competing suppliers of termination services each tracking the location and status of each mobile phone, would require very substantial changes to mobile network infrastructure, signalling and phones, particularly to ensure the continued functionality of ancillary services such as voicemail.
- 8.31 In Ofcom's view, therefore, the costs of any mandated form of technological change to remove the underlying cause of SMP, would exceed the benefits.

Remedies for SMP

- 8.32 The March 2006 Consultation and September 2006 Consultation explored five possible approaches to ensuring that charges are set at an appropriate level in the event that SMP persists; competition law, charge transparency, retail tying, an obligation that charges should be "fair and reasonable" or cost oriented and a requirement to comply with a charge control. In the September 2006 Consultation Ofcom proposed that the most cost effective option is a direct charge control.
- 8.33 H3G developed its view expressed in response to the March 2006 consultation, that price control is not the appropriate remedy and that Ofcom should rely instead on an obligation to ensure that charges are cost oriented or, potentially, that charges are fair and reasonable. In H3G's view, such an approach would provide the flexibility to deal with market change and uncertainty. In H3G's view, disputes in respect of a cost orientation condition could be resolved within four months, provided that Ofcom had issued appropriate regulatory guidance; H3G contrasted this timeframe with the extended period for market review consultations. As noted in paragraph 8.4 above, Orange too asked Ofcom to clarify why it believed that an obligation to ensure that charges are "fair and reasonable", applied against the background of Ofcom's powers to resolve disputes, would not deliver a satisfactory outcome.

- 8.34 In the following paragraphs, Ofcom responds to the views of Orange and H3G in respect of the option of imposing an obligation that charges should be cost oriented or fair and reasonable, and sets out its reasoning and conclusions in respect of the wider range of possible remedies set out in paragraph 8.33 above.

Option 3 Reliance on ex post intervention under competition law:

- 8.35 Ofcom potentially could withdraw all ex ante conditions relating to MCT charges and instead rely on ex post competition law. This would have the advantage of reducing the level of ex ante regulatory intervention.
- 8.36 However, as noted in the March 2006 Consultation, reliance on ex post competition law has a number of disadvantages. As set out at paragraph F.47 of Policy Annex F of the TSR Phase 2 consultation⁸⁴ the principles of competition law, as they can be derived from the statute and existing case law, do not always provide ready-made solutions to the problems experienced in telecoms markets. While competition law can, where necessary, incorporate such highly technical matters, there is nonetheless a practical case for addressing such issues through sector rules. This avoids what would otherwise be protracted delays in the development of a body of case law that supports the necessary technical requirements.
- 8.37 Indeed, without the imposition of ex ante regulation actively to promote the development of competition in markets in which competition is not effective, it is unlikely that ex post general competition law powers would be sufficient to ensure that effective competition became established. For example, ex post powers prohibit abuse of dominance rather than the holding of a dominant position. Ex ante powers can be used to reduce the level of market power and thereby encourage effective competition to become established.
- 8.38 Additionally, reliance on ex post competition law may not allow for the certainty of intervention that is necessary to give all parties (including MNOs and FNOs) the confidence to plan their businesses and make significant investments within a clear and predictable regulatory environment.
- 8.39 For the reasons summarised above, the March 2006 Consultation did not favour reliance on ex post competition law where SMP persists. Few stakeholders commented on this view. H3G, however, strongly favoured an “ex post” approach to charge setting, whether enforced through competition law or an ex ante obligation that charges should be fair and reasonable or cost oriented. In H3G’s view, a view reiterated in its response to the September 2006 Consultation, such broadly “ex post” approaches provide a greater degree of flexibility than a direct charge control, as they allow providers to modify their charges in the light of changing costs. H3G acknowledged, however, that competition law principles have not been developed with the circumstances of interconnection in mind, and a reliance on pure competition law at this stage would be inappropriate and could lead to industry confusion for a period of time. H3G’s response was, therefore, focussed on the use of an ex ante condition requiring that charges should be fair and reasonable or cost oriented. Ofcom has addressed H3G’s views below in the context of the evaluation of an approach based on a condition requiring that charges must be fair and reasonable or cost oriented.
- 8.40 Ofcom considers that in these markets a reliance on ex post competition law (where SMP persists) would not be appropriate or cost effective. This is because, among

⁸⁴ http://www.ofcom.org.uk/consult/condocs/telecoms_p2/tsrphase2/PolicyAnnexes_FL.pdf

other reasons, ex ante regulation would give greater regulatory certainty to MNOs and FNOs from which to plan their businesses and make the appropriate investment choices, while also ensuring that competition in related markets is promoted. A reliance on competition law could potentially lead to a high degree of uncertainty concerning Ofcom's ability to take appropriate action within a reasonable time. It could also create uncertainty with respect to the appropriate level of charges as discussed further below in the context of a possible reliance on ex ante conditions requiring that charges should be fair and reasonable or cost oriented.

Option 4 Ex ante conditions requiring that charge are 'fair and reasonable' or cost oriented

- 8.41 The March 2006 Consultation noted that, in their application, there are likely to be close similarities between SMP conditions requiring, respectively, that charges are F&R or cost oriented. Whilst the term F&R itself allows for significant freedom of interpretation, its practical application, in the context of SMP regulation, has tended to be linked to some definition of cost, both in the UK and in other jurisdictions. As noted in paragraph 4.11 of the Statement on end-to-end connectivity (see note 57 above), however, interpretation of the concept of "reasonable terms" when applied in a context where the supplier does not have SMP, will depend on the particular circumstances and may span a broader range of outcomes than that which might be considered in the circumstances of SMP.
- 8.42 For example, the Swedish regulator, PTS, has articulated a more explicit link between F&R and cost orientation. In the market for mobile call termination, five operators were judged to have SMP, but only three; TeliaSonera, Tele2, and Vodafone, are under cost orientation obligations, while H3G and Telenor are required to adopt F&R pricing. The PTS clarified this by stating that charges should be "fair and reasonable with reference to performance costs". A similar approach to regulating H3G has been applied in Denmark, although the European Commission has expressed concerns⁸⁵ as to what this means in practical terms.
- 8.43 In Australia, interconnection rates are determined by negotiation, but the negotiating parties do have recourse to the regulator who will make a decision to ensure that rates are fair and reasonable. The rates charged should be cost orientated, transparent, reasonable, have regard to economic feasibility, and sufficiently unbundled so that the operator only pays for the network components required.
- 8.44 In the context of F&R as a remedy to SMP in mobile call termination, as a consequence, whilst the term itself allows for significant freedom of interpretation, its practical application in these markets, along with the necessary conditions, may yield, in this case, an outcome that has similarities with cost orientation. Responses to the March 2006 and September 2006 Consultations recognised these similarities. No respondents expressed a clear preference for one of these forms of regulation over the other, even where a condition requiring that charges should be fair and reasonable or cost oriented was the preferred approach where SMP could be demonstrated to exist. H3G, which, in its responses to the March 2006 and September 2006 Consultations, expressed a strong preference for one or other of these forms of regulation as an alternative to charge controls, expressed a slight preference for a condition requiring that charges must be cost oriented (as opposed to "fair and reasonable") on the basis that such a condition might be more closely aligned with the principle that MNOs should be permitted to recover efficient costs.

⁸⁵ Commission letter dated 12 August 2005 addressed to the Danish NRA in response to the NRA's proposals for regulation of the market for wholesale mobile voice call termination in Denmark

However H3G acknowledged that the issue is finely balanced and which approach is preferable would depend on the actual implementation and detail around the guidance provided as part of the remedy.

- 8.45 The following paragraphs explore the costs and benefits of these forms of regulation. Ofcom considers that, in practice, the costs and benefits of these two approaches to regulation in these markets are very similar.
- 8.46 The March 2006 Consultation recognised the merits of cost orientation in respect of economic efficiency and efficient market entry and exit decisions. However, the document also noted that, in the markets under consideration, there potentially exist material disadvantages in imposing a cost orientation remedy or F&R condition on its own. These disadvantages included that it would be highly likely to result in a period of commercial and regulatory uncertainty (including disputes, challenges and appeals) followed by the likely setting of prices or imposition of charge controls in response to individual disputes. As such, it was Ofcom's view that the approach was likely to be burdensome, costly and inefficient. The March 2006 Consultation specifically invited interested parties to say whether they agreed with this view.
- 8.47 In their responses to the March 2006 Consultation, BT and C&W both agreed with Ofcom's view, and BT drew attention to what it perceived as a failure of an "understanding" during the 1990s that charges should be fair and reasonable, which led to charges being referred to the MMC in 1998.
- 8.48 The views expressed by mobile network operators, in their responses to the March 2006 consultation, were more varied. O2 agreed with Ofcom's view and argued strongly that either approach (cost orientation or F&R) would be abused by some MNOs which would exploit the uncertainty by setting high charges, prompting others to follow suit. O2 reiterated that view in its response to the September 2006 consultation. Vodafone, T-Mobile and Orange, in their responses to the March 2006 Consultation, all noted, however, that such a framework could be made to work provided that Ofcom issued appropriate guidelines. That view was also shared by H3G, which, in its responses to both the March 2006 and September 2006 Consultations, expressed a strong preference for one or other of these approaches in place of a direct charge control (if a need for regulation could be justified). Indeed, in its responses to both consultations, H3G argued that Ofcom had dismissed this approach far too quickly. H3G argued in response to the September 2006 Consultation that a cost orientation or F&R obligation would have the flexibility to deal with market changes and would better address uncertainty and risk of forecasting error. Orange too, in its response to the September 2006 Consultation, asked Ofcom to clarify its objections to relying on an F&R condition backed up by Ofcom's powers to resolve disputes.
- 8.49 As explained in the September 2006 Consultation, Ofcom recognises that it would be possible for it to publish guidelines on its approach to assessing whether charges are cost oriented (or whether charges are F&R if some other measure of fairness and reasonableness was judged appropriate). However, as illustrated in Section 9 below, the complexity of MCT costs is such that any assessment will inevitably necessitate very detailed decision taking on conceptual issues. These include accounting principles, allocation of common costs and allowance for network externalities, as well as principles for recovery of direct costs and licence fees. Each of these factors, depending on the approach taken, has the potential to make significant differences to the view of whether any charge is cost oriented or F&R. In Ofcom's view, it is highly unlikely that any guidelines, short of a detailed published evaluation of costs, would be sufficient to provide purchasers and suppliers with a reasonable level of clarity as

to the level of charges which could be considered cost oriented or fair and reasonable.

- 8.50 Responses to the March 2006 and September 2006 Consultations, from suppliers as well as purchasers, highlight the absence of a common industry view of what is the appropriate level of charges for MCT and what, if any, cost differences between different suppliers should reasonably be reflected in charges. Ofcom remains of the view that reliance on a condition requiring that charges must be cost oriented or F&R, even in the presence of detailed guidelines, would result in a period of uncertainty followed by the likely imposition of charge controls in response to specific disputes, unless the “guidelines” were so prescriptive as to set out the appropriate level of charges in closely specified circumstances. In Ofcom’s view, as proposed in the March 2006 Consultation, with detailed cost modelling, and having consulted extensively on conceptual costing issues, it would not be appropriate to delay publishing a conclusion on the appropriate level of costs until disputes are brought, particularly if such an approach is taken simply on the grounds that a restricted obligation is “light touch”.
- 8.51 The approach would generate costs in terms of market distortions caused by different suppliers adopting different charge setting strategies in response to regulatory uncertainty. As O2 argued in its responses to the March 2006 and September 2006 Consultations, it is likely that some suppliers would exploit the regulatory uncertainty by setting charges at a relatively high level, preferring to delay aligning charges with cost until Ofcom has determined the appropriate level of charges. Others, seeking to avoid regulatory intervention, might initially set charges at a relatively low level, subsequently increasing their charges in response to the behaviour of other suppliers. As a consequence, until charges are determined by Ofcom, the level of charges would tend to reflect suppliers’ views on their ability to take advantage of the regulatory uncertainty. There would also be administrative costs in resolving multiple disputes, and costs arising from purchasers’ uncertainty about the level of costs to be included in retail prices for calls to mobiles. These costs are unlikely to be outweighed by any benefits which, in Ofcom’s view, would be largely illusory, limited to an appearance of “light touch” regulation.
- 8.52 Ofcom notes H3G’s view that a cost orientation or F&R condition would afford suppliers of MCT greater flexibility to alter charges in response to unexpected changes to costs as and when these become apparent. Ofcom also notes, however, that the approach would remove incentives to improve efficiency. In H3G’s view, the uncertainty with respect to future costs is such that, while a charge control might afford certainty about the future level of the regulated charge, it provides no certainty that suppliers will be able to recover efficiently incurred costs. To deal with uncertainty about future costs Ofcom has considered the detriment consequent on setting charges too low or too high, and set charges at a level which strikes the appropriate balance in the circumstances, as set out in paragraphs 9.193 to 9.196 below. In Ofcom’s view, the alternative approach, of enabling suppliers of MCT to alter their charges as and when they perceive a change in costs, would generate a high probability of multiple series of disputes initiated each time a charge is altered. There is also the risk that charges overall will rise as suppliers may increase their charges in response to increases notified by other suppliers of MCT.
- 8.53 Therefore, in the presence of SMP, Ofcom does not consider it appropriate to rely solely on an obligation that charges should be cost oriented or F&R. The benefits arising from cost reflective charges (as set out in Section 7 above) are likely to be similar to those of a charge control set directly by Ofcom. However, the method of achieving that outcome (i.e. by resolving disputes as and when received) is likely to

be more costly than that of a direct charge control, in terms of continuing commercial uncertainty, a high risk that charges will remain excessive until disputes are resolved and higher administration costs.

- 8.54 Ofcom does believe, however, that it would be appropriate to include an obligation to supply Network Access on fair and reasonable terms as part of a condition requiring MNOs to meet reasonable demand for Network Access. This view is explored in paragraph 8.85 below.

Option 5 Transparency

- 8.55 The March 2006 Consultation set out Ofcom's view that an ex ante price transparency obligation for each MNO (for example notifying charges and publishing a reference offer) on its own may provide a constraint on the level of call termination charges to the extent that it affects the purchasing decisions of either the calling party or the called party. However, the co-incidence of (i) SMP call termination on each network and (ii) the presence of CPP as the prevailing pricing framework creates a situation in which calling parties do not impose a sufficient constraint on terminating operators. This is because they are unable to substitute to other forms of contacting a mobile subscriber, and the called party does not take into account the cost of being called when deciding to which network to subscribe.
- 8.56 Whilst price transparency may result in consumer pressure and lobbying, this is unlikely to wield sufficient pressure on MNOs to ensure the price is at the competitive level, unless the levels of mobile termination charges were such that they affected the subscription decisions of end users, for example as a consequence of negative end user sentiment impacting brand. The level at which mobile termination charges would have such an effect is untested. What is evident, however, is that levels of mobile termination charges significantly higher than those prevailing today have been tolerated by called parties, and appear to have had little impact on subscription decisions. As a consequence, the adoption of such a remedy, of itself, would not provide sufficient constraint on the pricing freedom of the MNOs.
- 8.57 Stakeholders responding to the September 2006 Consultations did not comment on the costs and benefits of relying on a transparency obligation to constrain MCT charges in the presence of SMP. H3G, in its response to the March 2006 Consultation, stated that it had no significant comments on this option, although H3G claimed that the March 2006 Consultation was unclear about what was meant by a price transparency obligation, and assumed that it referred to some kind of retail price transparency; H3G observed that the relevant retail prices are not charged only by mobile operators. In fact the March 2006 Consultation cited, at paragraph 7.16, the example of an obligation which required each MNO to notify charges and publish a reference offer (i.e. wholesale charges). In Ofcom's view, as set out in paragraph 8.21 of the September 2006 consultation, in the context of a finding of SMP in a wholesale market for the supply of MCT, any transparency obligation would be restricted to wholesale charges, because retail prices are in different markets beyond the SMP markets considered in this review
- 8.58 Thus it is Ofcom's view that, although the costs of implementing a transparency obligation may be low (in terms of publishing and/or notifying charges), where each operator has been designated as having SMP in its respective market for MCT, wholesale price transparency, of itself, is insufficient to constrain excessive pricing practices.

- 8.59 However, Ofcom has considered, in paragraphs 8.79 to 8.80 below, the costs and benefits of transparency obligations to supplement a charge control.

Option 6 Retail tying

- 8.60 The March 2006 Consultation noted that the option of tying MCT charges to retail prices appears to represent a 'light touch' (and potentially low cost) framework for constraining MCT charges, as compared, for example, with cost-orientation obligations. However the March 2006 Consultation also noted (as had responses to the Preliminary Consultation) that the approach also presents a risk of distorting 'spillover' effects into the retail market, along with practical implementation difficulties. No responses to the September 2006 Consultations identified any additional benefits in retail tying. Detailed responses had been made in response to the Preliminary consultation and Ofcom had commented of these in the March 2006 Consultation.
- 8.61 Ofcom continues to believe that retail tying presents significant challenges from both theoretical and practical perspectives. These include the likelihood that, as set out in the March 2006 Consultation, MNOs subject to such controls will respond to linkages between retail and wholesale prices by making pricing decisions in respect of retail prices taking into account the consequent effect on call termination prices. Therefore, rather than drive competitive effects from retail into call termination the opposite effect may occur. The competitive effects in the retail market could become distorted by its links with the wholesale MCT market. For example, in considering a reduction in retail prices, an MNO will recognise that this will, in turn, lead to a consequent reduction in call termination prices. Depending on the levels of the two charges with respect to their respective underlying costs, the MNO may choose to forgo the benefits such a retail price reduction may bring (for example, in terms of greater market share) in order to preserve the (potentially monopoly) profits which accrue from call termination.
- 8.62 Ofcom also recognises that it would be necessary to consider what the appropriate starting price points should be for the different operators. MCT charges (and prices for retail outbound services) vary between MNOs and, to an extent, between termination technologies. Such a starting point would, in theory, be the competitive price level i.e. a set of prices taking into account operators' efficiently-incurred costs. Therefore, such an approach, if rigorously applied, will not preclude the need for a detailed assessment of the appropriate starting point. This in turn, would require an understanding of the cost structures of the existing operators and the relationships between prices for different services and their underlying costs.
- 8.63 Further practical difficulties arise as a consequence of the introduction of increasingly sophisticated pricing structures for access and call charges. The retail mobile market is characterised by significant use of bundling (for voice and data traffic as well as including both on- and off-net calls to both fixed and mobile networks) and flat-rate charging structures. As a consequence of this complexity the identification of price(s) for an appropriate measure of retail prices to which mobile termination charges could be tied is challenging. In addition, attempting to specify a framework which regulates all operators with equal levels of stringency such that a 'fair' framework for competition is established, is also difficult since complexity and differences across operators' tariffs means there is scope for operators to manipulate any established price index. Furthermore, given the variety of available pricing structures, it is quite possible that if retail tying were introduced operators would not only make decisions regarding price changes with respect to their knock-on effects to mobile termination charges, but also in respect of the definition of those prices themselves, as baskets, services and service offerings constantly evolve in response to consumer demand.

- 8.64 One possible way to reduce the impact on retail markets involves the use of a framework whereby (i) the lowest industry mobile termination charges are adopted as the starting point and (ii) changes in mobile termination charges are based upon changes in industry price movements. Ofcom considers that this framework would dampen the feed-through from retail prices to mobile termination charges for any given operator, as their respective retail market shares will be below 100%. This could lead to a possible outcome such that the gain in retail market share from undercutting rivals will more than outweigh the diluted impact of reduction in mobile termination charges for all. However, whilst such an approach dampens the retail market distortion arising due to the knock-on effects to mobile termination charges, it still does not address the fundamental weakness of the framework in that this link remains. Operators will be incentivised to retain existing economic profit and desist from price competition that reduces their profits but is beneficial for consumers.
- 8.65 An extension of this framework is one in which the changes in the mobile termination charges of any given operator is a function of changes in the retail prices of the other operators. T-Mobile, in its response to the Preliminary Consultation, noted that the risk of distorting spillover effects could be addressed in this way. The approach breaks the link, for each operator, considered individually, between retail prices and mobile termination charges. However, the outcome of such a framework is ambiguous, and will depend, inter alia, on the assumptions made by each operator in respect of competitive responses to lower retail prices.
- 8.66 It is instructive to note that such an approach was relied upon from July 2001 by the Australian Competition and Consumer Commission (“ACCC”)⁸⁶. This approach tied the change in each operator’s mobile termination charges to the retail price movements of its ‘overall package of services.’ The ACCC adopted such an approach against the backdrop of significant recent reductions in retail charges and, in parallel with its introduction, also established a monitoring framework to assess the outcome. The ACCC noted, in recommending a return to mobile termination charge regulation in March 2004, that ‘this ha[d] not been as effective as it was hoped, as retail prices in mobile services ha[d] not decreased as much as was expected.’ This is in keeping with the outcome of the review process, which concluded that ‘during the monitoring period, the rate of change in the retail price of the bundle of mobile services ... was, by and large, inconsistent with the price decreases observed by the Commission prior to adopting this methodology ... [and that] such results would appear to call into question the foundation upon which the retail benchmarking principle is designed to work.’ Whilst this is not proof of the concern that MNOs’ retail pricing decisions would be distorted by the knock-on effects to mobile termination charges, it is certainly consistent with such an outcome. The ACCC now adopts a cost-oriented approach to determining the appropriate level of mobile termination charges.
- 8.67 In conclusion, retail tying may have the benefits of lower administrative and informational burdens when compared, for example, with cost orientation. However, it is Ofcom’s view that the cost of competitive distortions which may ‘spillover’ into the retail markets outweighs the benefits relative to other options for controlling MCT charges which do not rely on this linkage. It is also Ofcom’s view that, given the need to determine the fair starting point for the relation between retail prices and MCT charges, retail tying does not obviate the need for Ofcom to take a view as to the appropriate level of MCT charges (albeit defined relative to specified retail prices). In Ofcom’s view, the potential costs arising from this assessment (particularly, the costs consequent on setting charges too high or too low) are no less than those which may

⁸⁶ See ACCC: Mobile Services Review, Mobile Terminating Access Service, June 2004.

be incurred in the course of more obviously intrusive forms of regulation such as charge controls.

Option 7 Charge controls

- 8.68 A charge control is distinct from an obligation that charges should be cost oriented or 'fair and reasonable', in that an upper limit on prices is directly set by Ofcom. Such an arrangement can create positive incentives, from the outset, for MNOs to reduce their costs in order to benefit from increased profitability during the period of the control.
- 8.69 Where Ofcom decides to impose a specific charge control, the appropriate level of charges is determined after detailed consultation with stakeholders. That process takes place over a significant period of time and involves a high degree of interaction with stakeholders. In contrast, where Ofcom is requested to resolve a dispute in relation to a condition requiring that charges should be fair and reasonable, Ofcom is generally required by the Act, save in exceptional circumstances, to resolve the dispute within four months. In the case of dispute resolution, while Ofcom could be expected to establish a close dialogue with the parties to the dispute, the opportunity for close and transparent consultation with a wide spectrum of stakeholders would be limited. Ofcom recognises that where it has already consulted on the basis on which future disputes will be addressed and has published Guidelines, all interested parties could be said to have had some opportunity to influence the approach which Ofcom takes. However, as noted in paragraph 8.49 above, for such Guidelines to be capable of ensuring that there is a reasonable level of clarity about Ofcom's future approach, they would need to set out in considerable detail Ofcom's views on a wide range of complex conceptual and charging issues. In such a case it might be considered more appropriate to enforce the detailed views expressed with a direct charge control (which would remove uncertainty arising from implementation and compliance).
- 8.70 Furthermore, the timing of regulatory intervention to set a charge control would be known to stakeholders (in contrast to the situation under a cost-orientation or fair and reasonable charges obligation where timing would be dependent on when a dispute is brought to Ofcom for resolution). A decision to impose a direct charge control may, therefore, avoid a period of uncertainty and enable controls to be imposed in an orderly manner and on a basis which has been subject to extensive consultation, rather than on an ad hoc basis in response to individual disputes.
- 8.71 In their responses to the March 2006 and September 2006 Consultations, Vodafone, Orange and T-Mobile all acknowledged that, where SMP can be shown to exist and the consequent detriment can be shown to require action to constrain charges, the direct setting of an appropriate charge control can be an efficient and proportionate remedy for SMP. O2 did not comment on the merits of a direct charge control but, as noted in paragraph 8.48 above, was strongly of the view that a condition requiring that charges should be cost oriented or fair and reasonable would be abused by some MNOs. Given these concerns, O2 stated in its response to the September 2006 Consultation that it did not oppose the imposition of charge controls.
- 8.72 H3G, as noted in paragraph 8.52 above, was of the view that a direct charge control, while providing certainty with respect to the regulated charge, fails to provide adequate certainty that charge controlled suppliers of MCT will be able to recover their efficiently incurred costs in the light of uncertainty about future costs. That view was reiterated by H3G in its response to the September 2006 Consultation. In their responses to the March 2006 Consultation, all MNOs shared H3G's concern that any control must allow suppliers to recover their efficiently incurred costs. T-Mobile

proposed that a proportionate approach might be to apply a safeguard cap which is set at a level that provides a high degree of confidence that suppliers will be able to recover their costs. Ofcom has set out in Section 9 its approach to addressing uncertainty with respect to future costs, which relies in part on the use of conservative assumptions about future traffic volumes.

- 8.73 Responses to the March 2006 and September 2006 Consultations expressed widely divergent views on whether the present MCT charges (regulated and unregulated) of the various suppliers can, broadly, be considered fair and reasonable. This evidence suggests to Ofcom that there is no consensus view on the appropriate level of charges for mobile voice call termination in a world where calls are variously terminated using 2G and 3G networks. In Ofcom's view, therefore, a reliance on a requirement that charges should be cost oriented or fair and reasonable would almost certainly result in a period of commercial uncertainty and subsequent challenge. In these circumstances, it is Ofcom's view that it would be more efficient to set charges ex ante on a transparent basis following extended consultation. Furthermore, it is Ofcom's view that the charge controls imposed in these markets in June 2004 have been broadly successful to date in preventing MNOs from exploiting their SMP to the detriment of consumers.
- 8.74 In view of the costs and benefits of the different options identified for constraining MNOs with SMP from setting excessive MCT charges to the detriment of consumers, it is Ofcom's view that the most cost effective option is a direct charge control. Ofcom recognises that direct controls on charges are an intrusive form of regulation and should be designed with great care to avoid regulatory distortions and unforeseen consequences. In Section 9 below Ofcom sets out its view on the costs and benefits of different charge control structures and charge levels

Additional conditions

- 8.75 The September 2006 Consultation proposed that four further conditions should be imposed on MNOs which have SMP in the market for the supply of MCT, in addition to appropriate conditions to constrain charges.

First additional condition; publication of charges

- 8.76 As noted in paragraph 8.58 above, Ofcom does not consider that a price transparency obligation alone would provide sufficient constraint on and MNO's ability to exploit SMP to the detriment of consumers. However, the March 2006 Consultation and September 2006 Consultations reported Ofcom's view that it is important that charge controls are associated with a high degree of transparency for interconnecting operators, consumers and other interested parties and commentators. MNOs are currently subject to an obligation to notify charge changes to interconnected parties, but the September 2006 consultation proposed that this obligation should be extended to an obligation to publish charges at large, and set out a draft condition accordingly. Having considered responses to the September 2006 Consultation, Ofcom has concluded that such a requirement should be imposed on all MNOs with SMP. For the reasons set out in paragraph 8.17 above, Ofcom does not accept the view expressed by Orange in its response to the September 2006 Consultation that an obligation to publish charges is not required
- 8.77 The March 2006 Consultation proposed that, in the event that some form of blending of 2G and 3G charges based on actual traffic volumes can be envisaged, this should be made subject to an obligation to publish the basis on which charges are blended, including the relative weights, based on volumes of the different services within any

blend. This information would both provide transparency to stakeholders and facilitate compliance monitoring by Ofcom. As explained in paragraph 9.14 below, however, it is Ofcom's view that separate charge controls imposed on 2G and 3G termination are not desirable and the issue of blended 2G/3G charges will not arise in future. Condition MA6 at Annex 20 does not, therefore, contain any provision for such data to be provided to Ofcom.

- 8.78 Ofcom notes O2's concern that the proposed charge publication condition and charge control conditions, when taken together, may allow some MNOs to blend unpublished charges. Ofcom can confirm that this is not its intention, and Ofcom has made a small change to the condition set out in the September 2006 Consultation to clarify the intention. This revised text is set out in Annex 20

Second additional condition; obligation to publish access contracts

- 8.79 The September 2006 Consultation also proposed that MNOs with SMP should be required to publish their access contracts, in addition to publishing their charges. The September 2006 Consultation set out Ofcom's view that an obligation to publish access contracts is required to enable purchasers to assure themselves that MNOs are complying with their obligation not to unduly discriminate in the supply of MCT.
- 8.80 Having considered responses to the September 2006 Consultation, however, Ofcom has concluded, as summarised in paragraph 8.15 above, that the benefits of contract publication in ensuring non discrimination are outweighed by the loss of commercial confidentiality and the administrative burden of publishing contracts. Ofcom has therefore decided that MNOs with SMP should not be required, routinely, to publish their access contracts. Ofcom notes that where there is doubt that contract conditions are fair and reasonable and non discriminatory (as required by the other SMP conditions proposed) Ofcom has statutory powers to require the terminating MNO to disclose contract terms to Ofcom. Ofcom has therefore concluded that it is sufficient to use statutory powers to require the provision of contracts where this is considered necessary for the purpose of checking compliance with SMP conditions.

Third additional condition; prohibition of undue discrimination

- 8.81 The March 2006 Consultation explained that Ofcom considers that a prohibition of undue discrimination remains important to ensure that SMP is not used to the detriment of consumers. As noted in Section 7, the pricing freedom, enjoyed by the MNOs with SMP in the mobile termination markets could be used to distort and reduce competition in the retail mobile market. In particular, concerns could arise with respect to smaller new entrants, including future new entrants which may emerge with the increased availability of spectrum. In the September 2006 consultation, therefore, Ofcom proposed that all MNOs with SMP should be prohibited from unduly discriminating in the supply of mobile voice call termination, and set out a proposed draft condition.
- 8.82 O2 expressed the view that MNOs do not have the ability or desire to discriminate between purchasers of MCT. Ofcom recognises, as O2 points out, that purchasers of MCT have the option to purchase MCT from BT (packaged with transit services), and this option might be used where a less favourable and potentially discriminatory offer is made directly by the terminating MNO. It remains Ofcom's view, however, as summarised in paragraph 8.16 above, that MNOs with SMP have the ability to discriminate unduly in circumstances where the option of relying on BT transit is unattractive to the purchaser, whether because of technical considerations, issues of timing or otherwise.

- 8.83 Ofcom accepts that, as proposed by O2, it might in some cases be feasible to take action under the Competition Act. Ofcom has, however, set out in paragraphs 8.13 to 8.19 of the September 2006 Consultation some of the limitations of ex post competition law.
- 8.84 Having considered responses to the September 2006 Consultation, Ofcom has concluded that the condition should be imposed on all MNOs with SMP.

Fourth additional condition; obligation to meet reasonable demand for voice call termination

- 8.85 The March 2006 and September 2006 Consultations noted that the imposition of a charge control is of limited value if the supplier remains at liberty to refuse to meet reasonable demand for voice call termination or will only offer this on unreasonable contractual terms. The September 2006 Consultation proposed that all MNOs with SMP should be subject to a condition requiring them to meet reasonable demand for mobile voice call termination on fair and reasonable terms, and set out a draft condition "Obligation to meet reasonable demand for mobile voice call termination". Stakeholders made no substantive comments on this proposal, and Ofcom has concluded that it should impose the condition on all MNOs with SMP.

Legal tests

- 8.86 Ofcom has set out more fully in Section 10 below its application of the legal tests for deciding whether it is appropriate to impose these SMP conditions (including charge controls) in these markets. Before doing so, however, Ofcom has set out in Section 9 its approach to controlling charges.

Section 9

Impact Assessment: Part 3 – Charge control options

9.1 In this section Ofcom sets out its reasoning and conclusions with respect to the nature, duration and levels of the charge controls which, as set out in Section 8 above, it has concluded should be imposed on MNOs with SMP.

Ofcom's reasoning and conclusions with respect to charge control options

9.2 In the following paragraphs Ofcom has summarised and responded to stakeholders' comments on the proposal contained in the September 2006 Consultation, and has set out its reasoning and conclusions with respect to charge control options.

9.3 For the reasons set out in Section 8 above, Ofcom has concluded that charge controls are the most appropriate means of addressing the detriments, identified in Section 7 above, that are likely to arise from the MNOs' exercise of SMP in each of their respective markets where they supply MCT to other Communication Providers.

9.4 The charge controls in force today are time-limited and apply only to four of the five MNOs (no proposal was made to impose charge controls on H3G in June 2004 when Ofcom determined that H3G had SMP) and only to termination of voice calls on those MNOs' 2G networks. A number of key questions arise, therefore, when considering the form of any future charge controls;

- **Duration:** how long each control should last for,
- **Technology neutrality:** whether charge controls for a given operator should continue to distinguish which network (2G or 3G) is used to terminate voice calls,
- **Level of charge controls:** including whether the same charge controls or different controls (or no controls) should be imposed on each or only some of the MNOs with SMP (the issue referred to in the September 2006 consultation as operator neutrality), and how to deal with key areas of uncertainty (in particular, future demand levels),
- **Path of reductions in charges:** how charges should be brought down to the level of the efficient charge during the course of the control period,
- **Structure of the charge controls:** including the treatment of calls from fixed networks and off-net mobile-to-mobile calls, the treatment of variations in time of day/week, calculation of compliance with the control, RPI adjustments, and the impact of mobile number portability.

9.5 The following paragraphs consider these in turn.

Duration

9.6 In the September 2006 Consultation, Ofcom set out its view that the duration of the charge control should be of sufficient length to establish material incentives for MNOs to reduce their costs in order to benefit from increased profitability during the

period of the control. Such reviews also require the MNOs (and major purchasers) to devote significant resources to presenting their views on competition and the level of costs. As such, it remains Ofcom's view that there are benefits in setting charges for an extended period of time during which suppliers and purchasers can operate with a high degree of certainty as to MCT charges.

- 9.7 In responding to the September 2006 Consultation, C&W and H3G both argued that, in the presence of material levels of uncertainty about future traffic volumes and unit costs, Ofcom should consider imposing a charge control of shorter duration or should commit to reviewing the appropriateness of charge controls before the charge control period expires. Other stakeholders made no explicit comment on this aspect of the proposal.
- 9.8 Ofcom notes that these stakeholders hold opposing views of whether the proposed charge controls present a risk that MNOs will over or under-recover their costs. Ofcom has decided to impose charge controls in this market to address the high risk that, absent controls, MNOs will over-recover relative to costs. In setting controls with that objective in mind, Ofcom has taken into account conservative traffic assumptions intended to reduce the risk that MNOs will under-recover. In addition, although Ofcom's view is that the waterbed effect is unlikely to be complete, even an incomplete waterbed effect ameliorates the risk than MNOs fail to recover their efficiently incurred costs overall. Given that many of the assumptions underpinning the proposed level of the charge control are based on longer term forecasts of network utilisation, Ofcom does not accept that a charge control of shorter duration would materially reduce the risk of under-recovery or over-recovery of costs in the longer term. Ofcom has concluded therefore that a four year duration for each of the charge controls remains appropriate in providing market stability and incentives for MNOs to increase efficiency over that duration.
- 9.9 Ofcom recognises, however, as did H3G and C&W in their responses to the March 2006 Consultation, that a lengthy charge control may exacerbate the effects of forecasting or costing errors. The consequent risks must, therefore, be taken into account when determining the appropriate charge level. As set out in more detail below (and in Annex 5), Ofcom has taken into account the identified risk of forecasting errors in this market by considering a range of plausible traffic scenarios. Furthermore, as noted in the March 2006 Consultation, in the event that unexpected market or technological developments (such as VoIP) start to have a material impact on the MCT market, such that it appears that charge controls may no longer be required, it would be possible (and appropriate) for Ofcom to review the market again before any charge control expires, with a view to withdrawing or amending the charge control conditions.
- 9.10 Ofcom has considered responses to the September 2006 Consultation and assessed the risks and benefits of a lengthy charge control compared with a charge control of shorter duration (as set out in paragraph 9.6 above). Furthermore, taking into account that Ofcom (and Oftel before it) has generally set charge controls, in other markets, for a duration of four years, Ofcom has concluded that charge controls should be imposed with a duration of four years. This charge control should commence on 1 April 2007 when the charge controls presently in force in respect of the 2G/3G MNOs expire.

Technological neutrality

9.11 The March 2006 and September 2006 Consultations observed that, logically, there are three options for charge controls applied to an MNO operating both 2G and 3G networks:

- a charge control (or controls) for voice call termination on 2G networks, or 3G networks, but not both;
- separate charge controls for mobile voice call termination on 2G and 3G networks; and
- a combined charge control (or controls) for the blended mobile voice call termination rate on 2G and 3G networks, irrespective of which technology is used.

A charge control (or controls) for voice call termination on 2G networks, or 3G networks, but not both

9.12 A decision to charge-regulate only 2G or 3G MCT (but not both), while allowing MNOs to charge a single blended contractual charge for an undifferentiated wholesale service, provides MNOs with the ability to set blended contractual charges at the level of their choice (subject to any commercial or competition law constraints). This factor is evidenced by the proposed and/or actual blended contractual charges of the four 2G/3G MNOs today (see Figure 2.1 above). Even in the presence of charge regulation which applies only to one of these two forms of MCT, it is unlikely to be appropriate to prohibit blending of regulated charges (2G in the present case) and unregulated charges (3G in the present case). Such a prohibition would be unlikely to be practicable as the network (2G or 3G) used to terminate a call depends on the capability of the called phone and its location. Neither the calling party (or his call provider) nor the billing systems of the terminating MNO are able to determine in advance of call set-up which type of MCT will be used. Indeed the call may switch between MCT types while in progress if the called party is moving.

9.13 Having considered responses to the September 2006 Consultation, Ofcom maintains the view set out in the September 2006 and March 2006 Consultations, that the option to regulate MCT on either 3G networks or 2G networks (but not both) would be undermined by the ability to set unregulated blended charges, and should not be pursued.

Separate charge controls for mobile voice call termination on 2G and 3G networks

9.14 The option to set a control for voice call termination on the 2G network, and separately, a control on the 3G network would prevent operators from setting blended charges above the regulated levels. However, such an approach may influence the rate of migration between the two networks, depending on the actual or perceived relative stringency of the controls. In this regard, and as explained in paragraph 7.54 of the March 2006 Consultation, differing levels of stringency across the two separate controls would mean that cost minimisation and profit maximisation outcomes (within the constraints of charge controls) would not be congruent. For example, in the event that operators perceive the controls on 3G call termination charges to be more stringent than those applied to 2G call termination, they may be encouraged to retain significant traffic volumes on the 2G networks even where

migration to 3G networks may present a more efficient (i.e. lower cost) longer term outcome.

A combined charge control (or controls) for the blended mobile voice call termination rate on 2G and 3G networks, irrespective of which technology is used

- 9.15 All respondents, except H3G, agreed that any charge controls should apply to voice call termination on both 2G and 3G networks without differentiation. In H3G's view, however, a single undifferentiated charge control provides incentives to use the lower cost 2G technology, slowing migration to 3G, to the disadvantage of consumers. In H3G's view, charge controls should take into account the actual extent to which MNOs migrate traffic from one technology to another.
- 9.16 Ofcom notes H3G's objections with respect to the proposal not to differentiate between 2G and 3G voice call termination when controlling charges. As explained in paragraph 9.10 of the September 2006 Consultation, however, the option to impose separate controls on 2G and 3G MCT presents a risk that the approach may influence the rate of migration between 2G and 3G networks depending on the actual or perceived relative stringency of the controls. In Ofcom's view, the resulting loss of congruence between cost minimisation and profit maximisation would be likely to result in inefficient use of resources, to the detriment of consumers. Ofcom agrees with H3G's view, presented in its response to the September 2006 Consultation, that a single charge control which applies without distinction to 2G and 3G voice call termination will tend to encourage MNOs with 2G and 3G networks to use the more efficient technology (subject to wider considerations concerning rollout of 3G networks and services). In Ofcom's view, however, this is a desirable outcome, for the reasons set out above. Ofcom does not accept that it should attempt to distort (through regulation of MCT charges) the relative extent to which 2G and 3G networks are used to terminate calls as this is a judgement better left to the market to determine.
- 9.17 Given that the response of MNOs to incentives to minimise costs and to migrate traffic are matters for commercial judgement, the question of which technology is the most efficient may be a complex question, potentially involving considerations such as long-run and short-run marginal costs, reversibility or irreversibility of traffic migration etc. For example, it may be the case that the marginal costs of 2G termination are currently below those of 3G. However, as traffic is migrated to the 3G network, this position may reverse so that an MNO taking a long-term review would consider 3G the more efficient technology even if costs are above those of 2G in the short term.
- 9.18 Therefore, it is Ofcom's view that regulatory decisions concerning charge controls should enable MNOs to make undistorted choices about the efficient technology and the timing of migration.
- 9.19 As noted in the September 2006 consultation, there are also practical reasons why separate controls applied on a call by call basis would be problematic, in so far as whether a call is terminated on a 2G or a 3G network depends on the capability and location of the called phone. These are matters not within the control of the calling party or his originating operator, and the network used to terminate the call may even change while the call is in progress. Ofcom therefore maintains the view that separate controls on 2G and 3G MCT are not appropriate.

9.20 Having considered responses to the September 2006 Consultation, Ofcom has concluded therefore that a single charge control to apply to a given operator without distinction of the network used to supply MCT is appropriate and consistent with Ofcom's duties. It would provide appropriate incentives for operators to invest in and migrate traffic to the most efficient network, i.e. that with the lowest unit costs, such that cost minimisation and (constrained) profit maximisation are congruent. In Ofcom's view, a single technology-neutral control would also provide operators with appropriate incentives to invest in and utilise the lowest-cost technologies to the benefit of end users.

Key benchmarks for establishing the level of technology neutral controls

- 9.21 As noted in the September 2006 Consultation, there are three key cost benchmarks to consider in evaluating relative and absolute levels of cost-based charges for MCT:
- a 2G-only approach i.e. assuming 2G networks represent the efficient benchmark for the supply of voice call termination;
 - a 3G-only approach, on the basis that 3G networks represent, on a forward-looking basis, the appropriate technology and associated costs; and
 - a blended 2G and 3G approach (using a 3G-only structure when considering a 3G-only MNO's costs) consistent, in terms of technology, with existing networks and plans.

The 2G-only approach

9.22 The September 2006 Consultation stated that, in as much as 2G and 3G voice call termination can be viewed as delivering the same service, there may be an argument for taking the cost of 2G termination as a benchmark for a reasonable cost of supplying MCT in general, irrespective of the technology used to supply it in practice. Callers and their call providers are unable to select which type of termination is used to terminate any given call (and are unlikely to have a preference based on the quality or nature of the service). 2G has been the technology used to deliver mobile voice call termination for many years. It could be argued that the charge for this service should not be higher in the future as a consequence of the introduction of 3G as a new technology to supply what can be considered to be the same wholesale termination service.

9.23 As Ofcom noted in paragraph 7.60 of the March 2006 Consultation, an approach on these lines would be consistent with Ofcom's approach to charging for narrowband conveyance ("PSTN-emulation" services) on BT's NGN. Charges for the latter are subject to the Network Charge Control ("NCC") which was set on the basis of projections derived from PSTN costs. It is Ofcom's view⁸⁷ that such an approach has good incentive properties in the short-term and is likely to be appropriate until a future NGN interconnect model is agreed.

9.24 Similarly, in its response to the September 2006 Consultation, BT suggested setting call termination charges solely on the basis of 2G unit costs for the entire volume of terminating traffic. In particular, BT considered that its approach would address what, in BT's view, were errors in Ofcom's treatment of 3G spectrum costs.

⁸⁷ Set out in "Next Generation Networks: Developing the regulatory framework", March 2006. (See <http://www.ofcom.org.uk/consult/condocs/nxgnfc/statement/>)

- 9.25 Ofcom discusses BT's approach in further detail below, and in Annex 14 in the context of 3G spectrum costs. BT stated that its approach crucially relies upon 2G costs (of which spectrum costs are a part) being "accurate". Ofcom agrees with this view. As explained in paragraph 9.53 below, there are difficulties in benchmarking 3G costs to current 2G costs. In the light of these difficulties, Ofcom has not implemented BT's proposed approach directly, although it has taken this approach into account in its selection and consideration of scenarios for the treatment of 3G spectrum costs – see below.

The 3G-only approach

- 9.26 Alternatively, H3G argued in its response to the March consultation that it is impossible for regulation not to distort MNOs' incentives (i.e. to avoid creating incentives to migrate traffic to a lesser or greater extent between 2G and 3G networks), and that Ofcom should set out to promote investment in 3G as a policy objective. On this basis, charge cap levels would be set with this objective in mind.
- 9.27 This issue has most impact on the 2G/3G MNOs, and H3G's view was that this policy aim would be best achieved by setting separate charge controls (each with distinct incentive properties). However, for the reasons set out above, Ofcom has not implemented this approach for the 2G/3G MNOs. In addition, Ofcom does not consider that adopting a 3G-only benchmark is appropriate for estimating the costs of an average efficient 2G/3G MNO, given that traffic will continue to be terminated on the 2G/3G MNOs' 2G networks during the period of the charge control and that it is appropriate to take account of the different costs of such 2G termination in any charge controls. The 3G-only approach has, however, been implemented for the 3G-only MNO, H3G, as set out below.

The 2G/3G blended approach

- 9.28 However, as summarised in paragraph 9.11 of the September 2006 Consultation, Ofcom has concluded that the level of the charge control(s) to be applied to MNOs with 2G and 3G networks should be determined with reference to a blended 2G/3G benchmark (see paragraph 9.20 above). This will be based on an average of 2G and 3G cost benchmarks, weighted according to the respective volumes of terminated voice minutes in each year. These component 2G and 3G cost benchmarks for an MNO with both 2G and 3G networks can be constructed so as to take into account reasonable assumptions around the migration of traffic between these networks and the potential cost savings arising due to a degree of asset sharing. Ofcom considers that the use of combined 2G and 3G benchmarks in this way is the most appropriate option for modelling the costs of an average efficient 2G/3G operator, since it enables Ofcom to take into account any differences in the costs of termination on 2G and 3G networks.
- 9.29 To the extent that such controls would not enable a 3G-only MNO to recover its efficiently incurred costs (if the costs of a 3G-only MNO are higher than the average cost of an MNO operating both 2G and 3G networks), it is Ofcom's view that charge controls in respect of a 3G-only MNO should be benchmarked to the costs of 3G MCT (see paragraphs 9.140-143 below). 3G-only cost benchmarks have been constructed so as to account for national roaming agreements which allow traffic in (rural) areas outside the MNO's own 3G network coverage to be carried on the network of another operator. Such traffic has been excluded so that only own-network costs are considered.

- 9.30 Ofcom has tested the effects of accounting for the 3G-only operator's national roaming agreement, as recommended by O2 in its response to the September 2006 Consultation (see Annex 13). By 2010/11 the volume of traffic that is terminated on the 2G roaming partner's network is expected to be very small, therefore the effect of O2's suggested adjustment to the termination charge is negligible. For this reason, Ofcom has concluded that altering the model to account for national roaming would not impact its final conclusions on charge levels. Ofcom is also mindful that any adjustment would need to take account of offsetting costs that the 3G-only operator may incur in establishing and maintaining a roaming agreement.

The level of the charge controls

Approach to identifying the efficient charge level

- 9.31 As set out in the September 2006 Consultation, in assessing the efficient charge level for providing MCT, it is appropriate to highlight four major components as follows;
- Network costs
 - 3G spectrum costs (included within the network cost modelling)
 - Non-network costs
 - Network externality surcharge
- 9.32 Each of these components is subject to uncertainty and sensitivity to key assumptions. In particular, network costs are very sensitive to assumptions about the level of future demand for voice and data services, which is very uncertain (see Figures A13.5 and A13.6 in Annex 13 for further details on this impact). Ofcom has taken account of this uncertainty by developing a set of benchmarks for the efficient charge level of MCT, based on different plausible scenarios for these key components and their underlying assumptions. In order to deal with the key uncertainty in relation to future demand, Ofcom has considered four different scenarios encompassing high, medium and low cases for voice and data, as well as a voice only scenario (see paragraph 9.160). Having assessed stakeholders' responses to the ranges presented in Section 9 of the September 2006 Consultation, Ofcom has set out in Figure A13.8 in Annex 13 below its view on relevant benchmarks for the efficient charge level.
- 9.33 Ofcom believes that its final benchmarks represent a reasonable set of efficient unit cost estimates for determining a final level for the charge controls. In particular, Ofcom has incorporated 3G spectrum values into its benchmark scenarios that are broadly consistent with the volume of voice and data traffic within each scenario. Ofcom has then selected a point within each range of benchmarks that reflects a reasonable efficient charge level. In selecting this level, Ofcom has taken into account the potential impacts on investment and innovation if MNOs are prevented from recovering their efficiently incurred costs, and the consumer detriment that would continue if charges in excess of costs were permitted to continue.
- 9.34 Ofcom's approach to modelling network costs is summarised in Annex 5 and its approach to non-network costs is set out in Annex 15. Ofcom's approach to considering 3G spectrum costs in efficient charge benchmarks is considered in Annex 14, and the different methodologies for assessing network externality effects are explored in Annex 16. Annex 13 describes the assembly of overall efficient

charge benchmarks, including the impact of each component and key sensitivities. The following paragraphs provide a high level summary of Ofcom's approach in each case.

The network cost model

- 9.35 In considering the form of this charge control it is necessary to understand the levels and structures of costs across the different operators and, specifically, the costs of providing MCT. Ofcom has conducted extensive cost modelling, in close association with the MNOs, to forecast efficient costs under a broad range of different scenarios. The structure and scope of the model is set out in Annex 5. The primary objective of the model is to assess the network costs to a single MNO of delivering voice services over 2G and/or 3G mobile networks. However, there are significant economies of scope in the provision of voice and data services, particularly on 3G networks. Therefore data services have also been included in order to provide a more accurate view of the costs of voice services and voice termination in particular.
- 9.36 The model is based on the use of technologies and spectrum bands which have been, or are currently being deployed in the UK. Specifically it includes:
- GSM in the 900MHz band
 - GSM in the 1800MHz band
 - UMTS using 5MHz paired spectrum in the 2.1GHz band.
- 9.37 The model explicitly calculates the investment and operating costs associated with network equipment, in particular the following:
- Radio network (including base station sites and equipment)
 - Backhaul (i.e. links from the base stations to the core network)
 - Backbone network
 - Core network switching equipment and other assets.
- 9.38 In line with the approach taken in the 2G LRIC model, used by Ofcom to determine the appropriate level of charges in June 2004, the model includes all network costs from the radio network to the core network, up to and including the gateway switches and interconnect ports. The model considers these costs over the lifetime of the network. For the purpose of the explicit modelling this is taken to be 1990/91 to 2039/40.
- 9.39 The LRIC approach matches the cost of equipment to its actual and forecast usage over the long term. As a consequence, there is relatively lower cost recovery in years where utilisation is low and relatively higher cost recovery in years of full, or almost full, equipment utilisation.
- 9.40 As in the previous market review, the approach selected by Ofcom for defining paths of cost recovery within the cost model is economic depreciation (see Annex 5). The timing of cost recovery under economic depreciation varies from that under some forms of accounting depreciation: typically accounting methods take the actual price paid for equipment (or its replacement cost) and divides this by the expected equipment life to reach a depreciation charge for the year (thereby adopting a

straight-line depreciation profile). Economic depreciation seeks to set an optimal path of cost recovery over time by mimicking the outcomes of a competitive market. Taking account of 3G network rollout, by the end of the charge control period the use of economic depreciation results in a higher per minute cost of terminating calls.

- 9.41 The cost model has been calibrated against MNOs' high level accounting cost data to ensure that the model provides a reasonable estimate of a MNO's efficiently incurred costs. By calibrating Ofcom's model against this information it is possible that inefficient as well as efficient costs are included in Ofcom's benchmarks. However, Ofcom has not attempted to make any efficiency adjustments in the absence of compelling evidence suggesting it is appropriate to do so. Ofcom has taken this approach primarily because it observes a sufficient level of competition⁸⁸ in the UK mobile market in general to indicate that there are unlikely to be major unrealised efficiencies implicit in the MNO data⁸⁹. The methodology used to conduct this calibration is set out in Annex 12, and the accounting data supplied by each MNO to undertake this calibration is set out in Annexes 7 to 11. As the accounting data is confidential to each MNO, Annexes 7 to 11 are confidential to the corresponding MNO, however, the average data is summarised in Annex 6.
- 9.42 The impact of network costs on overall MCT unit costs depends critically on forecast voice and data traffic on 2G and 3G networks, as well as the chosen path of cost recovery and the treatment of 3G spectrum costs. As explained in Annex 5, in forecasting demand, Ofcom has considered a broad range of scenarios encompassing high, medium and low cases for voice and data traffic usage per subscriber. These scenarios are based on historical data and third party forecasts, including those provided by the MNOs. Ofcom has also considered a voice-only traffic scenario which it considers to be useful in determining an upper bound on the unit cost estimates for MCT (for a given level of voice traffic) that would arise from operating a mobile network for voice services rather than voice and data services.
- 9.43 Ofcom received a number of responses to the September 2006 Consultation that addressed the cost model. Annex 5 sets out the points raised by stakeholders in relation to the cost model, and Ofcom's response to these points, in more detail. In some cases Ofcom has amended the model as part of its response to stakeholder input and further analysis. The most significant changes to the cost model since the September 2006 Consultation are:
- reduced growth in voice traffic per subscriber in Ofcom's medium demand scenario (from 9% per annum to 5% per annum until 2010/11);
 - amendments to the 3G-only market share profile to reflect more up-to-date information about historical subscriber numbers in line with figures provided by H3G and arguments from other MNOs about the future prospects of an efficient 3G-only operator (the model now assumes that the 3G-only operator will achieve market share parity around 2016/17, compared with a previous estimate of 2020/21);

⁸⁸ For example, as noted in Section 7, no MNO has been found to have SMP in the retail market for mobile services (See Oftel's consideration of the retail market for outbound mobile services contained within its assessment of the market for wholesale mobile outbound services; Oftel statement *Mobile access and call origination services market review* – published August 2003).

⁸⁹ Ofcom also notes that in the Competition Commission's report of 2003, no efficiency adjustment was applied in general to the accounting cost data gathered from MNOs.

- revisions to operating and investment cost trends to improve the calibration of the model and to reflect the most up-to-date accounting data.

3G spectrum costs

9.44 The new cost model includes the cost of 3G spectrum in its consideration of network costs and apportions the recovery of this cost between voice and data services. 3G spectrum costs have the potential to make a substantial contribution to the overall cost benchmarks and are discussed further below.

Considerations in assessing the costs of 3G spectrum

9.45 Ofcom has identified three potential considerations in assessing the costs of 3G spectrum to be included in the cost base and charges for mobile termination. These are:

- Providing appropriate price signals to consumers for efficient consumption of services using mobile termination;
- The impact on MNOs' cost recovery; and
- The impact on MNOs' incentives to use spectrum efficiently.

9.46 As discussed in Annex 14, particular weight should be given to the first of these considerations (i.e. providing appropriate price signals to consumers). Whilst, in general, Ofcom considers that regulation should not deny regulated firms the opportunity to recover their efficiently incurred costs, for the purposes of this review, the second consideration (i.e. impact on MNOs' cost recovery) should not be given disproportionate weight. This is because: (i) the majority of the recovery of 3G spectrum costs would be expected to come from unregulated mobile services (services other than mobile voice call termination); (ii) the potential to distort future spectrum awards if bidders expect that, were any charges to subsequently be regulated, Ofcom would include the full licence fee; and (iii) it would be incorrect to assume that market prices would be determined by the sum paid for the 3G licence (rather than the other way around). Similarly, the third consideration (i.e. impact on MNOs' incentives to use spectrum efficiently) is not the primary consideration of this review because other policy instruments (such as Administered Incentive Pricing⁹⁰ ("AIP") or the introduction of trading and liberalisation) can be used to facilitate the efficient use of spectrum.

9.47 Given the emphasis on the objective of providing appropriate price signals to consumers, Ofcom has focused on the marginal forward looking opportunity cost ("MFLOC") of 3G spectrum. Opportunity cost is the measure of the resource cost to society, in this case, of scarce spectrum. Prices ideally reflect opportunity costs so that consumers are exposed to efficient signals about the resource costs of different services.

Ofcom's approach to 3G spectrum costs in the September 2006 Consultation

9.48 In the September 2006 Consultation, Ofcom set out a number of scenarios to explore the impact of different treatments of 3G spectrum costs. The charge control

⁹⁰ The WT Act 2006 enabled prices for annual licence fees to be set above administrative cost to reflect a range of spectrum management objectives. The system has been termed Administered Incentive Pricing (AIP)

proposals in that consultation were consistent with a number of different scenarios, including a medium traffic scenario with a relatively high contribution towards 3G spectrum costs.

Key responses to the September 2006 Consultation

- 9.49 In its formal response to the September 2006 Consultation the European Commission expressed concern about the proposed level of the charge controls and invited Ofcom to reconsider its assessment of 3G spectrum costs. The European Commission noted that “[t]ermination rates should be set at the cost which would be faced by an efficient operator to provide the relevant service”, and that “[w]hat should be considered in the LRIC model, from today’s perspective, are all the cost elements that are not sunk today.” The Commission further noted that it would not be appropriate to rely on historical costs, which risk overestimating the appropriate costs, and that this concern might be “particularly relevant for spectrum fees which have been written off since the relevant frequencies were auctioned ...”
- 9.50 BT argued that the outcome of Ofcom’s treatment of 3G spectrum costs does not seem reasonable since one would expect a “superior” new technology such as 3G to reduce costs, rather than increase them. BT considered that the conclusion in the September 2006 Consultation that 3G termination costs are higher than 2G termination costs was because the economic value of 3G spectrum was overstated and/or because too large a share of the 3G spectrum value was allocated to MCT services. Accordingly, BT suggested that MCT charges should be set solely on the basis of 2G unit costs for the entire volume of terminating traffic. C&W suggested a variant of the BT approach, namely that MCT charges on 3G networks should actually be less than the price of such termination on 2G networks (reflecting the efficiency gains generated by the provision of voice call termination using 3G technology).

Ofcom’s approach to 3G spectrum costs in this statement

- 9.51 In principle, there are a number of possible approaches for estimating, or calculating a proxy, for the MFLOC of 3G spectrum. One method by which to proxy the MFLOC of 3G spectrum is to draw upon – at least as a starting point – information from the 2000 auction of 3G licences. However there are a number of reasons why the 2000 auction payments may overstate the MFLOC: (i) the value may have fallen since 2000; (ii) the 2000 licence fees may reflect other factors (such as “toehold” advantages in other European 3G auctions); (iii) the 2000 licence fees may reflect the average opportunity cost of the spectrum, rather than the marginal opportunity cost; and (iv) the possibility that the 2000 licence fees include an element reflecting imperfect competition. In Annex 14, Ofcom discusses other evidence that could inform estimates of the MFLOC. For example, the MNOs have conducted impairment reviews in relation to their UK businesses (which test for a reduction in the recoverable amount below their carrying value) as a result of which O2 has impaired the value of its 3G licence (though the other MNOs have not done so). The exploration of this and other issues in Annex 14 illustrates the difficulty in deriving a precise estimate of the appropriate cost of 3G spectrum for inclusion in regulated termination charges. In such circumstances, rather than engage in complex (and likely inconclusive) analysis to try and directly estimate the MFLOC of 3G spectrum, Ofcom has explored the impact of different estimates of the MFLOC through modelling a range of scenarios. In some scenarios, the MFLOC of 3G spectrum is based upon the 2000 auction fees; in other scenarios, it reflects the conclusions of O2’s impairment review and is lower than the 2000 licence fees. In response to the arguments advanced by BT, in one scenario the MFLOC of 3G spectrum is set at a

level which equalises the estimated costs of termination on 2G and 3G networks. In addition, Ofcom has also considered scenarios which explore changes to other relevant variables (such as the amount of 3G spectrum used by the 3G network (i.e. 2 or 3 carriers)) – these are discussed in Annex 13. In all these scenarios, the costs of 3G spectrum are allocated using the radio traffic cost driver (as set out in Annex 13).

- 9.52 As required by the Framework Directive, Ofcom has taken the utmost account of the comments of the European Commission. Ofcom considers that its use of the MFLOC accords with the Commission’s view as to the appropriate theoretical concept. Ofcom agrees with the Commission that it would not be appropriate simply to use the price paid at auction as the only estimate of the MFLOC of 3G spectrum. Ofcom does not, and did not in the September 2006 Consultation, assume that the auction payments in 2000 necessarily represent the forward looking opportunity cost of 3G spectrum. In assessing the MFLOC of 3G spectrum Ofcom has carefully considered the impairment reviews conducted by the MNOs (note that; none of the 3G licences have been entirely written off). As in the September 2006 Consultation, Ofcom has explored a range of scenarios in which the level of 3G costs included in its model are lower than the 2000 auction payments.
- 9.53 Ofcom has carefully considered whether BT or C&W’s approaches should be applied in practice. BT’s response to the September 2006 Consultation stated that “BT appreciates that, if the logic of our [BT’s] “sanity test” is used to value 3G spectrum, then it is important that 2G costs are accurate. One part of these costs is for 2G spectrum ...” Ofcom agrees with this view. However, as discussed in Annex 14, there are difficulties in benchmarking 3G costs to current 2G costs (in addition to the uncertainty in accurately estimating the MFLOC of 3G spectrum, as discussed above). First, 2G AIP fees do not take into account the potential impact of liberalisation on the value of 2G spectrum. Second, for technical reasons the size of the smallest useful block of 2G spectrum is very different to the corresponding amount for 3G spectrum (a single carrier) and this makes comparisons problematic.
- 9.54 In the light of these difficulties, Ofcom has not implemented BT or C&W’s proposed approaches directly. However, as mentioned above, in its modelling, Ofcom has explored a scenario in which the value of 3G spectrum has been lowered to a level that would equate to the modelled costs of termination on 2G and 3G networks being equalised (and, where the 2G termination cost is assumed to be based upon the current AIP). Also, as discussed below, Ofcom has placed greater weight upon scenarios implying a lower MFLOC of 3G spectrum than it did in the September 2006 Consultation.
- 9.55 H3G noted that in the modelling reported in the September 2006 Consultation the cost of 3G spectrum had been input into the model in 2000/01 prices rather than the 2006/07 prices which would be consistent with all other such inputs. Ofcom has now corrected this issue. Comments made in H3G’s response to the September 2006 Consultation also prompted consideration of whether estimates of the MFLOC based upon the 2000 auction payments capture the opportunity cost of 3G spectrum in 2021 and beyond (since the current 3G licences expire in that year). It is appropriate to consider costs over the lifetime of the network, and hence Ofcom agrees that it is appropriate to consider whether the opportunity cost of 3G spectrum after 2021 is appropriately reflected in Ofcom’s cost benchmarks. The opportunity cost from 2021 may already be reflected in the scenarios considered by Ofcom. Alternatively, as an upper bound and in the absence of any reasonable estimates of the potential opportunity cost of 3G spectrum in 2021 and beyond, Ofcom has considered a scenario in which it is assumed that MNOs incur a payment in 2021 equal in real

terms to the payments made in 2000. Ofcom considers this to be an extreme upper bound.

Conclusion on 3G spectrum costs

9.56 To summarise, in considering the appropriate contribution towards 3G spectrum cost recovery, Ofcom has explored a number of scenarios for the treatment of 3G spectrum costs with the aim of reflecting a reasonable upper and lower bound impact on the level of the efficient charge for MCT. These scenarios reflect differing assumptions about the MFLOC of 3G spectrum, 3G spectrum allocations and market shares in 2010/2011. It is also important to recognise that a reasonable ppm estimate for 3G spectrum costs is closely linked to other modelling assumptions; in particular, such an estimate should be broadly consistent with the forecast traffic levels considered. For example, high levels of demand for network services would imply that a greater value (opportunity cost) should be attributed to 3G spectrum than would be the case for low levels of demand.

Non-network costs

9.57 In order to estimate the total cost of MCT it is necessary to consider whether any share of non-network costs should be added to the network costs. As explained in Annex 15, non-network costs are costs of all activities that are not directly associated with enabling calls to be made. These can be grouped into three categories:

- Customer acquisition, retention and service costs (CARS) – comprising advertising and marketing, handset costs, discounts and incentives, customer care, billing and bad debts;
- Administration costs – to include general overheads; and
- Other costs – not relating to the running of the UK network nor either of the above two categories (eg payments to other operators such as roaming charges).

9.58 Since the September 2006 Consultation Ofcom has updated its analysis of MNOs' non-network costs based on 2005 accounting information and taken into account comments from stakeholders on Ofcom's approach and estimates. Annex 15 provides further detail of this analysis.

9.59 Ofcom remains of the view (set out in the September 2006 Consultation) that CARS costs should not be recovered from MCT charges. H3G disagrees with this approach and has made a number of points to Ofcom about this issue. These points are dealt with in detail in Annex 15. In conclusion it is Ofcom's view that these costs should be recovered from the prices paid for mobile retail services since they are incremental to mobile retail services and vary with the number of subscribers on a MNO's network.

9.60 Ofcom considers that administration costs are common across all of an MNO's activities and therefore a share of these costs should be included in the costs of MCT. This is consistent with the approach taken by Ofcom in its last market review and by the Competition Commission.

9.61 Using the MNOs' accounting information Ofcom estimated the share of administration costs that can appropriately be allocated to network services and specifically to MCT. In the September 2006 Consultation, Ofcom proposed that £112m in 2006/7 terms should be allocated to network activities as a share of administration costs for the average operator, and that the absolute level of MNOs'

administration costs would remain relatively constant with changes in traffic. In addition Ofcom also proposed that it should assume that the proportion of total costs that are network costs is constant over time. Under a medium voice and data scenario, this resulted in a non-network cost mark-up of about 0.2ppm and 0.35ppm in the final year of the charge control for 2G/3G operators and 3G-only operators respectively. Respondents to the September 2006 consultation made a number of points about these proposals. In particular these comments were related to four issues:

- the overall level and network share of administration costs – Vodafone argued that a higher proportion of administration costs should be allocated to network activities. T-Mobile argued that costs will rise in real terms going forward whilst BT argued that efficiency gains mean that costs will fall;
- the costs included in different non-network cost categories – stakeholders have argued that Ofcom's approach to a number of specific cost categories is not appropriate and understates the level of administration costs and the share attributable to network services e.g. incentive payments to a distributor or retailer, handset costs, brand fees, 3G spectrum costs and the cost of capital on non-network costs;
- the relative levels of administration costs of 3G-only and 2G/3G average operators – Vodafone argued that it is not appropriate to assume the same total level of administration costs for a 2G/3G combined operator and a 3G-only operator; and
- the use of economic depreciation to determine the mark-up on MCT for administration costs – Ofcom has not used economic depreciation to determine the timing of cost recovery for administration costs.

9.62 With respect to the first issue raised, different stakeholders have argued for a greater or smaller contribution of administration costs being allocated to MCT for 2G/3G and 3G-only operators. These issues are discussed in detail in Annex 15. Overall, taking into account the arguments presented by stakeholders, Ofcom considers that, on the basis of 2005 accounting information, it is appropriate to increase its estimate of the level of administration costs allocated to network services. However, on a forward looking basis (and in particular with regards to 2010/11) Ofcom has been presented both with arguments for increasing as well as decreasing administration costs. Ofcom notes that there are valid arguments to support both these positions, and on balance, has therefore concluded that its estimate for administration costs in 2010/11 should remain at the same level as 2005 administration costs in real terms.

9.63 The administration cost in each year is allocated across network activities e.g. incoming calls, outgoing calls and data services in proportion to the share of network traffic costs that these services account for. In the September 2006 Consultation Ofcom estimated that £112m in 2006/07 prices should be allocated to network services for administration costs. Ofcom has revised this estimate given updated information and comments from stakeholders. Ofcom now estimates that £148m in 2006/07 prices should be allocated to network activities, on the basis of accounting information for 2005 and detailed consideration of the points raised in the second issue noted above.

9.64 Ofcom has also given careful consideration to the third issue above regarding the relative levels of administration costs of 3G-only and 2G/3G operators, as discussed in Annex 15. The revised allowance for administration costs results in an overall ppm

mark-up in 2010/11 (in real 2006/07 prices) on MCT for administration costs, after taking into account Ofcom's revised traffic scenarios (set out in Annex 13), of 0.3ppm for 2G/3G operators and 0.4ppm for 3G-only operators. Ofcom considers that this is a reasonable allowance for the recovery of administration costs from MCT.

- 9.65 Finally, Ofcom is of the view that it would not be appropriate to change its approach for the timing of recovery of administration costs by adopting economic depreciation, for the reasons stated in Annex 15.

Network externality

- 9.66 Users of both fixed and mobile communication networks benefit from having a large number of mobile subscribers with whom they can communicate. However, when consumers decide whether or not to subscribe to a mobile network, they generally take their own private benefit into account but not the benefit that fixed and other mobile subscribers derive from contacting and being contacted by them, and from the ability to contact and be contacted by them. This discrepancy is the source of a "network externality"⁹¹.
- 9.67 In the presence of a network externality, not enough consumers may choose to become mobile subscribers from the perspective of society as a whole. This is because some consumers (referred to below as "marginal subscribers") may choose not to join the network because their private benefits do not cover the cost of becoming a subscriber, even though social welfare would be enhanced if they did, because of the benefits obtained by others.
- 9.68 In some cases, consumers internalise the network externality. For instance, this occurs when consumers contribute to the cost of subscription of others with whom they expect to communicate or with whom they desire having the ability to do so. However, it is reasonable to expect that not all of the network externality is internalised and, therefore, that social welfare can be increased by providing a subsidy to some of those consumers who are not willing to pay the full price of subscription.
- 9.69 To the extent that the subsidy to those marginal subscribers which it is optimal to subsidise is provided by MNOs, it is efficient to fund it by raising the prices of all mobile communications services supplied by MNOs. Ofcom believes that it would therefore be appropriate for wholesale mobile termination charges to include a contribution towards the recovery of this subsidy via an "externality surcharge".
- 9.70 The concern that without an externality allowance there would be too few mobile subscribers might at first appear misplaced given that around 80 per cent of the UK population aged 15+ already owns a mobile phone. C&W has suggested that, in these circumstances, a network externality allowance in the charge for mobile call termination is not justified.
- 9.71 However, the main purpose of the externality surcharge is not to increase the penetration of mobile phones in the UK. In fact, the analysis undertaken by Ofcom, which is described in detail in Annex 16, shows that the vast majority of marginal subscribers are consumers who currently own a mobile phone but are not willing to pay enough to renew the subscription.

⁹¹ Notice that the definition of the network externality presented encompasses also the "option value", i.e. which is related to the ability to contact and be contacted by the new subscriber as opposed to actually making calls to and receiving calls from the new subscriber.

- 9.72 BT has also submitted to Ofcom that it disapproves of the externality allowance. BT suggests that the externality surcharge has a similar purpose to universal service obligations⁹² but that there is no reciprocity in the funding arrangements between fixed and mobile networks. As a result, mobile network operators do not pay any surcharge when their customers call fixed networks, but they benefit when fixed customers call their networks.
- 9.73 Both the network externality surcharge and universal service obligations have the effect of subsidising the consumption of communications services by some consumers. While the externality surcharge is funded through a surcharge on MCT, BT currently funds those elements of the universal service obligation that it is required to provide. The funding mechanism for the provision of universal service obligations is appropriately addressed in separate regulatory processes dealing with universal service issues and is not a matter for this review of MCT.
- 9.74 In Annex 16, Ofcom has set out the methodology underpinning its explicit externality model. This methodology is as set out in the September 2006 Consultation, but has been updated with new parameter values as appropriate – including: handset costs, forecast traffic and the proportion of mobile subscribers in the population.
- 9.75 All MNOs commented on Ofcom’s calculation of the externality surcharge. Orange and Vodafone broadly supported Ofcom’s methodology, but commented on some of the parameter values used. These related to: the size of the Rohlfs-Griffin factor⁹³, handset costs; leakage; and the degree of pass-through on mobile-to-mobile off-net calls. O2 continued to see merit in a Ramsey-type methodology; H3G suggested that the calculation of the surcharge should address what it considered to be its different position from the other MNOs; and T-Mobile’s main methodological comment related to the use of off-net minutes in the calculation. These comments are addressed in Annex 16.
- 9.76 Having considered the responses received and having revised the parameters of Ofcom’s externality model appropriately, as well as updating parameter values for which new data is available, the net effect is to increase somewhat the upper bound to the externality surcharge (as can be seen in Annex 16, Figure A16.5). On balance, Ofcom considers that the 0.3ppm consulted on remains a reasonable allowance for the externality surcharge, but notes that it remains above the mid-point of the plausible range.

Summary of cost modelling results

- 9.77 As acknowledged in the September 2006 Consultation, Ofcom notes that there is a significant degree of uncertainty in forecasting critical variables which influence the level of efficient charges for MCT. Ofcom has modelled a wide range of subscriber migration and voice and data demand scenarios to take account of this uncertainty. These include, at one extreme, those where voice and data traffic volumes are forecast not to increase materially from today’s levels and, at the other extreme, assumptions that growth in voice and data demand will be vigorous over the modelled period. In determining the level of forecasts for a medium case voice and data demand scenario, Ofcom has placed weight on MNOs’ own demand forecasts as well as forecasts from independent analysts. Ofcom has also considered a ‘voice-

⁹² See Ofcom statement Review of Universal Service Obligations
http://www.ofcom.org.uk/consult/condocs/uso_statements.pdf

⁹³ The Rohlfs-Griffin factor is given by the ratio of the marginal social benefit to the marginal private benefit. (See Annex 16 for details.)

only' scenario, which assesses the cost of carrying medium case voice demand in the absence of any data traffic.

- 9.78 Furthermore, Ofcom has examined various treatments for 3G spectrum costs in the case of the blended 2G/3G and 3G-only operator cost benchmarks. In September 2006, Ofcom presented benchmarks which accounted for different valuations of 3G spectrum, allocations of spectrum, assumptions about market share paths and methodologies for allocating 3G spectrum costs between voice and data traffic.
- 9.79 In combination, these alternative demand forecasts and treatments of 3G spectrum costs result in a very wide range of efficient unit charge benchmarks for each type of operator. In the September 2006 Consultation, Ofcom set out three broad options for the level of charge controls for each type of operator. These were characterised as generating "High", "Medium" and "Low" ranges of potential charge levels. The breadth of the medium ranges (1.0ppm for 2G/3G operators and 1.3ppm for 3G-only operators) reflected the degree of uncertainty with respect to demand forecasts, which is greater in respect of a new entrant 3G-only operator⁹⁴.
- 9.80 BT's response to the September 2006 consultation argued that this approach will produce arbitrary results because "the outcome is simply a reflection of the cases that the analyst has chosen to include".
- 9.81 Whilst acknowledging BT's concern, Ofcom considers that it is necessary to take account of the significant uncertainties inherent in the cost modelling exercise and believes that a scenario-based approach to setting charge control levels for 2010/11 remains the most appropriate. Ofcom has refined its approach to take account of comments in response to the September 2006 Consultation. In particular, Ofcom has been very careful to select a range of benchmarks that most accurately represents the results of its analysis. The scenarios noted in Figure 9.1 below are not the only ones that Ofcom has modelled, and many more scenarios could be developed in addition to those presented in this document. However, Ofcom believes that its final benchmarks represent a reasonable set of estimates for determining a final level for the charge controls.
- 9.82 For each of the scenarios, Ofcom has incorporated spectrum values into its benchmark scenarios that are broadly consistent with the volume of voice and data traffic within each scenario. For example, high levels of demand for network services would imply a greater opportunity for spectrum cost recovery by MNOs than lower levels of demand. Therefore, where a high voice and data traffic volume is assumed for a particular scenario, Ofcom believes that the value assigned to spectrum for that scenario should be towards the higher end of its range of plausible valuations, and vice versa.
- 9.83 In particular, Ofcom has been careful to consider consistent spectrum values for the voice-only scenario. The purpose of the voice-only scenario is to explore the extent of economies of scale and scope in network costs due to carrying both voice and data traffic. As such, Ofcom believes that it is appropriate to consider levels of 3G spectrum cost recovery from voice termination under this scenario that are equivalent to those under the medium voice and data demand scenario, so that comparisons

⁹⁴ In the case of a 2G/3G operator, the level of uncertainty in the 3G cost benchmark is similar to that for a 3G-only operator. However, this uncertainty is diluted by the 2G cost benchmark (which is less uncertain due to the large proportion of modelled 2G demand which is historical and therefore fixed) in the calculation of a 2G/3G blended benchmark.

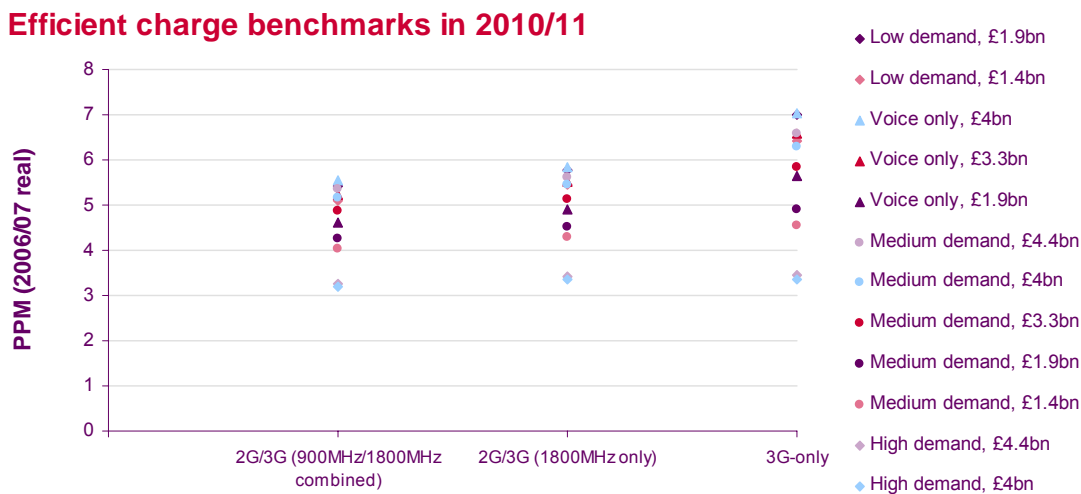
with corresponding voice and data traffic scenarios quantify the network economies of scope.

- 9.84 Responses to the September 2006 Consultation did not suggest that Ofcom should place more weight on the High and Low ranges than the Medium range of potential charge levels mentioned above, however Ofcom remains of the view that it should set out the fuller range of plausible demand scenarios. For this reason, the final set of benchmarks includes examples that are produced by both high and low traffic scenarios. These scenarios form the lower and upper bounds respectively of Ofcom's overall range of efficient unit charges.
- 9.85 In comparison to the results presented in September 2006, the final set of benchmarks has also been refined in two further ways. Firstly, all scenarios assume that the MNOs use only two carriers of 3G spectrum for voice services for the reasons stated in paragraphs A13.26-28. Secondly, in response to the arguments presented by MNOs, Ofcom has allocated 3G spectrum costs in all scenarios by using the radio traffic cost driver for the reasons stated in paragraph A13.30.
- 9.86 As explained in Annex 13, Ofcom has selected the following 12 final scenarios as the basis for an appropriate set of benchmarks for the level of the charge control:
- Medium voice and data demand, using 3G spectrum values of:
 - i. £4.4bn
 - ii. £4.0bn
 - iii. £3.3bn
 - iv. £1.9bn
 - v. £1.4bn
 - High voice and data demand, using 3G spectrum values of:
 - vi. £4.4bn
 - vii. £4.0bn
 - Low voice and data demand, using 3G spectrum values of:
 - viii. £1.9bn
 - ix. £1.4bn
 - Medium voice-only demand, using 3G spectrum values⁹⁵ of:
 - x. £4.0bn
 - xi. £3.3bn
 - xii. £1.9bn

9.87 Figure 9.1 shows the resulting efficient charge benchmarks for 900/1800MHz and 1800MHz-only 2G/3G operators and the 3G-only operator. The range of results is narrower than the overall results presented in the September 2006 Consultation document, which reflects the removal of several factors that contributed to a wider range of benchmarks (e.g. zero 3G spectrum values and the "all traffic" driver used to allocate 3G spectrum costs) which Ofcom believes are less relevant. The cost modelling produces efficient charge benchmarks for the 900/1800MHz combined operators that are slightly (less than 0.3ppm) lower than the equivalent 1800MHz operator benchmarks.

⁹⁵ The 3G spectrum values under the voice-only scenario are intended to ensure that a similar magnitude of 3G costs are recovered from voice services as under the medium voice and data scenario. Since about 75% of 3G spectrum costs are recovered from voice services under the medium voice and data scenario, the spectrum values stated here are scaled down by a corresponding 75%. Ofcom notes that if it were to consider 3G spectrum values which are recovered in full from voice services, without any adjustment, it would be appropriate to consider 3G spectrum values towards the lower end of the range considered for the medium voice and data scenario.

Figure 9.1 Full range of efficient charge benchmarks in 2010/11



Differences in charge levels between MNOs

- 9.88 In the September 2006 Consultation, Ofcom proposed that a single charge control should be applied to all four 2G/3G operators. However, Ofcom did not consider that it would be appropriate to attempt to align the charge controls imposed on all five MNOs (including the 3G-only operator H3G).
- 9.89 Ofcom considers that exogenous cost differences between MNOs warrant consideration when determining the appropriate level of any charge controls.
- 9.90 The next portion of this section addresses whether Ofcom should set different charge controls for different types of MNO and is structured as follows. Ofcom first outlines its cost modelling results for:
- 900/1800MHz operators relative to 1800MHz-only operators; and
 - 2G/3G operators relative to 3G-only operators.
- 9.91 Given that this modelling indicates that cost differences exist between different types of MNO, Ofcom then sets out responses to the September 2006 Consultation on whether different types of MNO should be subject to different charge controls. Finally, Ofcom sets out its conclusions on this issue.

Modelled cost differences between MNOs

- 9.92 The modelling reported in the September 2006 Consultation indicated that there are some cost differences between different types of MNO.
- 9.93 In their responses to the September 2006 Consultation, MNOs made various arguments about the magnitude and treatment of these modelled cost differences. These arguments have been addressed in Annex 5 as part of the discussion of the network module of Ofcom's cost model.
- 9.94 Having considered these responses, the cost modelling undertaken by Ofcom continues to indicate that there are some differences between the costs of (i)

900/1800MHz operators relative to 1800MHz-only operators; and (ii) 2G/3G operators relative to 3G-only operators.

- 9.95 It is important to recognise that any modelling results are dependent upon the assumptions made, including the assumptions about spectrum costs. Over the course of the charge control period, and the period modelled in the cost model more generally, it is reasonable to assume that trading and liberalisation will be introduced for the spectrum considered in the modelling. However, in the absence of reliable, objective evidence about the impact of any future changes, the cost model has assumed that various factors remain constant. For example, it has been assumed for modelling purposes that there is continued use of the current 2100MHz spectrum band for the deployment of 3G services. Similarly, it has been assumed that the costs of 2G spectrum remain unchanged at the current AIP (in real terms). Ofcom has had regard to these assumptions when setting the appropriate level of charge controls; Ofcom has not simply assumed that all cost differences estimated by its cost model are exogenous cost differences that should be reflected in the level of charge controls.

Modelled cost differences between 900/1800MHz and 1800MHz-only operators

- 9.96 The modelled differences in network costs between the 2G/3G operators (as illustrated in Annex 13) arise predominantly from the costs of deploying coverage networks in the past. Vodafone and O2 operate 2G networks mainly using 900MHz spectrum (although they also use some 1800MHz spectrum) and Orange and T-Mobile operate 2G networks using 1800MHz spectrum. H3G does not operate a 2G network (although national roaming agreements enable H3G to use the 2G network of at least one other MNO).
- 9.97 The 1800MHz-only operators face higher coverage costs, other things being equal, because they need a greater number of coverage cells.⁹⁶ However, as traffic demand grows, the difference in the required numbers of cells (and by extension other network equipment such as BTSs and BSCs) narrows. The requirement to meet traffic demand becomes increasingly the binding constraint in network deployment, i.e. what were initially cells required for coverage purposes become capacity-constrained as demand increases.
- 9.98 Ofcom's cost modelling indicates that the differences in network unit costs between the two types of 2G/3G operator have narrowed. The forecast unit cost difference is less than 0.3ppm in 2010/11 using economic depreciation under a medium voice and data traffic scenario.

Modelled cost differences between 3G-only and combined 2G/3G operators

- 9.99 All MNOs operate 3G networks using spectrum in the 2100MHz band and Ofcom considers that these spectrum allocations present no material cost differences from each other.
- 9.100 Differences in network costs between 3G-only and combined 2G/3G operators could arise due to cost savings that 2G/3G operators can achieve from deploying a 3G

⁹⁶ Radio propagation characteristics exhibit an inverse relationship between maximum coverage area per cell and frequency of spectrum. Combined 900/1800MHz operators (i.e. Vodafone and O2) can therefore deploy fewer cells for a given coverage area compared with their 1800MHz-only counterparts by providing coverage using 900MHz spectrum. See Annex F, paragraph F.90 to the December 2003 Consultation.

network alongside the 2G network. 2G/3G operators can deploy a significant amount of 3G equipment on existing 2G sites, hence reducing the number of sites deployed and allowing for recovery of the site costs from both 2G and 3G services. Some savings are also possible on operating costs for 2G/3G operators because 3G cell equipment it is largely co-located with the 2G cell equipment.

- 9.101 Ofcom's cost model indicates a unit cost differential between 3G-only and combined 2G/3G operators of 0.3ppm -1.0 ppm in 2010/11 under a medium voice and data traffic scenario. As the migration of subscribers from 2G to 3G grows for the 2G/3G operators, the cost model forecasts that the difference between the 3G-only and combined 2G/3G operators decreases.
- 9.102 The differential between 3G-only and combined 2G/3G operators is sensitive to the particular value assigned to 3G spectrum costs in the model (see Annexes 13 and 14 for more details on the impact of 3G spectrum costs on the 3G-only operator). It is also sensitive to demand assumptions, particularly in relation to data traffic, since 3G networks provide economies of scope for cost recovery to a much greater extent than operators can achieve on 2G networks (see Annex 13).

Responses on differentiated charge controls

- 9.103 Given that Ofcom's cost modelling indicates that cost differences exist between different types of MNO, this raises the question of whether the charge controls should be differentiated to reflect this. As noted above, in the September 2006 Consultation Ofcom proposed applying a single charge control to all four 2G/3G operators but did not consider that it would be appropriate to attempt to align the charge controls imposed on all five MNOs (including the 3G-only operator H3G). Respondents to that consultation advanced strongly held, and opposing, views on whether any modelled cost differential should be reflected in charge controls (aside from their views on the magnitude of that cost differential).

The 900/1800MHz operators' responses

- 9.104 In their responses to the September 2006 Consultation, O2 and Vodafone (i.e. the 900/1800MHz operators) agreed that there should be a single charge control for the four 2G/3G MNOs.
- 9.105 Vodafone considered that call termination is essentially a homogenous product, and hence, in a competitive market, one would expect to see a uniform price for mobile call termination across all MNOs.
- 9.106 O2 and Vodafone's responses both referred to the introduction of spectrum trading over the charge control period. They considered that this would allow 2G/3G MNOs to vary their spectrum holdings, implying that spectrum costs were not an unavoidable cost difference between the types of 2G/3G MNO that justifies differential charge controls. O2 and Vodafone also considered that setting a standardised MCT charge would support spectrum trading (by reducing uncertainty and avoiding distortions to spectrum valuations), including trading between 900/1800MHz and 1800MHz-only MNOs. O2 considered that a "standardised, accepted" charge, "around which relative cost differences may be justified or negotiated", would be a more attractive regulatory regime (in terms of certainty, efficiency and cost). Vodafone expressed a similar view and advocated the application of a "spectrum neutral" voice termination rate to future entrants such as "4G" and WiMax operators. Vodafone also considered that such a regulatory

approach would reward new entrants using “efficient” technology and discourage inefficient entry.

9.107 O2 considered that simplified wholesale MCT charges are more likely to simplify retail prices (which O2 considered to be desirable), although it provided no evidence demonstrating that this relationship exists. O2 considered that, given that the 900/1800MHz and 1800MHz-only cost differentials predicted by Ofcom’s model amounted to under 1% of Orange and T-Mobile’s revenue, any impact of removing charge control differentials on competition between MNOs would be negligible. O2 also considered that Ofcom should have regard to the near convergence in 2G/3G MNOs’ costs in 2010/2011 under Ofcom’s model (under an accounting depreciation methodology). Vodafone considered that the interaction between charge control differences and the current MNP arrangements (under which the termination charge equals the donor network’s termination charge for customers that port their numbers) distorts MNOs’ behaviour (e.g. by encouraging MNOs to ‘target’ customers of MNOs with higher MCT charges to port their numbers). O2 also noted that current MNP arrangements would tend to narrow any differential in charge controls. [X].

9.108 [X]

The 1800MHz-only operators’ responses

9.109 The responses from Orange and T-Mobile (i.e. the 1800MHz-only operators) argued that any difference in costs predicted by Ofcom’s cost model should be reflected through differentiated charge controls.

9.110 T-Mobile argued strongly that it would be discriminatory for Ofcom not to recognise a “significant objective difference” between the costs of 900/1800MHz and 1800MHz-only operators. T-Mobile considered that such discrimination by Ofcom would be contrary to national and European law. Orange expressed a similar view, namely that “exogenous” cost differences should be reflected in the charge control (and that doing so would be consistent with the European Commission’s view).

9.111 Orange and T-Mobile considered that setting termination charges for 900/1800MHz MNOs based upon an estimate of 1800MHz-only MNOs’ costs enables 900/1800MHz operators to charge “excessive” MCT prices. As a result, they considered that 900/1800MHz operators would enjoy a competitive advantage in retail markets because additional subscribers are more valuable to 900/1800MHz operators. T-Mobile also considered that such excessive MCT pricing has the effect of making 900MHz spectrum more valuable, which would benefit holders of that spectrum.

9.112 Orange believed that spectrum cost differences are outside of operators’ control. Orange argued that it is “naïve” to assume that spectrum trading and liberalisation will alter this situation because, to date, O2 and Vodafone had not indicated any willingness to trade their 900MHz spectrum holdings with other MNOs. T-Mobile noted that it is unclear when spectrum trading would be introduced for “mobile spectrum”. Orange added that liberalisation is unlikely to remove the cost differential because UMTS 1800 equipment is likely to be developed at a slower rate than UMTS 900 equipment.

9.113 T-Mobile considered that it is not burdensome for Ofcom to set different charges in this review (given it has already modelled the costs of a 900/1800MHz MNO and a 1800MHz-only MNO). T-Mobile disputed the policy benefits of setting a common termination charge, arguing that common charges based on 1800MHz operators’

costs are unlikely to be suitable for future new entrants using alternative technologies.

- 9.114 T-Mobile presented evidence (based on analysis of current retail prices) that it considered demonstrated that simplified wholesale MCT charges are unlikely to result in simplified retail pricing. T-Mobile claimed that there is no evidence that the interaction of current MCT charge differentials and the current MNP arrangements has led to “targeting” of subscribers based on termination charges. Indeed T-Mobile considered it would be “bizarre” to rely on this justification given that Ofcom had not proposed the removal of MCT charge differentials between the 2G/3G MNOs and H3G.

H3G’s response

- 9.115 In its response to the September 2006 Consultation, H3G argued that undifferentiated charges are not an appropriate benchmark. H3G referred to its response to the March 2006 Consultation in which it argued that it was “flawed” to claim that a competitive MCT market would lead to a single price because call termination is a homogenous service. H3G considered that the key issue is whether the conditions of demand and supply are homogenous (rather than the product) and referred to the example of petrol prices which can vary between different geographical locations. H3G considered that an approach which ignores cost differences between operators cannot be considered to replicate a competitive outcome.
- 9.116 In its response to the September 2006 Consultation, H3G also stated that it was inappropriate and premature to rely on spectrum trading and liberalisation. H3G considered that it is inconsistent for Ofcom to advocate setting charges for future entrants (using different technology) based on the costs of incumbent suppliers using established technology. Finally, H3G did not consider that the existing MNP arrangements were a strong reason for moving towards undifferentiated charge controls since these arrangements may be addressed during the period of the charge controls anyway.

Fixed operators’ responses

- 9.117 In their responses to the September 2006 Consultation, BT argued that 3G charges should be set by reference to the cost of termination on 2G networks i.e. that there should be no differential between 2G and 3G charges. These arguments are explained in detail in paragraph 9.50 and Annex 14.

Ofcom’s position on differentiated charge controls

- 9.118 Having given all representations careful consideration, and as discussed in more detail below, Ofcom considers that a single charge control level for the provision of MCT by all operators:
- Reflects the position that would prevail in a competitive market;
 - Is supported by the prospects for spectrum trading and liberalisation over the control period; and
 - (As a secondary consideration) might reduce regulatory burdens in the future.

The competitive benchmark

- 9.119 The situation that would prevail in a competitive market can provide a useful benchmark for regulation (and taking a competitive market as a benchmark would be consistent with Ofcom's general approach to deriving efficient cost benchmarks using economic depreciation). As argued by Vodafone, MCT is a homogenous product. Consumers are unaware of, and likely to be indifferent to, the type of network or, indeed, which operator their call terminates on. This implies that, in a (hypothetical) competitive MCT market in which all MNOs compete against each other, differences in MCT charges between MNOs would not be sustainable.⁹⁷
- 9.120 In a (hypothetical) competitive market for MCT, one would expect spectrum costs (in an efficient spectrum market) to adjust to reflect the absence of a price differential. For example, in order to equalise the costs of 900/1800MHz and 1800MHz-only operators, the relative opportunity cost of 900MHz and 1800MHz spectrum could change. 900MHz spectrum could become more costly (relative to 1800MHz spectrum), reflecting the network cost advantages from using 900MHz spectrum, and this change in relative spectrum costs could offset the differences in network costs.
- 9.121 Ofcom does not accept that this reasoning is undermined by H3G's focus upon whether the conditions of demand and supply are homogenous. H3G has advanced no evidence or reasoning to explain why, in a hypothetical competitive MCT market that included MCT supplied by all of the MNOs, termination on 900/1800MHz, 1800MHz-only and 3G-only networks would not be close substitutes. Ofcom does not consider that H3G's example of 'real world' price differences between petrol retailers is relevant because, in reality, petrol sold by retailers in different locations is not homogenous from the perspective of a given customer. This is because of the differences in costs (e.g. travel time) involved in purchasing petrol from retailers in different locations. Indeed, the petrol price differences identified by H3G may reflect differences in price between distinct relevant markets.⁹⁸ Nor does Ofcom accept H3G's argument that its approach "ignores" cost differences between operators. Rather, as explained in the preceding paragraph, Ofcom considers that *modelled* cost differences (which reflect the assumptions made in Ofcom's cost model) would not be expected to persist in a (hypothetical) competitive MCT market.

Spectrum trading and liberalisation

- 9.122 The above argument concerning the (hypothetical) competitive benchmark should be considered in the light of reasonable assumptions about 'real world' spectrum policy over the course of the control period. Given the forward looking nature of this review, Ofcom does not accept H3G's argument that it is "inappropriate and premature" to take into account these likely developments. The *Spectrum Framework Review* stated that Ofcom wishes to allow the market to operate freely through the

⁹⁷ Ofcom does not accept the argument advanced in H3G's response to the March 2006 Consultation that such an approach is inconsistent with Ofcom's market definition. Market definition reflects the 'real world' position of MCT suppliers; this should be distinguished from the hypothetical position that would prevail if one assumed that the MCT market included all MNOs and were competitive (for the purposes of establishing a competitive benchmark).

⁹⁸ In "Anticipated acquisition by Tesco Stores Limited of former BP/Safeway petrol forecourts and stores from Wm Morrison Supermarket Plc", 16 November 2005, the OFT considered the impact of a merger between fuel retailers at a local level (paragraph 18). The OFT further commented that "a UK wide market was considered unlikely given the considerable price variations between local areas, suggesting that the chain of substitution was imperfect" (paragraph 16). This OFT decision is available at: http://www.of.gov.uk/shared_of/mergers_ea02/2005/tesco.pdf

introduction of spectrum trading and liberalisation where possible (page 51).⁹⁹ In the *Spectrum Framework Review: Implementation Plan*, Ofcom set out a number of options for the liberalisation of 2G spectrum (paragraphs 9.45-9.62) and stated that “[s]ubject to a satisfactory resolution of the issues connected with the applicability of liberalisation, Ofcom would seek to extend trading to the existing 2G licences in 2007” (paragraph 9.67). In relation to the existing 3G licences, Ofcom stated that “the extension of trading is likely in due course to bring benefits to citizens and consumers” (paragraph 9.68).¹⁰⁰ More recently, Ofcom has stated that it expects to issue a further consultation document relating to the application of trading and liberalisation to the mobile sector in the early part of 2007.¹⁰¹

- 9.123 Ofcom considers that Orange and T-Mobile’s argument that spectrum cost differences are outside of MNOs’ control will be hard to sustain over the course of the control period, given that increased spectrum trading and liberalisation can reasonably be expected during that time. Similarly the Competition Commission’s 2003 Report stated at paragraph 2.538 that “the only [cost] differences we should allow are those that are *absolutely outside* the companies’ control ...” (emphasis added). Given expectations about spectrum trading and liberalisation over the control period, Ofcom does not consider that it is reasonable to assume that spectrum costs and holdings will remain “absolutely outside” MNOs’ control.¹⁰² Rather, spectrum trading (i) will facilitate changes in MNOs’ spectrum holdings; (ii) may result in changes to the opportunity cost of different blocks of spectrum (regardless of whether or not trades actually occur, since the opportunity to trade is still present); and (iii) is likely to reveal any changes in the relative opportunity cost of spectrum. For example, insofar as the use of 900MHz spectrum results in network cost savings (relative to the use of 1800MHz spectrum), this suggests that the opportunity cost of 900MHz spectrum might rise (relative to the price of 1800MHz spectrum), helping to offset the network cost differences.
- 9.124 The possibility that 900/1800MHz operators might refuse to trade 900MHz spectrum (as argued by Orange) does not prevent the opportunity cost of 900MHz spectrum changing. Rather, by choosing not to trade 900MHz spectrum, O2 and Vodafone would be foregoing the potential revenues from trading with 1800MHz-only operators. Such foregone revenues would constitute an opportunity cost borne by 900/1800MHz operators.
- 9.125 T-Mobile considered that allowing 900/1800MHz MNOs to charge ‘excessive’ MCT prices (or, more specifically, a price higher than their estimated costs) has the effect of making 900MHz spectrum more valuable, which would benefit holders of that spectrum. However, as explained in paragraph 9.177 below, Ofcom does not necessarily consider that aligning MCT charges results in MNOs charging prices that exceed the level of costs in a competitive market.
- 9.126 Further, Ofcom considers that the issue of potential windfall gains (from any revealed increases in the value of 900MHz spectrum) are best dealt with within the context of spectrum policy more generally, particularly as the majority of the recovery of

⁹⁹ http://www.ofcom.org.uk/consult/condocs/sfr/sfr/sfr_statement

¹⁰⁰ <http://www.ofcom.org.uk/consult/condocs/sfr/sfr/sfr-plan.pdf>

¹⁰¹ See paragraph 6.72 of Ofcom’s consultation on the award of 2.6GHz spectrum, available at: <http://www.ofcom.org.uk/consult/condocs/2ghzawards/2ghzawards.pdf>

¹⁰² Ofcom notes that there appears to be academic support for such a position. For example, “when relevant spectrum is ... freely tradable, there would be scope to remove ... the remaining distinction between operators in the regulated price cap.” See page 29 of “Price controls on mobile termination charges”, Littlechild, S (2003) available at: http://erg.eu.int/doc/publications/consult_accounting_sep/vodafone_paper_regulating_mt.pdf

spectrum costs would be expected to come from unregulated mobile services. Ofcom considers that manipulating MCT charges, in order to distort spectrum prices, is a poor policy instrument for addressing any windfall gains/losses resulting from MNOs' spectrum holdings.

Impact of removing differentiated charge controls on regulatory burdens

- 9.127 As in the September 2006 Consultation, Ofcom continues to take the view that removing differentiated charge controls may reduce the burden of regulation in the future, although Ofcom considers this to be a secondary consideration. Aligning different suppliers' mobile voice call termination charges (over an appropriate period) may reduce the need for separate, detailed modelling for a wide range of different benchmark operators using different technologies. This may be advantageous as new spectrum is released and alternative technologies and forms of access competition grow (such as WiMAX and IMT-Advanced wireless solutions) and may have benefits in terms of the efficiency and clarity of the regulatory process, the associated cost burden for operators and, ultimately, through prices for end users.
- 9.128 T-Mobile has argued that, for the purposes of the *current* review, it would not be onerous for Ofcom to set different charges for 1800MHz-only operators (given that Ofcom has modelled the costs of a 1800MHz-only operator). This has not been a consideration in Ofcom's decision. As explained in the preceding paragraph, Ofcom considers that a benefit of removing differentiated charge controls is a reduction in *future* regulatory burdens. In this context, T-Mobile's suggestion does not fit well with Ofcom's longer-term view that it is desirable for MCT charge controls to become more closely aligned. By aligning 2G/3G MNOs' MCT charges by 2010/2011, Ofcom is acting in accordance with this policy position.
- 9.129 Ofcom does not consider that H3G or T-Mobile's arguments that common MCT charges based on 1800MHz operators' costs are unlikely to be suitable for future new entrants using alternative technology are a strong reason for not aligning 2G/3G MNOs' charge controls. In the current review, Ofcom is not setting charge controls for such new entrants. However, without fettering its discretion, in the event that it were to be regulating such charges, Ofcom is inclined to the view that it is likely to be desirable for new entrants' MCT charges to be aligned with those of incumbent suppliers. When assessing such matters, Ofcom will take into account all relevant considerations at the time, as it has done in the present market review.

Other points raised in the 2G/3G MNOs' responses

- 9.130 The September 2006 Consultation raised the possibility that simplified wholesale pricing may result in simplified retail prices for calls to different mobile networks. However, Ofcom agrees with T-Mobile that there is evidence to suggest that simplified wholesale pricing will not necessarily lead to simplified retail pricing in that differentials between retail prices of calls to mobiles often do not reflect differentials between MCT charges.
- 9.131 The September 2006 Consultation, as well as H3G, O2 and T-Mobile's responses to that consultation discussed possible interaction between the current MNP arrangements and any differences in charges controls. (H3G made strong representations in respect of other consequences of MNP and these are discussed in paragraphs 9.229 to 9.235 below). As explained in paragraph 9.235, Ofcom intends to consult separately, taking account of responses to the MNP consultation, on an amendment to the new charge control conditions which would take into account the potential impact of MNP on termination revenues. Accordingly (although without

prejudice to the outcome of that consultation), any distortions flowing from the current charging arrangements for calls to ported numbers may instead be addressed as a result of that amendment.

Conclusion on differentiated charge controls

9.132 For the reasons set out above, Ofcom considers that it is desirable to move towards a position where a single charge control is applied to all MNOs.

Issues associated with the implementation of a single charge control for all MNO types

9.133 Moving to a single charge control for all MNOs raises two issues, namely:

- The level of the common charge; and
- The time at which charges are aligned.

9.134 These issues are discussed separately below in relation to the alignment of 2G/3G MNOs' charges and alignment with a 3G-only MNO's charges.

Alignment of 2G/3G MNOs' charges

9.135 In principle there are a number of options for aligning 2G/3G MNOs' charges, each of which might reflect different changes in the opportunity cost of spectrum (in a competitive MCT market). Specifically, there are three options for how a common MCT charge could be set:

- equal to 1800MHz-only operators' estimated costs (**option 1**) e.g. reflecting a rise in the opportunity cost of scarce 900MHz spectrum to offset any difference in 900/1800MHz and 1800MHz-only operators' network costs;¹⁰³
- equal to 900/1800MHz operators' estimated costs (**option 2**) e.g. reflecting a fall in the opportunity cost of 1800MHz spectrum;¹⁰⁴ or
- In between the level of 900/1800MHz and 1800MHz-only operators' estimated costs (**option 3**) e.g. reflecting a fall in the opportunity cost of 1800MHz spectrum and a rise in the opportunity cost of scarce 900MHz spectrum (and, overall, these changes offset any difference in 900/1800MHz and 1800MHz-only operators' network costs).

9.136 In the September 2006 Consultation, Ofcom proposed option 1, namely that the level of the control should reflect the higher of the individual ranges for the two types of operator.

9.137 In their responses to the September 2006 Consultation:

¹⁰³ Such a rise in the opportunity cost of 900MHz spectrum reflects its finite (scarce) availability.

¹⁰⁴ Since 900/1800MHz operators use both 900MHz and 1800MHz spectrum, a common charge set at this level would reflect a fall in the opportunity cost of 1800MHz spectrum, though also a rise in the opportunity cost of 900MHz spectrum, such that the 900/1800MHz cost benchmark would remain unchanged but the 1800MHz-only operators' cost benchmark would fall to this level.

- Orange and T-Mobile argued that aligning 2G/3G MNOs' charges based on an estimate of an 1800MHz-only operator's costs would allow 900/1800MHz MNOs to charge "excessive" prices and that such prices also distort retail markets.
- H3G referred to its response to the March 2006 Consultation. H3G considered that setting prices according to the competitive benchmark (as discussed in paragraphs 9.119-9.121) leads to the conclusion that the appropriate price is determined by the MNO with highest costs (since this reflects the costs of the marginal supplier).

9.138 Ofcom has considered these responses:

- Ofcom does not accept Orange and T-Mobile's arguments:
 - Orange and T-Mobile appeared to suggest that option 1 allows 900/1800MHz MNOs to charge "excessive" prices. However, as explained above, in a (hypothetical) competitive market one would expect the prices of supplying MCT to align (given that it is a homogenous product) and in a liberalised spectrum market one would expect opportunity costs of spectrum to reflect the alignment of prices. Under option 1, the assumption is that the costs of 900/1800MHz operators rise (in the hypothetical competitive benchmark), for example because the opportunity cost of 900MHz spectrum is higher. Accordingly Ofcom does not consider that this option necessarily allows 900/1800MHz MNOs to charge "excessive" prices.
 - Moreover, as discussed in paragraph 9.126, Ofcom considers that the issue of potential windfall gains (e.g. for holders of 900MHz spectrum) are best dealt with within the context of spectrum policy more generally.
 - Ofcom does not accept that option 1 results in a material distortion to retail markets. The cost modelling undertaken by Ofcom highlights that modelled cost differences between 900/1800MHz and 1800MHz-only MNOs are relatively small and have narrowed over time.¹⁰⁵ In Ofcom's cost model, this narrowing is forecast to continue over the proposed charge control period, such that, in 2010/2011, the modelled unit cost difference is less than 0.3ppm, compared with the 0.7ppm difference reflected in the existing charge controls for MCT on 2G networks. Under a medium traffic scenario, in 2010/11 this modelled differential equates to less than 1.5% of either Vodafone or O2's 2005 retail revenues.¹⁰⁶
- Ofcom does not accept that the modelled cost of the operator type with highest costs necessarily reflects either (i) the costs in a competitive market; or (ii) the only appropriate benchmark for common charge controls. However, Option 1 reflects a conservative assumption about the level of MNOs' costs in a competitive market and would therefore ensure that Orange and T-Mobile recover their efficiently incurred costs (which, to the extent that this impacts on investment decisions, is likely to serve the longer term interests of consumers –

¹⁰⁵ It is important to recognise that the outputs of this modelling reflect the assumptions made. The modelling does not incorporate the changes in the opportunity cost of spectrum discussed in paragraph 9.120.

¹⁰⁶ Comparing the modelled differential multiplied by the number of terminated minutes for a benchmark 2G/3G MNO in 2010/11 with retail revenues in 2005 (note that retail revenue in 2005 will understate retail revenue in 2010/11).

see paragraphs 9.193-196). Accordingly, Ofcom considers that option 1 remains the appropriate benchmark, for the purposes of this review.

9.139 Turning to the issue of the time at which charge controls are aligned, Ofcom notes that, in previous reviews of MCT charges, both Ofcom and the Competition Commission have set different charge controls for 900/1800MHz operators and 1800MHz-only operators. In addition, as discussed in paragraph 9.122 above, anticipated developments in spectrum policy support the arguments for aligning charge controls. However, given that trading and liberalisation of 900MHz and 1800MHz spectrum are currently not in place, this suggests that immediate alignment may not be appropriate. Accordingly, in Ofcom's view, it is reasonable to allow a period of transition. Ofcom considers therefore that the charge control for 2G/3G MNOs' should be aligned over the course of the charge control period, i.e. by 2010/2011. In reaching this conclusion, Ofcom has taken into account that, as discussed in paragraph 9.138, in 2010/2011 the modelled unit cost difference is less than 0.3ppm.

Alignment of all MNOs' charges

9.140 As mentioned above, in their responses to the September 2006 Consultation, both BT and C&W advanced arguments that 3G charges should be set by reference to the price for termination on 2G networks. For the reasons explained in paragraph 9.53 and Annex 14, Ofcom has concluded that there are practical difficulties in benchmarking 3G costs to current 2G costs (given that 2G AIP fees do not take into account the potential impact of liberalisation and that the size of the smallest useful blocks of 2G and 3G spectrum are very different).¹⁰⁷ These practical difficulties also make it challenging, at this time, objectively to determine an appropriate level at which the charges of 2G/3G MNOs and a 3G-only MNO could be aligned.

9.141 Further, as explained in paragraph 9.139 above, Ofcom considers that it is reasonable to allow a period of transition. As noted in paragraphs 9.96-9.102, the size of the modelled cost differential between a 3G-only MNO and a 2G/3G MNO is much larger than the size of the modelled cost differential between 900/1800MHz and 1800MHz-only operators. This suggests that a longer transition period is appropriate for aligning 3G-only MNOs' charges.

9.142 Given the arguments above in favour of a longer adjustment period in the case of 3G-only operators' charges, as well as the practical problems with attempting to align 2G/3G and 3G-only operators' charges at this time, Ofcom remains of the view that it is not appropriate to align 2G/3G and 3G-only operators' charge controls during the period of this charge control to 2010/11. Rather, by 2010/2011, Ofcom's charge controls will narrow the current differential between 2G/3G and 3G-only operators' charges but not eliminate it entirely.

9.143 Over the longer term, and without prejudice to the conclusions of any future reviews (when the need, or otherwise, for continuing charge regulation is considered again), Ofcom would anticipate further convergence in MNOs' MCT charges.

Summary of efficient charge level

9.144 In the September 2006 Consultation, Ofcom proposed that the efficient charge level for the 2G/3G MNOs should lie within the range 4.8 to 5.8ppm and the efficient

¹⁰⁷ Note that these practical comparison issues do not arise when comparing 900MHz with 1800MHz spectrum.

charge level for H3G should lie within the range 5.4 to 6.7ppm. Ofcom noted that the midpoints of these ranges are, respectively, 5.3ppm and 6ppm.

- 9.145 The majority of responses to the September 2006 Consultation that related to the level of the charge control are dealt with elsewhere in this document. Those related to Ofcom's network cost modelling are discussed in detail in Annex 5. The treatment of 3G spectrum costs is another important factor in deriving the efficient charge level, and Ofcom received a number of relevant responses on this issue that are covered in Annex 14.
- 9.146 Some responses from stakeholders also referred explicitly to Ofcom's approach to determining efficient charge levels. Notably, C&W argued that the most likely effect of consistent conservative assumptions will be an over-recovery of termination costs by MNOs, which will be to the detriment of FNOs.
- 9.147 Ofcom understands C&W's concern, but does not agree that its approach to setting efficient charge levels has relied on assumptions that are consistently conservative. For example, the key inputs and assumptions in Ofcom's cost model reflect the best available evidence. In all cases, Ofcom has considered the relative impacts of its assumptions on all stakeholders, not just the MNOs.
- 9.148 Further, H3G expressed the view that the charge level proposed for the 3G-only operator, H3G, is too low and fails to take into account dynamic investment and competitive effects. In H3G's view, any charge controls should be designed to ensure a [X] neutral impact on termination payments/revenues between H3G and the other MNOs. [X]
- 9.149 Ofcom does not agree with H3G's argument that charge controls should be set to ensure [X] neutral revenue flows between mobile operators for termination payments. [X]
- 9.150 Ofcom has also given careful consideration to [X] the treatment of uncertainty in unit costs arising from uncertainty in future traffic levels, as described in the following paragraphs.

Ofcom's objectives and approach in determining the final level

- 9.151 In order to implement the charge controls, which Ofcom has determined are part of the appropriate remedies to address the detriments identified in Section 7, it is clearly necessary to specify the levels of the charge control. In doing so, Ofcom has considered its objective to further the interests of consumers by promoting efficiency, promoting effective and sustainable competition, and securing the maximum benefit for end users (as discussed further in Section 10).
- 9.152 As acknowledged in the September 2006 Consultation, Ofcom notes that there is a significant degree of uncertainty in forecasting critical variables which influence the level of efficient charges. As a result of this uncertainty, identifying a specific benchmark as the optimal level is intrinsically difficult. Nevertheless, as described in paragraphs 9.31 to 9.87, and discussed in further detail in the annexes to this statement, Ofcom has undertaken considerable analysis and cost modelling in order to examine these uncertainties and consider their impact on the efficient charge levels. A wide range of variables can have a material impact on the efficient charge levels, but Ofcom's focus has been to consider a range of assumptions for the three most important:

- traffic demand forecasts: including demand for voice and data services – the uncertainty associated with this factor has the greatest influence on the overall levels of the charge controls;
- network economies of scale and scope between voice and data: the uncertainty over data traffic forecasts in particular make it appropriate to consider the impact on network costs of only carrying voice traffic;
- treatment of 3G spectrum costs: incorporating both the magnitude of costs to be recovered and the proportion recovered from voice termination services.

9.153 Given the uncertainty, in Ofcom's view it is undesirable to seek to derive efficient charge levels from a single scenario and set of assumptions. Instead, the purpose of Ofcom's analysis has been to identify bounds on the uncertainty in order to inform a judgement of efficient charge levels. Specifically, Ofcom has adopted the following approach:

- Step 1: Identify a set of relevant and reasonably representative benchmarks (each reflecting a different set of assumptions);
- Step 2: Consider, in a qualitative fashion, the relative weights to be attached to different benchmarks;
- Step 3: Apply reasonable judgement to identify efficient charge levels, taking into account Ofcom's objectives, Steps 1 and 2 and other relevant considerations, such as any asymmetry in the risks and impact of setting charges that turn out to be too low;
- Step 4: Cross-check the appropriateness of the judgement exercised in Step 3, by identifying specific scenarios consistent with the identified efficient charge levels and considering the reasonableness of the set of assumptions in those scenarios.

9.154 Ofcom has considered adopting alternative approaches to address the uncertainty, such as probabilistic methods including Monte Carlo analysis. For example, in its response to the September 2006 Consultation, H3G suggested that an appropriate approach would be to assign some form of probability distribution to the various possible outcomes and compute an overall average. However, in this context, it is Ofcom's view that adopting a probabilistic approach would introduce a further degree of complexity. Rather than illuminating the problem further, the nature of the uncertainty in this case is such that an attempt to quantify the risks and probabilities would be likely to generate spurious degrees of "accuracy", especially given the absence of compelling evidence to guide the choice of probability distribution. Furthermore, in Ofcom's view this is likely to result, in practice, in less rather than more transparency, as the judgments would be embedded in the particular probabilities assigned to each of the different cost scenarios.

9.155 In the context of its objectives, Ofcom believes that its approach to determining efficient levels for the charge controls, by identifying bounds on the uncertainty in order to inform its judgement within a clearly defined structure, is reasonable and proportionate given the applicable circumstances, such as the intrinsic uncertainty in a number of key variables.

Efficient charge levels

- 9.156 The scope of the uncertainty is reflected in Figure 9.1, which sets out a range of relevant efficient charge benchmarks for the 900/1800MHz operators, the 1800MHz-only operators and the 3G-only operator.
- 9.157 In applying Step 1 as set out above, in order for its approach to be robust, Ofcom has been careful to select a range of benchmarks that most accurately represent the results of its analysis. The scenarios in Figure 9.1 include a broader set of scenarios than were used to generate the medium range consulted upon in September 2006 although they are not the only ones that Ofcom has modelled, and many more scenarios could be developed in addition to those presented here. Ofcom believes that its final benchmarks represent a reasonable set of efficient unit cost estimates (plus network externality surcharge) for determining a final level for the charge controls. For example, Ofcom has incorporated 3G spectrum costs into its benchmark scenarios that are broadly consistent with the volume of voice and data traffic within each scenario. High levels of demand for network services would imply a greater opportunity for spectrum cost recovery by MNOs than lower levels of demand. Therefore, where a high voice and data traffic volume is assumed for a particular scenario, Ofcom believes that the opportunity cost assigned to spectrum for that scenario should be towards the higher end of its range of plausible valuations, and vice versa.
- 9.158 Ofcom's cost modelling produces efficient charge benchmarks for the 900/1800MHz operators that are slightly lower (by less than 0.3ppm) than the equivalent 1800MHz-only operator benchmarks (see Figure 9.1). For the reasons set out in paragraphs 9.118-139, Ofcom has decided to set a single charge for all 2G/3G operators. To ensure that MNOs can recover efficiently incurred costs, Ofcom has used the 1800MHz-only operator benchmarks to set the charge control level for all 2G/3G operators.
- 9.159 The set of benchmarks used to inform Ofcom's judgement in determining the charge control levels is shown in Figure 9.2 below, with further details, including the ppm figures, in paragraphs A13.58-A13.62 of Annex 13.
- 9.160 The single most important contributor to the uncertainty which these benchmarks take into account is the uncertainty in forecasts of voice and data traffic. As discussed in paragraph 9.42, Ofcom has considered a broad range of demand scenarios encompassing high, medium and low cases for voice and data traffic, as well as a voice-only traffic scenario. These scenarios are described more fully in paragraphs A5.79 to A5.89 of Annex 5 and could each represent a number of different specific market outcomes. However, one illustrative characterisation of each scenario is as follows:
- High voice and data traffic: this scenario corresponds, for example, to a very optimistic market outcome in which aggressive mobile pricing drives high levels of fixed-mobile substitution for voice calls and emerging data services such as music and video downloads and location-based services prove to be highly popular. This scenario gives rise to relatively lower unit benchmarks for mobile call termination;
 - Medium voice and data traffic: this scenario corresponds to a small ongoing trend towards fixed-mobile substitution for voice calls as mobile prices continue to fall (Ofcom assumes moderate growth in voice usage per subscriber of 5% per year until 2010/11 and reduced growth thereafter). At the same time, the use of mobile

data services continues to grow at a moderate rate (Ofcom assumes a forecast towards the lower end of the range obtained from mobile operators, brokers' reports as well as third party market research). It gives rise to conservative benchmarks for medium traffic levels;

- Medium voice-only traffic: this scenario considers the same demand for voice services as the medium voice and data traffic scenario but where network costs are assessed as if no data traffic at all is carried on the network. While this is an unrealistic scenario, it provides a useful benchmark as an upper bound on the unit cost estimates for MCT (for a given level of voice traffic) ignoring the economies of scale and scope in network costs due to carrying both voice and data traffic; and
- Low voice and data traffic: this scenario corresponds to a pessimistic view of future demand for mobile voice and data services where there is no growth at all in subscriber voice usage and mobile data services remain a niche product, for example, limited primarily to mobile data-cards for business use. It gives rise to relatively higher benchmarks for MCT.

9.161 In addition to the uncertainty arising from forecasts of voice and data traffic, the treatment of 3G spectrum costs also has a material impact on the efficient charge benchmarks. As noted in paragraph 9.56, Ofcom has explored a number of scenarios with the aim of reflecting a reasonable range including upper and lower bound impacts of 3G spectrum costs on the level of efficient charge for MCT, reflecting differing assumptions about the MFLOC of 3G spectrum and 3G spectrum cost allocations. In particular, in the case of the medium voice and data traffic scenario, Ofcom has considered 3G spectrum costs which range between £1.4bn and £4.4bn (see Annex 14). However, it is important that spectrum costs are broadly consistent with the volume of voice and data traffic within each scenario, and hence Ofcom has taken values towards the higher end of this range to apply in the case of the high voice and data traffic scenario, and values towards the lower end in the case of the low voice and data traffic scenario, as explained more fully in paragraphs 9.82-9.83. The resulting 12 scenarios incorporating traffic demand and 3G spectrum costs are listed in paragraph 9.86.

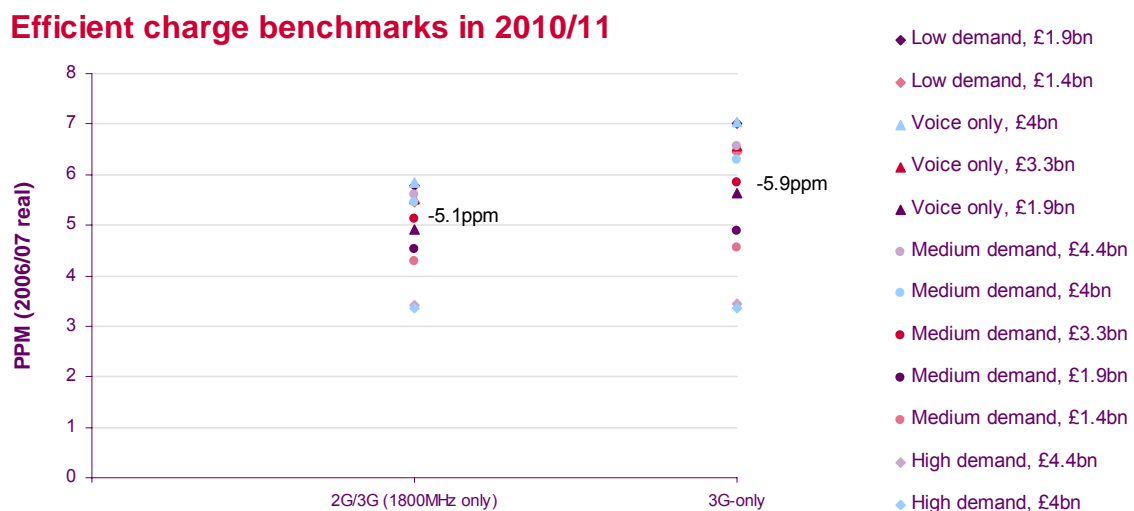
9.162 Step 2 requires consideration of the relative weights to be attached to different benchmarks. It might be thought that a reasonable starting point for the determination of a single final charge control level in 2010/11 would be the mid-point of the range of efficient charge benchmarks for each operator type. Given that the set of benchmarks accurately represents a range of plausible efficient charge scenarios, the mid-point of this range might be a reasonable balance of the different factors that have generated the benchmarks. For an 1800MHz-only operator, the midpoint of the range of benchmarks would be 4.6ppm, compared with 5.2ppm for a 3G-only operator.

9.163 In this case, however, Ofcom believes that selecting the midpoint of the range would not be the most appropriate approach. Selecting a midpoint means that the only benchmarks that ultimately determine the final charge outcome are those that lie at the extremities of the selected range. Ofcom considers this to be a disadvantage, given that the extreme benchmarks are those that use either the high demand or low demand scenarios, and in Ofcom's opinion are less likely to be realised than those that use the medium case. For this reason, Ofcom considers that less weight should be placed on these scenarios.

- 9.164 With regards to the eight benchmarks for the medium demand and voice-only cases, Ofcom considers that the voice-only scenarios are useful because they represent an upper bound in relation to the corresponding medium demand scenarios but that less weight should be placed on them because they do not allow for economies of scope with data services.
- 9.165 In applying Step 3, Ofcom has given careful consideration to the points discussed above and other relevant considerations in the context of its objective to further the interests of consumers by promoting efficiency and securing the maximum benefit for end users.
- 9.166 In giving relatively more weight to medium demand and voice-only scenarios than to low and high demand scenarios, as discussed under Step 2, Ofcom notes that the benchmarks for the eight scenarios that do not derive from either the high or the low demand cases tend to be on the higher side of the range of benchmarks. For example, six of the eight scenarios lie above the midpoint of the range. An implication is that the charge control should be set at a level above the midpoint of the full range of benchmarks for the twelve scenarios.
- 9.167 A further concern for Ofcom, which has a similar implication, is that selecting the midpoint of a range of benchmarks may not take sufficient account of the risks involved in setting a charge control level. H3G, in response to the September consultation, argued that the size of the range was an indicator of investment risk, and that the selection of a midpoint meant that the magnitude of this risk did not have any bearing on the final charge control outcome.
- 9.168 Ofcom has noted previously that there is potentially an asymmetry in the risks and impact of setting charges that turn out to be too low. Charge controls which, in practice, fail to enable recovery of efficient costs may have an adverse impact on investment, which would be detrimental to consumers generally. Ofcom has noted that charge controls should not be so tight as to impact adversely prospects for investment, particularly in the light of uncertainty about future traffic levels on 2G and 3G networks. On the other hand, although Ofcom's view is that the waterbed effect is unlikely to be complete, even an incomplete waterbed effect ameliorates the impact of the level of termination charges on MNOs' profitability and thus reduces the risk that MNOs fail to recover their efficiently incurred costs overall. There is potential, therefore, for the impact on MNOs' incentives to invest and on consumers to be overstated. Nevertheless, Ofcom believes that the presence of this asymmetric risk also supports a charge control level that is above the midpoint of its range of benchmarks.
- 9.169 Taking account of all of these factors, Ofcom's judgement is that reasonable efficient charge levels are 5.1ppm for the 2G/3G operators and 5.9ppm for the 3G-only operator. Ofcom has been careful to ensure consistency in its treatment of operators and has therefore determined efficient charge levels for the 2G/3G operators and the 3G-only operator which reflect a consistent treatment of demand and 3G spectrum costs.
- 9.170 Finally, in terms of Step 4, in order to test the reasonableness of these charge levels, Ofcom has conducted further scenario modelling to identify multiple scenarios which correspond to the benchmarks of 5.1ppm and 5.9ppm. These unit cost estimates can be arrived at using several combinations of key variables, notably 3G spectrum costs and demand scenarios, and the relationship between the levels of these two variables demonstrates a good level of consistency. For example, as set out in Annex 13, Ofcom has identified scenarios of reasonable assumptions based on each

of the low traffic demand, the medium traffic demand and the voice-only traffic demand scenarios, which when coupled with appropriate 3G spectrum costs, correspond to the pair of benchmarks of 5.1ppm and 5.9ppm for the 2G/3G operators and 3G-only operator respectively. Furthermore, Ofcom has identified weightings of the demand scenarios, which together with appropriate 3G spectrum costs, are also consistent with benchmarks of 5.1ppm for 2G/3G operators and 5.9ppm for the 3G-only operator. These results provide further confirmation that the efficient charge levels determined by Ofcom are appropriate.

Figure 9.2 Efficient charge benchmarks used to determine the charge control level in 2010/11



Path of reductions in charges

9.171 The current MCT charges for all MNOs are higher than their relevant charge control levels for 2010/11, and it is therefore necessary to consider how quickly the charges of each MNO should fall during the period of the control. This issue is most relevant to H3G, because its current charges are significantly higher than other MNOs and well in excess of the final target charge of 5.9ppm to which Ofcom has concluded H3G’s charge should fall by 2010/11. H3G’s current charges are also significantly above reasonable estimates of cost for 2007/08.

9.172 In broad terms, the path of reductions in charges should give due consideration to balancing two objectives:

- reductions should be achieved sufficiently quickly in order to deliver substantial benefits to consumers, including benefits to be derived by addressing possible competitive distortions; and
- reductions should allow sufficient time for operators and customers to adjust to new levels and structures of mobile charges and take these changes into account in their business plans and planned capital expenditure.

9.173 The first point seeks to ensure that consumers are able to benefit from lower prices for network services (including fixed to mobile calls). The second point notes that benefits to callers to mobiles should not be at the expense of unacceptable disruption

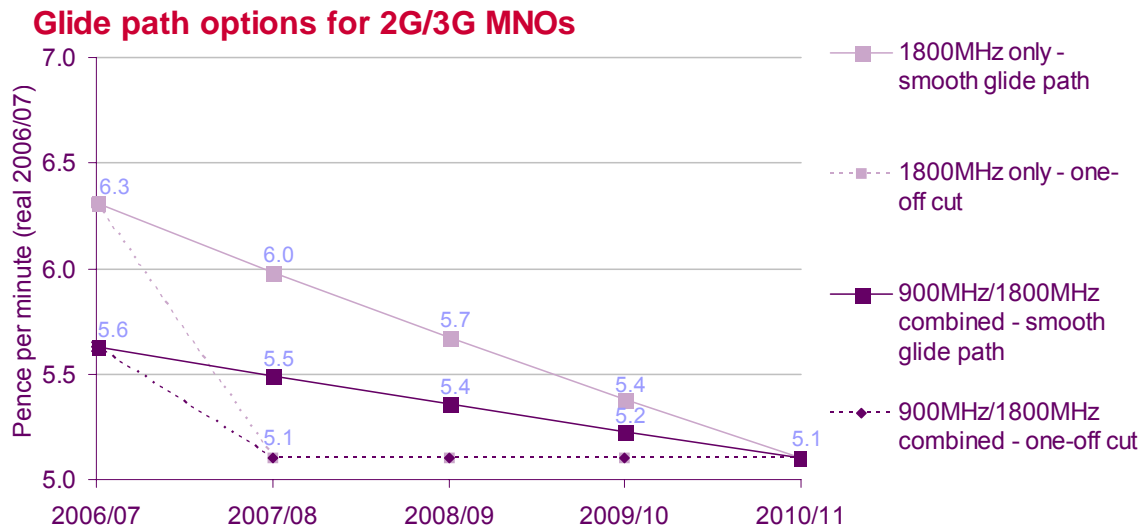
to the mobile sector, the industry and consumers more generally (e.g. through adverse effects on investment).

- 9.174 In addressing this question, Ofcom considers that MNOs should not be denied the opportunity to recover their efficiently incurred costs. It is therefore important to ensure that the path of required charge reductions does not require that MNOs charge below their respective underlying cost benchmarks. In the case of the 2G/3G MNOs, Ofcom's cost analysis at Annex 13 suggests that their underlying cost path is generally flat, such that any reasonable pattern of charge reductions during the control period is unlikely to lead to charges that are below the cost path. However, in the case of H3G, costs are forecast to fall over the course of the four year control and therefore this is a material consideration.
- 9.175 Ofcom recognises that a balance must be achieved between serving the short term welfare of consumers (through lower prices and hence immediate reductions of prices to a level consistent with the underlying costs), and conversely the need for efficient investment incentives for existing and prospective network operators and service providers by allowing a sufficient period of time for operators and customers to adjust to new levels and structures of mobile charges (which benefit consumers in the longer term).
- 9.176 Nevertheless, where a provider has SMP and, in the absence of regulatory controls, has set charges materially above cost, a smooth glide path which reduces charges over an extended period might be considered to allow that provider to continue to set excessive charges. The more excessive the charges, the longer such a glide path will allow above-cost charges to be levied.
- 9.177 In the case of the 2G/3G MNOs, while the blending of unregulated 3G charges has, in some cases, caused charges to rise above the regulated 2G level, the level of the blended charges set by these MNOs has been determined for the most part by regulation of the 2G charges which at present have a high weight in the derivation of the blended charge. This has not been the case with H3G which is not presently subject to charge controls and which has used its freedom to set charges. This is an important consideration in determining the appropriate path of regulated charges to 2010/11.

2G/3G MNOs' path of charge reductions

- 9.178 In the September 2006 Consultation, Ofcom considered two main options for reducing the regulated charges of the 2G/3G MNOs to the target level in 2010/11: (i) a smooth glide path to cost, (ii) an immediate reduction to cost. The charges of the 2G/3G MNOs are, however, not significantly above the level which Ofcom considers to be appropriate in 2010/11. As such, a one-off cut straight to the target charge may have little adverse impact on the 2G/3G MNOs and may bring benefits to consumers. However, the existing charges of the 2G/3G operators have been heavily influenced by the current charge control framework even noting a degree of blending of unregulated 3G charges (as described above). Therefore, a glide path may represent a more appropriate approach given the role regulation has played in determining the level of the 2G/3G MNOs' termination charges today. The options considered in the September 2006 consultation are set out in the figure below.

Figure 9.5 Options for implementing charge reductions for 2G/3G MNOs (Real 2006/07 prices)¹⁰⁸



9.179 BT supported the proposal for a smooth glide path to 2010 for the four 2G/3G MNOs, provided that the starting point is the headline regulated charge for 2G MCT (and does not take into account the current blending of 3G charges). C&W, however, favoured a one-off reduction to cost for these MNOs, with charges tracking costs thereafter. H3G did not propose a preferred approach for the 2G/3G MNOs but argued that it would not be appropriate to take the same approach to glide paths for H3G and for the 2G/3G MNOs as these MNOs are in different substantive positions. Vodafone proposed that the charges of all five MNOs (including H3G) should be required to follow a glide path to cost by 2008/9, and O2 proposed a path of just 18 months duration for all MNOs to reduce charges to cost. Orange favoured a smooth glide to cost for 2G/3G MNOs.

9.180 Having considered responses to the September 2006 consultation, Ofcom has concluded that the 2G/3G MNOs should be required to reduce their charges in line with a smooth glide path of four equal percentage reductions, the steps to be calculated with reference to the applicable average charge for the final year of the charge control (2010/11), taking the headline level of the charge controls currently in force (i.e. 5.63ppm for Vodafone and O2 and 6.31 ppm for Orange and T-Mobile) as the starting point for the glide path. Furthermore, Ofcom has determined that the target average charge for the first period (2007/08) should be set on this basis as an absolute target in pence per minute. This represents a small one-off adjustment to remove any increase in current blended charges which is above the 2G regulated rates. The higher starting point for Orange and T-Mobile is advantageous to those two MNOs in the first three years of the charge control. In Ofcom's view, this is proportionate and objectively justified, for the reasons set out at paragraph 9.139 above.

9.181 In these particular markets, it has generally been the practice of Ofcom (and Oftel before it) to give Communications Providers at least 60 days notice of the imposition of new charge controls. Ofcom recognises that compliance with charge controls may require a degree of adjustment to business plans and MNOs may be subject to contractual notice periods which must be observed before charges are modified. In

¹⁰⁸ Note that these options have been modified from the figure presented in the September 2006 Consultation to reflect the final target charge level of 5.1ppm.

the case of the present review of the market for MCT, it is Ofcom's view that it is important that new charge controls should take effect on the day that the present charge controls imposed on the 2G/3G MNOs expire (ie 1 April 2007), rather than delay for 60 days from the date on which the present statement is published. Delay would create a period of uncertainty and, potentially, disruption. Given that this final statement and the attached Notifications are not being published 60 days before 1 April 2007 when the new controls come into force, Ofcom has concluded that it is appropriate to adjust the year-one (2007/8) charge levels under the new charge control conditions to reflect the absence of an extended regulatory notice period.

9.182 Ofcom has therefore adjusted the year-one (2007/8) charge levels which would otherwise have been defined by a smooth glide path of four reductions of equal percentage change from today's headline regulated charges for 2G MCT down to the final year (2010/11) regulated charge. When specifying the year-one target average charge Ofcom has increased the level of the charge defined by a smooth glide path by weighting this as though it applied for only 10 of the 12 months of the control and as though for two of the 12 months the present headline regulated charges for 2G MCT applied. In the case of the year-one charge controls applicable to the 2G/3G MNOs the impact on the target average charge is less than 0.1ppm. As a consequence, the size of the percentage reduction from the first to the second year of the control is increased slightly by not more than 1%.

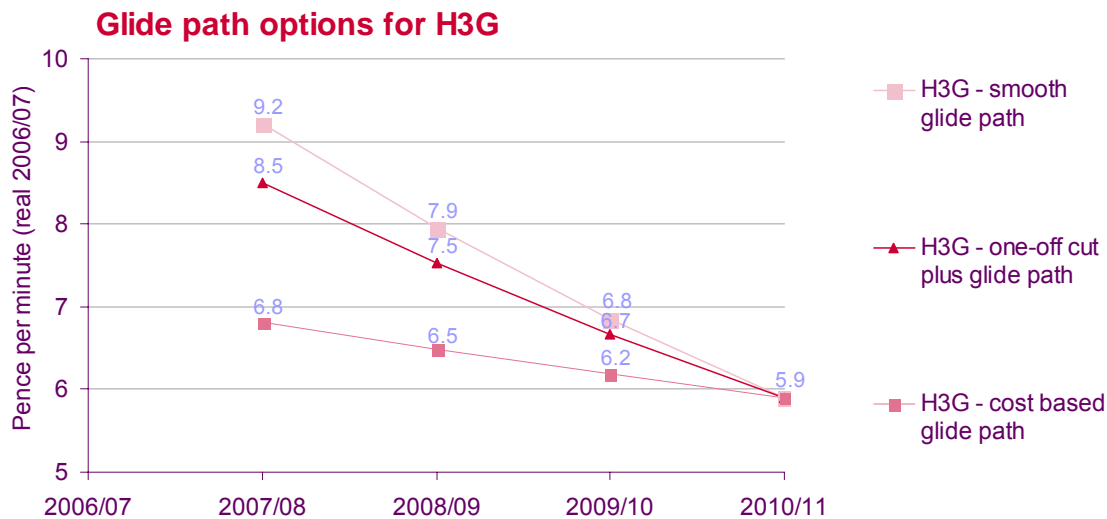
H3G path of charge reductions

9.183 Given the finding that H3G's charges are well in excess of the cost-based level to which Ofcom has concluded these charges should fall by 2010/11, the September 2006 Consultation identified three possible options for implementing charge reductions:

- Option 1: Establish a smooth 'glide path' under which charges are reduced at a constant percentage rate in each of the four years (using an 'RPI - X' formulation), such that charges in 2010/11 align with the cost-based target for that year;
- Option 2: Reduce charges immediately through a partial one-off cut and then adopt a glide path, which is less steep than a smooth four year glide path as a consequence of the initial cut, to ensure charges align with the cost-based target for the final year of the charge control; and
- Option 3: Reduce charges immediately to align with the 3G-only operator cost benchmark for 2007/08, and then set charges equal to the forecast cost path thereafter.

9.184 These are set out in the figure below.

Figure 9.4 Options for implementing charge reductions for H3G (Real 2006/07 prices)¹⁰⁹



- 9.185 As discussed further in paragraphs 9.193-195, in assessing these options, a balance must be struck between the short term and longer term interests of consumers which may be addressed by charge controls. While Ofcom considers, for the reason set out in paragraph 9.168 above, that to allow H3G to benefit from a smooth glide path from the present high level of charges (Option 1) could perpetuate a situation where consumers face a material detriment, conversely, Ofcom is concerned that a sharp and immediate reduction to cost (Option 3) may not be in the longer term interests of consumers (if such a reduction presents a material risk to further investment in mobile services).
- 9.186 Ofcom also included for consultation, therefore, Option 2 which would have required H3G to implement a substantial reduction in its average charges for the first year of the charge control (2007/8), but would not require H3G finally to reduce its charges to cost until the final year of the charge control (2010/11).
- 9.187 The principles for deriving Options 1 or Option 3 across each of the four years of the charge control are clear, given the final efficient target charge in 2010/11 and the starting charge. Ofcom proposed that if Option 2 were adopted, the further reduction to cost (including network externality mark-up) should be achieved in three further uniform percentage reductions in each of the following three charge control years.
- 9.188 In respect of the glide path for H3G, BT argued that H3G should be required to reduce charges to cost immediately, with charges tracking costs thereafter. C&W noted that H3G is still a relatively new operator and that, for this reason, there is an argument for allowing some over-recovery of efficient costs for a limited period. However C&W expressed concern that to allow H3G to continue to over-recover at the current extent would be unlikely to lead to H3G establishing itself in a stable manner; C&W noted H3G's WePay service¹¹⁰ as an example of the impact of inefficiently high MCT charges. C&W therefore argued that H3G should be required to make a substantial one-off adjustment.

¹⁰⁹ Note that these options have been modified from the chart presented in the September 2006 Consultation to reflect the final target charge level of 5.9ppm.

¹¹⁰ H3G's WePay service offers H3G's retail customers a credit for incoming voice calls and SMS

- 9.189 Vodafone and O2 argued that all MNOs (including H3G) should be required to reduce charges to cost within either 2 years (in Vodafone's view) or 18 months (in O2's view). Vodafone and O2 both presented lengthy consideration of the likely impact on H3G of a requirement to make a substantial reduction in their charges, noting that MNOs have in the past been required to make substantial one-off adjustments to MCT charges (most notably in 2003 when the Competition Commission required reductions of about 25% in a single year). T-Mobile proposed that to address present market distortions, the margin between H3G's regulated charges and costs should be reduced immediately to the same level as that experienced by 2G/3G MNOs. Orange proposed an immediate reduction to cost.
- 9.190 Having considered the responses of stakeholders, Ofcom has concluded that the most appropriate glide path option to apply to H3G is option (2) as set out in paragraph 9.183 above, i.e. an immediate and substantial reduction in charges as a partial elimination of the adverse effects identified, followed by a glide path of three annual reductions of equal percentage in order to reduce charges to cost by the final year of the charge control. Ofcom has concluded that the appropriate charge level for the first year (2007/8) is 8.5ppm (2006/7 prices) which corresponds to a reduction of just over 20%.
- 9.191 In reaching this conclusion, Ofcom has considered the objectives set out in paragraph 9.151 above and has struck a balance between the short term and longer term interests of consumers. In Ofcom's view, an immediate reduction to cost, while more effective in swiftly addressing competitive distortions, would not be in the longer term interests of consumers, as an immediate reduction in charges of up to 40% would present a risk to further investment in mobile services. An immediate percentage reduction of this size would go beyond regulatory precedents in mobile termination markets, where immediate reductions of no more than about 35% have been required, and even then, only under specific circumstances that do not apply here.¹¹¹ Conversely, a smooth glide path from the present level of charges would tend to reward excessive charging to date, and prolong competitive distortions and high prices paid by consumers. Ofcom notes that the present market review has been protracted (commencing with the publication in June 2005 of a Preliminary Consultation). Ofcom finally published a firm proposal that H3G should be subject to charge controls in September 2006, and set out a proposed maximum charge of 6.0ppm to apply in 2010/11 and three different glide path options including option (2) which Ofcom has concluded should be adopted. H3G has, therefore been aware of the possibility of charge controls for some time, and the likely level of the controls for at least 6 months. Ofcom also notes that H3G's business plan produced in May 2006 assumed a reduction of average MCT charges to around [x] in 2007/8. Ofcom has concluded, therefore, that H3G has had sufficient time to consider its options for implementing a charge control of a similar stringency to that which Ofcom has concluded should be imposed.
- 9.192 For the reasons set out in paragraph 9.181 above in respect of the 2G/3G MNOs, Ofcom has concluded that an adjustment should be made to the year-one (2007/8) charge level discussed in the preceding paragraph to reflect the absence of an extended regulatory notice period. When specifying the year-one target average charge Ofcom has increased the 8.5ppm (2006/7 prices) level of the charge as though it applied for only 10 of the 12 months of the control and as though for two of the 12 months the present average charges applied. In the case of the year-one

¹¹¹ In the previous market review concluded in June 2004, reductions of over 30% were imposed to compensate for delay, but only after the MNOs had been aware of the approximate target levels for a period of years.

charge controls applicable to H3G this increases the year-one target average charge to 8.9ppm (2006/7 prices) and represents a reduction of [3%] (in real terms) from current charges. As a consequence, the size of the percentage reduction from the first to the second year of the control is increased slightly. The larger enhancement of H3G's year-one target average charge (compared with the enhancement applied to the 2G/3G MNOs) reflects the larger discrepancy between the current average charge and the year-one target charge absent the notice period adjustment.

Risks inherent in charge setting and financial impact

The risks of setting too high or too low a price

- 9.193 As Ofcom has acknowledged, there remains a high degree of uncertainty about future traffic volumes on mobile networks and, hence, the appropriate unit cost for MCT. Ofcom is mindful of the risks to MNOs' ability to recover efficient costs if charge controls are set on a basis which ultimately proves to over-estimate actual traffic levels, and hence under-estimate reasonable unit costs. This could impact on investment and in the longer term impact consumer services. As discussed in Section 7, Ofcom considers that there are material gains for consumers from regulating MCT charges. However, in responding to the September 2006 Consultation, H3G argued that the gains from small changes in termination charges are not significant and that Ofcom should take this into account when determining the appropriate MCT charges and in particular when reaching a view on different charges where differences between them are relatively small.
- 9.194 Ofcom accepts that there is potentially an asymmetry in the risks and impact of setting charges on the basis of forecast costs that are ultimately below the actual costs incurred by MNOs. Charge controls which, in practice, fail to enable recovery of efficient costs may have an adverse impact on investment in mobile services, which would ultimately be detrimental to consumers generally.
- 9.195 As explained in Section 7, Ofcom remains of the view that the waterbed effect is unlikely to be complete. However, even an incomplete waterbed effect ameliorates the impact of the level of termination charges on MNOs' profitability and so on MNOs' ability or incentives to invest in 3G and consumer services. However, if termination charges are below costs, the mechanism of the waterbed effect may involve MNOs earning sufficient revenues to cover their costs by setting higher mobile retail prices. This may be detrimental to consumers in the long run because it may slow the growth of new mobile services and lead to slower investment by MNOs. This may lead to a loss in consumer welfare resulting from a delay in the availability and innovation in new services. Ofcom has concluded, therefore, that unit estimates adopted when identifying the appropriate level of MCT charges should be based on reasonably conservative assumptions which, in the presence of any uncertainty, are not likely to result in under-recovery of costs.
- 9.196 In deriving the final target efficient charge benchmarks set out in paragraph 9.169 above, Ofcom has taken into account the risks to recovery of efficient costs and the possible impact on investment and subsequent consumer services. Ofcom considers that the conservative approach adopted in regards to traffic forecasts and consistent treatment of 3G spectrum costs used to derive the final year efficient charge levels of 5.1ppm for the 2G/3G operators and 5.9ppm for H3G, takes into account concerns raised by respondents, and strikes an appropriate balance between efficient cost recovery and investment incentives, and benefits to consumers.

Financial effects

- 9.197 Ofcom recognises that imposing a reduction in MCT charges will have a financial consequence for the MNOs to the extent that the waterbed effect is not complete¹¹². In particular it is possible to identify two broad effects (abstracting from the implications of the waterbed effect):
- In respect of traffic between the five MNOs, a reduction in termination rates will affect the relative balance of termination revenues. The size of this impact on each MNO will depend on the balance of incoming and outgoing traffic between MNOs and the level of the regulated charge that applies to each MNO.
 - For traffic originating from operators other than the five MNOs (ie primarily incoming fixed to mobile call traffic) then all five MNOs will face an absolute reduction in incoming termination revenues (assuming the resulting price elasticity effect will be insufficient to offset the reduction in termination rates).
- 9.198 In respect of the first effect, the total balance of revenue transfers between operators will still net to zero regardless of the level of termination rates. However, there may be some changes in the net revenue collected by particular MNOs (i.e. there may be 'winners' and 'losers' to the extent that the reduction in termination rates is not even across all MNOs and if traffic balances between MNOs change as a result).
- 9.199 In respect of the second effect, there will be a transfer of value from mobile operators to customers of fixed operators, and to the extent that any reduction in termination charges represents a closer relationship between the efficient charge level and the price of termination, then Ofcom's intervention represents an increase in economic efficiency.
- 9.200 Ofcom is mindful to consider the consequences of its charge control decisions on the MNOs' commercial positions, in particular, the effect of the charge control in relation to the MNOs' expectations (e.g. as expressed in their business plans). As discussed in Section 7 and Annex 19, Ofcom considers that an assessment of the impact on welfare resulting from regulation should compare the charge control against a scenario where there is no regulation (or threat of regulation). However, as a further consideration, Ofcom has also assessed whether its decision is likely to generate any financial effects which present an unreasonable adjustment for the MNOs.
- 9.201 In relation to current charges, Ofcom notes that its charge control decisions require H3G (who has not previously been subject to charge regulation) to reduce its rates by a significantly greater percentage than the other MNOs. For this reason, Ofcom's decisions may be expected to have a greater financial impact on H3G than the other MNOs.
- 9.202 Ofcom has not received detailed business plans from the 2G/3G MNOs, however, to establish the likely order of magnitude of the financial effect of its decisions, Ofcom has compared its charge control against a scenario where MCT rates are maintained at the current level, assuming the volumes of terminated minutes forecast in the cost model. In doing so, Ofcom is aware that this approach clearly overstates the size of the financial impact for two reasons: (i) it assumes that the waterbed effect is zero; and (ii) it does not allow for the MNO to benefit from reduced termination payments arising from the reductions in the MCT charges of counterpart MNOs (as discussed further below). Ofcom estimates that, in net present value terms over the period of

¹¹² Ofcom discusses the waterbed effect in more detail in Section 7 (see paragraphs 7.34 et seq.)

the charge control, in comparison to existing charge levels, gross termination revenue will be reduced by a little over £100m for the 900/1800MHz combined operators (Vodafone and O2) and a little over £250m for the 1800MHz-only operators (Orange and T-Mobile). The reduction in revenue is larger for 1800MHz-only operators due to their relatively higher charges at present compared to the target average charge levels at the end of the charge control period. However, even for the 1800MHz-only operators, Ofcom estimates that these reductions represent less than 2.5% of total revenues over the charge control period¹¹³. However, it is Ofcom's view that the financial consequences of its charge control decisions should also be measured against a benchmark of cost. For the reasons stated in paragraphs 9.178 to 9.180, Ofcom has decided that the 2G/3G MNOs' charges should be reduced by four equal percentage reductions, rather than reduced to cost immediately.

- 9.203 As noted above, the change in gross termination revenues will overstate the net financial impact on MNOs, because each operator will benefit from lower outpayments as a result of the lower termination rates charged by their counterparts during the new charge control period. In order to assess the magnitude of this effect, Ofcom has calculated the net financial effect on 2G/3G operators assuming incoming and outgoing minutes between MNOs are balanced¹¹⁴ and estimates that for 1800MHz-only operators, the net reduction in revenue will be less than half of the gross reduction indicated above. For 900/1800MHz combined operators, Ofcom estimates that the net financial impact will be positive due to their lower outpayments for mobile termination.
- 9.204 H3G is in a different position, not having previously been subject to charge regulation. Of the five MNOs only H3G identified the financial impact of Ofcom's proposals as an argument against intervention, in response to the September 2006 Consultation. H3G argued that Ofcom's proposals would significantly reduce H3G's revenues, [redacted] over the four years of the control, and result in a transfer of revenue from H3G to the other MNOs.
- 9.205 Ofcom does not dispute that a reduction in termination rates will reduce H3G's termination revenues compared to a 'no change' scenario where rates are maintained at the existing unregulated level.¹¹⁵ As an alternative comparison, Ofcom notes that H3G's own business plan¹¹⁶ does not forecast MCT charges which persist at the current rates but rather anticipates charges which fall over time. When the new charge control is compared against H3G's own forecast of charges, based on H3G's forecast volumes for termination, Ofcom estimates that the gross reduction in revenues for H3G is [redacted] in net present value terms over the period of the charge control. As is the case with the 2G/3G MNOs, the effect on net termination revenues will be significantly smaller given the lower outpayments to other MNOs as a result of Ofcom's charge control decisions. However, as stated above, Ofcom considers that its charge control decision should also be measured against a benchmark of cost. Ofcom has concluded that H3G's current charges are well above cost and therefore the figures calculated by H3G in response to the September 2006 Consultation are merely a reflection of the partial reduction in revenue required to bring these charges better into alignment with an efficient cost-based benchmark.

¹¹³ For simplicity, these estimates assume no revenue growth from 2005 levels and therefore may overstate the impact of the reductions in gross termination revenue

¹¹⁴ Ofcom notes that this may not be true for individual operators, but regards this as a reasonable approximation in this context

¹¹⁵ Ofcom's estimates of the revenue reduction resulting from this comparison are broadly consistent with H3G's estimates

¹¹⁶ H3G business plan completed February 2006

9.206 However, Ofcom does not consider that its conclusions allow over recovery by H3G that will have a significant impact on retail competition (either disproportionately advantaging or disadvantaging H3G). This is because:

- termination revenues are a comparatively small proportion of total MNO revenues;
- all MNOs will benefit to an extent from the glide paths
- H3G provides a relatively small volume of MCT compared to other MNOs, and this is likely to continue to be the case in the early years of the control period when the glide path for H3G is at its greatest in relation to cost.

9.207 In response to the September 2006 Consultation, H3G expressed the view that the proposed charge level is too low and fails to take into account dynamic investment and competitive effects.

9.208 In making its charge control decisions, Ofcom has been careful to take into account dynamic investment and competitive effects, as discussed in paragraphs 9.193 et seq. above. Ofcom has decided to impose an initial one off cut in year one followed by a glide path to cost over the remaining three years of the control because it considers that this approach strikes a better balance between the short-term interests of consumers and investment incentives compared to an immediate reduction to cost in year one.

9.209 Ofcom also notes that in seeking to encourage efficient investment, the most effective regulatory mechanism is to set input prices at the level that would occur in a competitive market, namely a cost-orientated price allowing for a reasonable return on invested capital.

9.210 H3G also argued that any charge controls should be designed to ensure a [X] neutral impact on termination payments/revenues between H3G and the other MNOs. In H3G's view, [X].

9.211 Ofcom does not accept that it should [X].

9.212 Therefore, while recognising that its proposals will lead to an absolute reduction in termination revenues and a change in the relative balance of payments between MNOs, Ofcom believes that its conclusions regarding the charge control are reasonable and proportionate in addressing the detriments identified in Section 7.

Structure of the charge controls

9.213 The previous sections discussed proposals for the efficient charge level and how quickly charges should be reduced to these levels over the course of the charge control. This section describes Ofcom's approach for the structure of the control, specifically:

- the control periods;
- the treatment of calls from fixed networks and off-net mobile-to-mobile calls;
- the calculation of compliance with the control;
- the treatment of variations in time of day / week; and

- the treatment of ported numbers.

9.214 The following paragraphs deal with each in turn.

Control periods

9.215 For the reasons discussed in paragraphs 9.6 to 9.10 above, Ofcom has concluded that the charge control should last until 31 March 2011, resulting in four annual periods:

- 1 April 2007 to 31 March 2008 (2007/08);
- 1 April 2008 to 31 March 2009 (2008/09);
- 1 April 2009 to 31 March 2010 (2009/10); and
- 1 April 2010 to 31 March 2011 (2010/11).

Separate controls for mobile to mobile and fixed to mobile termination charges

9.216 As in the current charge controls introduced in 2004, Ofcom does not wish for the structure of the charge controls to prevent MNOs from setting different termination charges as between fixed to mobile and mobile to mobile calls. However, if both types of termination were included in a single charge control, below-average charges for termination of mobile to mobile calls would allow MNOs to set above-average charges for termination of fixed to mobile calls to the detriment of fixed network call originators and their customers. There is a risk that inclusion in the same basket would distort MNOs' incentives in setting termination charges for these two types of call. Ofcom has concluded, therefore, that two separate charge control conditions should be imposed on each MNO (each control having the same target average charge). This will ensure that average MCT charges levied in respect of fixed to mobile calls do not exceed the regulated maximum average. This is the arrangement currently in force in respect of the charge controls applicable to the 2G/3G MNOs.

9.217 The charge control conditions currently in force in respect of each of the 2G/3G MNOs include time of day weights. When calculating the average MCT charge in any given period the time of day weights are provided to be mobile to mobile and fixed to mobile termination traffic weights in the relevant period, unless Ofcom consents that the sum of each of these sets of weights may be used. Ofcom has granted such consent for the duration of the current charge controls. This is because the MNOs have advised Ofcom that they are unable to calculate fixed to mobile and mobile to mobile traffic weights separately. The principal reason being that many mobile to mobile calls are transited through BT and are indistinguishable to the terminating MNO from fixed to mobile calls.

9.218 Ofcom understands that it is unlikely, during the period to 31 March 2011, that terminating MNOs will be able to distinguish accurately between fixed to mobile calls and mobile to mobile calls which are transited through BT. Ofcom has concluded, therefore, that, while MNOs continue to charge the same price to all originating operators, the charge control conditions should allow MNOs to use traffic weights based on the sum of fixed to mobile and mobile to mobile traffic. This is a change to the current conditions and is intended to reflect the practical reality of how MNOs charge for MCT and therefore how traffic weightings are measured.

Compliance with the charge control

- 9.219 In the September 2006 Consultation, as in the existing charge controls on 2G mobile voice call termination, Ofcom proposed to place a charge control on the average of the charges levied by each of the MNOs (i.e. across daytime, evening and weekend charges) for terminating voice calls, weighted by the relative call volumes in the previous year. This arrangement was intended to bring the weighted average charge down to the efficient charge level by 2010/11. Having considered responses to the September 2006 Consultation, Ofcom has concluded that this is the appropriate approach and charge controls should require that, during each period of the control, the average charge set by the regulated MNO (the Average Interconnection Charge or 'AIC') does not exceed the charge with which the operator is required to comply (the Target Average Charge or 'TAC').
- 9.220 Ofcom has also concluded, as proposed in the September 2006 Consultation, that it should set the target average charge for the first period (2007/08) to be equal to an absolute target in pence per minute, so as to ensure that Vodafone and O2's charges are brought to the same level and that Orange and T-Mobile's charges are brought to the same level (currently differences in the blended 2G/3G rate exist, primarily due to the blending in of different proportions and levels of unregulated 3G termination rates). These absolute target charge levels for the 2G/3G MNOs in the first year of the control will be equivalent to the first of four equal percentage reductions from the current regulated 2G charges to reach the target efficient charge level at the end of the charge control period. In the case of H3G, Ofcom has also concluded that it should implement an absolute target charge for the first year of the charge control, consistent with the approach outlined above for the 2G/3G MNOs. As explained below, Ofcom has specified the target average charge (TAC) for the subsequent periods of the charge control (2008/09, 2009/10 and 2010/11) as an RPI-X control to reflect the required reduction from the 2007/08 charges necessary to reach the efficient charge level for 2010/11.
- 9.221 Under this approach, the TAC in each of these years is calculated as the previous year TAC for that MNO multiplied by $(1 + \Delta RPI - X)$, where ΔRPI is the change in the Retail Prices Index and X is the specified uniform percentage reduction in the real level of the charge for that MNO. The change in RPI is measured as the change measured over the 12 month period from 31st December to 31st December immediately prior to the start of the annual charge control period. This approach is designed to give clarity as to the level of the TAC for the coming year so as to enable MNOs to set prices with certainty at the beginning of each annual charge control period.
- 9.222 In the previous MCT market review, which was concluded with the June 2004 Statement, Ofcom determined that a Weights Adjustment Factor (WAF) should be applied to the level of the Target Average Charge (TAC) for each MNO. However, in the context of a new market review, it has been appropriate to consider this aspect of the charge control mechanics afresh.
- 9.223 The aim of the WAF, as applied to the charge control in the previous market review, is to address concerns that unearned gains or losses could arise during the period of the charge control, solely through a change in traffic profile rather than as a result of price changes. In this context, there are two important properties of the WAF which Ofcom has previously highlighted: first, the WAF maintains consistency between the weighting mechanism used to determine an MNO's Average Interconnection Charge (AIC) and the TAC, which the AIC must not exceed. Second, the WAF exhibits important characteristics in relation to movements in underlying costs.

- 9.224 Absent consistency in the weighting of the AIC and the TAC, as ensured by the WAF, it is possible for MNOs to raise their prices across all times of day, or symmetrically, for MNOs to fall into breach of the charge control conditions, without changing any of their prices, simply as the result of a shift in the traffic mix. As discussed in paragraph 3.103 of the December 2005 Statement and paragraphs 6.42-6.45 of the June 2004 Statement, the WAF is designed to address these concerns.
- 9.225 However, following responses from Vodafone and T-Mobile to the June 2005 Extension Consultation (see footnote 2 above) which raised concerns about the characteristics of the WAF in relation to underlying costs, Ofcom has undertaken further investigation in this area. As indicated in paragraph 3.104 of the December 2005 Statement, there is a complex behaviour dependent on the inter-relationship of a number of linked issues. These issues are associated with underlying costs which has the potential to lead to complications, both with or without the application of the WAF. The ability of the WAF to address concerns about unearned gains and losses is dependent upon these factors. In particular, the relationship between the structure of underlying costs to the structure of prices by time of day. Understanding the behaviour of underlying cost structures is further complicated by the current migration of traffic from 2G to 3G networks. Furthermore, arguments for applying the WAF, or not, depend on the extent to which traffic movements by time of day are endogenous or exogenous. For example, to provide incentives for cost efficiency MNOs should generally be allowed to benefit from efficiency gains, which they have achieved by intentionally shifting their traffic mix so as to reduce costs. Such benefits arising from endogenous changes in traffic mix are, in general, suppressed by the application of the WAF. In such cases it may be more appropriate to remove the WAF from the charge control mechanics. However, Ofcom recognises that in reality changes in traffic mix by time of day are likely to be a combination of endogenous and exogenous effects.
- 9.226 Whilst the TAC mechanism incorporating the WAF is well-established, with an equivalent mechanism having operated in BT's retail and network price controls since 1984, Ofcom observes that there are some notable differences between the situations where BT charge controls have been implemented and those relevant to this market. In particular, these differences include the imposition of a charge control on a single versus multiple operators and considerations of competitive neutrality.
- 9.227 In summary, whilst the consistency benefits of the WAF are clear, as stated in the December 2005 Statement, Ofcom recognises that consistency is not the only factor relevant to the WAF. There are a number of further issues associated with movements in underlying costs. Ofcom notes that the benefits of the characteristics of the WAF in this respect are not unambiguous, and application of the WAF adds additional complexity to the charge control mechanics. In response to the September 2006 Consultation, both Vodafone and T-Mobile expressed the view that it would be inappropriate to apply the WAF to the proposed charge control. Having considered these responses, Ofcom has decided that it should not apply the WAF to the mechanics of the charge controls on mobile voice termination concluded in this review.

Charge variations by time of day/week

- 9.228 As indicated above and consistent with current MCT charge controls, the September 2006 Consultation proposed that charge controlled MNOs should be permitted to vary MCT charges by time of day/week provided that, as at present, the traffic weighted average complies with the charge control. The charge control levels referred to in this consultation exercise should, therefore, be viewed as maximum

average charges. There are a number of disadvantages of applying traffic weights for the calculation of the AIC that reflect concurrent traffic shares achieved during the period of each charge change, including the commercial uncertainty which such an approach would generate. Therefore, the September 2006 Consultation proposed that compliance with specified maximum average charges should be assessed on the basis of traffic weights achieved during the relevant period 12 months before the charging period in question. Ofcom has concluded that this is the appropriate approach, and the conditions contained in the Notification at Annex 20 do not prevent MNOs from varying charges by time of day/week, provided that the average interconnection charge complies with the terms of the charge control.

Ported numbers

- 9.229 While, under the current donor network MNP arrangements, MNOs are not able to control the termination charge for ported-in subscribers, Ofcom continues to hold the view expressed in paragraphs 6.46 – 6.49 of the June 2004 statement and in the September 2006 Consultation that call minutes to ported-in numbers should be excluded from the charge controls on voice termination. However, if the current arrangements for charging for calls to ported-in numbers change and MNOs gain control of setting termination charge for calls to ported-in numbers then, under the provisions of the SMP conditions contained in the Notification at Annex 20, termination on ported-in numbers will be included in the charge controls. This is because fixed to mobile and mobile to mobile calls are defined in the SMP conditions in such a way that termination of such calls is included in the charge control where, amongst other things, the MNO sets the charge (and excluded where the MNO does not set the charge).
- 9.230 In the last market review, and indeed in the September 2006 Consultation, Ofcom did not seek to take into account the effect of the charging arrangements for calls to ported-in numbers on the effective average charges of MNOs and therefore whether or not their effective average charges were equal to the MCT regulated charges. Ofcom considered that it was not appropriate to seek to account for these charging arrangements and their impact on effective charges, as it was Ofcom's view that the these arrangements were unlikely to be material in their impact on effective charges.
- 9.231 However, H3G made strong representations in relation to the existing arrangements, arguing that such arrangements could result in H3G failing to recover the efficient costs of provision in the case where the rate it receives for terminating a call is below its actual cost of terminating that call. H3G also argued that the existing porting arrangement gives an incentive to other MNOs to focus their customer acquisition strategies on H3G customers in order to benefit from the higher termination rate they would receive when a H3G customer ports a number to their network.
- 9.232 Ofcom is presently considering responses to a consultation on possible changes to porting arrangements¹¹⁷, including a possible change to direct routing arrangements for ported numbers.
- 9.233 In the meantime, Ofcom considers that it may be appropriate to introduce an interim measure that, in the context of mobile termination rates, would address the revenue impact of the current charging arrangements for calls to ported-in numbers under the existing donor network arrangements. One option would be to amend the definition of the AIC contained in the relevant SMP conditions so that this average charge is calculated on a basis which takes into account the charges actually levied for

¹¹⁷ See www.ofcom.org.uk/consult/condocs/gc18/gc18v.pdf

terminating calls on ported-in numbers (as well as the charges for terminating calls on non ported numbers).

- 9.234 Ofcom considers that such an arrangement, if adopted, would represent a material change to the proposals set out on in the September 2006 Consultation. As such, Ofcom considers it appropriate to reconsult on this matter. Given the relative size of the financial impact of (i) the possible changes reflecting the impact of MNP and (ii) the wider charge controls, Ofcom does not consider that it would be appropriate to delay implementing the new charge controls until after Ofcom has reconsulted on this matter.
- 9.235 Ofcom has therefore published simultaneously with this concluding statement a proposal for an amendment to the charge control set out in the Notification at Annex 20 which considers options to minimise the impact of the existing arrangements for charging for calls to ported-in numbers on MCT revenues.

Compliance assessment

- 9.236 Ofcom is currently considering its general approach to monitoring charge control compliance. Improvements to the current approach may require changes to charge control conditions. Ofcom intends to introduce any such changes on a market by market basis during or shortly after existing market reviews. Ofcom therefore expects to issue a consultation in Summer 2007 on charge control compliance which would propose changes to the charge controls set out in the Notifications at Annex 20 to the present statement. Any such changes would be limited to the manner in which compliance with the substantive provisions is monitored.

The specific conclusions

- 9.237 As summarised above, Ofcom has concluded that it should set a maximum average charge to apply to MCT supplied by each of the five MNOs during each of the four periods of 12 months from 1 April 2007 to 31 March 2011. As detailed in paragraphs 9.220-221 above, Ofcom has concluded that the determined target average charges should be subject to adjustment in line with movements in the Retail Prices Index.

The 2G/3G MNOs

- 9.238 Ofcom has concluded that across the final year of the control (1 April 2010 to 31 March 2011), the average charges of each of the four 2G/3G MNOs should not exceed 5.1ppm (2006/07 prices).
- 9.239 In respect of the first three years of the charge control, Ofcom has concluded that, in respect of the four 2G/3G MNOs, the maximum average charge should reduce at a constant percentage rate in each of the four years, such that in 2010/11 this aligns with the target determined for that year. Ofcom has concluded that the starting point for this glide path should be the unadjusted headline Target Average Charge applicable under the present charge control (i.e. 5.63ppm for Vodafone and O2 and 6.31ppm for Orange and T-Mobile). The first year of this glide path equates to 5.5ppm (2006/07 prices) for Vodafone and O2 and 6.0ppm (2006/07 prices) for Orange and T-Mobile which correspond to 5.7ppm and 6.2ppm in nominal terms (taking account of inflation¹¹⁸) respectively.

¹¹⁸ Using an inflation assumption of 3.1% (see paragraph A18.42 in Annex 18)

H3G

9.240 Ofcom has concluded that, across the final year of the control (1 April 2010 to 31 March 2011), H3G's average charges should not exceed 5.9ppm (2006/07 prices).

9.241 In respect of the first three years of the controls on H3G's charges, Ofcom has concluded that the maximum average charge for the first year (1 April 2007 to 31 March 2008) should be 8.5ppm (2006/07 prices) and the maximum average charge should reduce at a constant percentage rate in each of the remaining three years, such that in 2010/11 this aligns with the target determined for that year. This was the approach set out as Option 2 in the September 2006 Consultation. The first year target average charge of 8.5ppm corresponds to 8.8ppm in nominal terms.

9.242 However, in these particular markets, Ofcom would normally give around 60 days notice of regulatory charge reductions. As existing MCT charge controls expire less than one week after publication of the present statement, such notice cannot be given on this occasion without a break between the old and new controls (which Ofcom does not consider appropriate). To address this procedural concern, Ofcom has decided, therefore, to impose new controls from 1 April 2007 but to adjust the level of the year-one controls by weighting them as though they applied for only 10 of the 12 months of the year one control and as though for two of the 12 months the present average charges applied. The present charges are taken to be the headline regulated charges for 2G MCT applied in the case of the 2G/3G MNOs, and the current unregulated charges in the case of H3G. For the 2G/3GMNOs, this procedural adjustment to the first year target average charge is less than 0.1ppm. For H3G, this adjustment results in a higher first year target average charge. In all cases the size of the second year percentage reduction is increased to ensure that the target charges from 2008/09 onwards remain unchanged.

9.243 The following table sets out the final conclusions.

Figure 9.6 Table of charge control conclusions following adjustment for notice period

| | Current average regulated charges | First year target charge (nominal) | Second year percentage reduction (i.e. X in RPI-X) | Third and fourth year percentage reduction (i.e. X in RPI-X) | Final charge in 2010/11 (real 06/07 prices) |
|--|--|---|---|---|--|
| Vodafone and O2 | 5.6 | 5.7 | 3.2% | 2.5% | 5.1 |
| T-Mobile and Orange | 6.3 | 6.2 | 5.8% | 5.3% | 5.1 |
| H3G Option 2 (Immediate cut plus glide path) | Not regulated | 9.1 | 15.1% | 11.8% | 5.9 |

Section 10

The SMP conditions

- 10.1 Given the detriments identified in Sections 7 to 9 above, and in the light of the costs and benefits of addressing those detriments through the remedies considered in Section 8 and 9 above, Ofcom has concluded that the following conditions should be imposed on each of the five MNOs with SMP;
- An obligation to meet reasonable requests for MCT on fair and reasonable terms (condition MA1).
 - A prohibition of undue discrimination (condition MA2).
 - A charge control on fixed to mobile MCT to apply until 31 March 2011 (condition MA3).
 - A charge control on mobile to mobile MCT to apply until 31 March 2011 (condition MA4).
 - An obligation to publish charges applicable to the supply of MCT, and to notify interconnected parties and Ofcom of any changes to such charges at least 28 days before they are proposed to take effect (condition MA5).
- 10.2 Ofcom has attached at Annex 20 the Notification imposing these conditions.
- 10.3 In Sections 8 and 9 above, Ofcom explained the rationale for imposing each of the conditions, and responded to the views of stakeholders in respect of the need to impose each of the conditions to realise the benefits of regulation. In this Section, Ofcom sets out the legal tests which underpin each of the conditions. Ofcom also considers in this section the views of stakeholders in respect of the drafting and particular application of each of the conditions.

Legal tests

- 10.4 Section 87(1) of the Act provides that, where Ofcom has made a determination that a person has SMP in the market reviewed, it must set such SMP conditions as it considers appropriate and as are authorised in the Act. This implements Article 8 of the Access Directive.
- 10.5 Section 46 of the Act provides that a person to whom an SMP services condition is applied must be a ‘communications provider’ or a ‘person’ who makes associated facilities available and a ‘person’ whom Ofcom has determined to have SMP in a specific market for electronic communications networks, electronic communications services or associated facilities.
- 10.6 Article 16 of the Framework Directive requires that, where a national regulatory authority determines that a relevant market is not effectively competitive, it shall identify “undertakings” with SMP on that market and impose appropriate specific regulatory obligations. For the purposes of EC competition law, “undertaking” includes companies within the same corporate group (*Viho v Commission* Case C79/73/95 P [1996] ECR I-5447), for example, where a company within that group is not independent in its decision making.

- 10.7 Ofcom considers it appropriate to prevent a dominant provider to whom a SMP service condition is applied, which is part of a group of companies, exploiting the principle of corporate separation. The dominant provider should not use another member of its group to carry out activities or to fail to comply with a condition, which would otherwise render the dominant provider in breach of its obligations. For this reason, Ofcom has concluded that the conditions should apply to O2 (UK) Ltd, Orange Personal Communications Services Ltd, T-Mobile (UK) Ltd, Vodafone Ltd, and Hutchison 3G UK Ltd, and any O2, Orange, T-Mobile, Vodafone, or H3G subsidiary or holding company, or any subsidiary of that holding company, all as defined by Section 736 of the Companies Act 1985 as amended by the Companies Act 1989, as amended from time to time¹¹⁹.
- 10.8 The Act (sections 45-50 and 87-92) sets out the regulatory obligations that Ofcom can impose if it finds that any undertaking has SMP. Sections 87 to 92 implement Articles 9 to 13 of the Access Directive and Articles 17 to 19 of the Universal Service Directive. The potential regulatory obligations relevant to this review are:
- the provision of network access;
 - no undue discrimination;
 - transparency; and
 - price control.
- 10.9 Recital 27 of the Framework Directive provides that ex ante regulation should only be imposed where competition is not effective and where competition law remedies are not sufficient to address the problem. In order to provide a full analysis, Ofcom has, therefore, considered the option of no ex ante regulation, and whether it would be sufficient to rely on competition law alone. Sections 7 and 8 above discusses the need for ex ante or ex post regulation.
- 10.10 Section 4 of the Act imposes a duty on Ofcom, in carrying out its functions, to act in accordance with the six Community requirements set out in that section. This implements Article 8 of the Framework Directive. Ofcom, in considering for the purposes of this market review whether to impose any SMP conditions, has considered all of these requirements. In particular, it has considered the requirement to promote competition in relation to the provision of electronic communications networks and electronic communications services. Ofcom has also considered the requirement to encourage network access and service interoperability for the purposes, inter alia, of securing efficient and sustainable competition in the markets for electronic communications networks and services, and for securing maximum benefits for customers of communications providers.
- 10.11 Furthermore, as well as being appropriate (section 87(1)), each SMP condition must also satisfy the tests set out in section 47 of the Act, namely that each condition must be:
- objectively justifiable in relation to the networks, services, facilities, apparatus or directories to which it relates;
 - not such as to discriminate unduly against particular persons or against a particular description of persons;

¹¹⁹ Ofcom notes in this regard the Companies Act 2006.

- proportionate to what the condition is intended to achieve; and
- in relation to what it is intended to achieve, transparent.

10.12 There are also additional matters to consider in respect of network access conditions, set out in section 87(4) of the Act, including the feasibility of the provision of the network access, and additional requirements for network access pricing conditions, set out in section 88 of the Act. It is Ofcom's view that the conditions set out in Annex 20 satisfy the relevant requirements specified in the Act and relevant European Directives. This view is explained in detail in the following paragraphs.

Responses of stakeholders

10.13 The view of stakeholders in relation to the merits of imposing each of the proposed remedies to realise the benefits of regulation were discussed in Section 8 above. In the following paragraphs Ofcom is addressing the views of stakeholders in respect of the wording and particular application of these conditions.

10.14 In their responses to the September 2006 Consultation, Orange and T-Mobile both questioned whether the term "Network Access" had been adequately defined. Both MNOs noted that the term is used in almost all of the proposed conditions. In the views of Orange and T-Mobile the definition included with the proposed conditions is drawn more broadly than MCT, and potentially includes any service offered via interconnection.

10.15 In its response to the September 2006 Consultation, O2 warned that the text of the proposed charge control conditions, in association with the proposed charge publication condition could leave open the possibility that some MNOs might blend unpublished and unregulated charges within their contractual charges for MCT.

10.16 As noted in paragraph 8.9 above, Vodafone, O2 and T-Mobile all argued that an obligation to publish access contracts would be burdensome and unnecessary, as these contracts are usually the result of bilateral negotiation.

10.17 Orange, in its response to the September 2006 Consultation questioned the need for separate charge control conditions in respect of mobile to mobile and fixed to mobile call termination, and argued that that the imposition of separate conditions is unduly onerous. In Orange's view, Ofcom's concern about possible undue discrimination between fixed and mobile purchasers of MCT is unfounded as such behaviour would be caught by other provisions prohibiting undue discrimination.

10.18 Orange also expressed concern that the proposed charge control conditions would require MNOs to adjust MCT charges in the following year where they fail to meet the terms of the control, but make no allowance for recovery of revenue in the following year where the MNO has under-recovered.

Ofcom response to specific points raised by stakeholders

10.19 Ofcom has set out, in the paragraphs below which immediately follow, a short summary of its views on the responses made to the September 2006 Consultation in respect of the proposed conditions. A more detailed account of Ofcom's conclusions and reasoning is to be found in the remainder of this Section.

10.20 Ofcom notes the concern expressed by Orange and T-Mobile with respect to the scope of the term "Network Access". Ofcom confirms that, in the context of the

conditions proposed in the September 2006 Consultation and now set out in the Notification at Annex 20, the term refers only to Network Access in the market defined, i.e. the market for wholesale mobile voice call termination provided in the UK to other Communications Providers in the UK. Therefore Ofcom does not consider that there is a material risk that the term can be construed more widely than intended.

- 10.21 Ofcom shares the concern expressed by O2 that arrangements for assessing compliance with the charge controls should be clear and unambiguous. As O2 has noted, the charge control conditions proposed in the September 2006 Consultation make plain that the fixed to mobile and mobile to mobile interconnection charges referred to in the proposed charge control conditions are the charges published in accordance with the charge publication SMP condition. However, if such services are terminated not via 2G or 3G networks then the charges for such services will have to be fair and reasonable. Therefore if any charge is blended, it will have to be on fair and reasonable terms. Ofcom has considered O2's concerns that the charge publication condition MA5 set out in the September 2006 Consultation may not be sufficiently clear to prevent "clandestine" blending. Ofcom has therefore modified the condition to make clear that, where a charge is published for a form of Network Access which includes but is not limited to interconnection of 2G and 3G calls, the MNO must publish both the blended charge and the underlying charges for the charge regulated MCT. This modification is set out in condition MA5.2 where Ofcom has set out that "The Dominant Provider shall publish its charges for terminating a Call, separately from any of its other termination charges." Ofcom has modified the definitions of Fixed-to-Mobile Interconnection Charge and Mobile-to-Mobile Interconnection Charge to reflect that the reference is to the charge for Calls (as a consequence, the reference to the charges published in accordance with MA5.1 is no longer needed, and has been deleted). Ofcom has also made consequent changes to the definition of Access Charge Change Notice to reflect the modified condition references, and the numbering of condition MA5.
- 10.22 As noted in paragraph 8.15 above Ofcom has concluded that it would be disproportionate to require publication of access contacts, and proposed Condition MA5 has not been included in the Notification at Annex 20. Subsequent conditions have therefore been renumbered.
- 10.23 Ofcom notes the view expressed by Orange that it would be disproportionate to require MNOs to comply with separate charge controls for mobile originated and fixed originated MCT. However, while Ofcom accepts that it might be possible to rely instead on a general prohibition of undue discrimination, such an approach would require assessment of the circumstances of each case to determine whether discrimination is undue. Given the nature of the detriments identified in Section 7 above, in particular the risk of distortion of competition between fixed and mobile services, Ofcom considers that separate charge controls should be imposed on MCT for fixed and mobile originated calls. The conditions recognise the reality that MNOs' networks are not currently able to record separately the volumes of mobile originated and fixed originated incoming calls, and that to require MNOs to change their systems solely to enable different traffic weights to be applied to mobile originated and fixed originated MCT would be disproportionate. Given that compliance with the two separate charge control conditions is assessed against a common traffic profile derived from the totality of fixed originated and mobile originated calls, Ofcom considers that imposition of separate controls is a proportionate response to the risks identified in Section 7 above.

- 10.24 With respect to Orange's concern about the absence of provisions for enabling recovery of sums where an MNO has under-recovered during the year in question, Ofcom notes that the proposed charge control conditions provide for use of prior year traffic profiles and, therefore, there should be no risk of under or over recovery of MCT charges arising through forecasting error.

Aims of the conditions

- 10.25 In the following paragraphs, Ofcom sets out the aims of each condition and relates these to Ofcom's statutory powers and duties.

Condition MA1: Requirement to provide network access on reasonable request

- 10.26 Condition MA1.1 requires MNOs with SMP to meet reasonable requests for Network Access on fair and reasonable terms. As discussed in paragraph 8.85 above, Ofcom considers that such a condition should be imposed on MNOs with SMP. Although the charge control conditions limit the average charges which MNOs may levy for MCT, they do not, of themselves, require MNOs to supply MCT and, in the absence of condition MA1.1, MNOs might refuse to supply MCT. Condition MA1.2 also requires that terms and conditions (and not just charges) should be fair and reasonable. In Ofcom's view it is necessary to impose a condition requiring the supply of network access (MCT) on fair and reasonable terms, even in the presence of charge control condition.
- 10.27 In SMP condition MA1.3, Ofcom sets out that the charges for 2G/3G Calls as covered by the charge control SMP conditions MA3 and MA4, shall be as set out in those conditions rather than as set out in condition MA1.1 (fair and reasonable), but only for the duration of those conditions. Ofcom has included this condition to ensure that the MNOs have certainty in this context of what the appropriate charges should be for the provision of such calls i.e. that the only rules regarding the level of 2G/3G charges are contained in conditions MA3 and MA4 for their duration. The charges for any other services within this market which are not subject to the charge controls, (such as mobile termination of calls other than 2G or 3G calls) would however be subject to the obligation that these charges, and not just other terms and conditions, should be fair and reasonable.
- 10.28 Section 87(3) of the Act authorises the setting of SMP services conditions requiring the dominant provider to provide network access, as Ofcom may from time to time direct. These conditions may, pursuant to section 87(5), include provision for securing fairness and reasonableness in the way in which requests for network access are made and responded to and for securing that the obligations in the conditions are complied with within periods and at times required by or under the conditions. When considering the imposition of such conditions in a particular case, Ofcom must have regard to the 6 factors set out in section 87(4) of the Act, including, inter alia, the technical and economic viability of installing other competing facilities and the feasibility of the proposed network access. As explained in paragraph 8.30 above, Ofcom does not consider it technically or economically feasible to install competing facilities. However, given that MNOs are currently providing network access, Ofcom considers that provision of Network access is feasible.
- 10.29 Section 87(9)(a) of the Act authorises the setting of an SMP services condition imposing charge controls in relation to matters connected with the provision of network access.

- 10.30 Section 88(1) of the Act authorises the setting of an SMP condition falling within section 87(9) where there is a relevant risk of adverse effects arising from price distortion (as noted in paragraphs 7.41 to 7.51 above); and it also appears that the setting of the condition is appropriate for the purposes of promoting efficiency, promoting sustainable competition and conferring the greatest possible benefits on the end-users of public electronic communications services. As discussed above in Section 7, it appears from the market analysis that there is a relevant risk of adverse effects arising from price distortion. As required by section 88(1)(b) of the Act, Ofcom considers that this obligation therefore promotes efficiency, confers the greatest possible benefits on the end-users and, by ensuring that PECN Providers competing for customers in the retail market are not exploited by the five MNOs setting unreasonable conditions in the wholesale market, promotes effective and sustainable competition. Furthermore, the fair and reasonable obligation takes into account the costs and reasonable rates of return on investments required by the five MNOs in providing wholesale voice call termination. As such, the fair and reasonable obligation takes account of the extent of the investment in the matters to which the condition relates of the five MNOs, as required by section 88(2) of the Act.
- 10.31 Further guidance on the application of the Network Access obligation can be found in the Revised ERG common position on remedies¹²⁰, the guidelines on imposing access obligations under the new EU Directives, dated 13 September 2002¹²¹ (the “Access Guidelines”), and Oftel’s guidelines for the interconnection of public electronic communications networks, dated 23 May 2003¹²² (the “Interconnection Guidelines”).
- 10.32 Ofcom in imposing this obligation has considered all the Community requirements set out in section 4 of the Act, in particular the requirements to promote competition, secure efficient and sustainable competition and secure the maximum benefit for retail consumers. Furthermore, Ofcom has considered its duties under section 3 of the Act, in particular the requirements to further the interests of citizens and to promote competition. In particular, an access obligation ensures that other PECN providers are able to complete calls to subscribers of the MNOs in question under fair and reasonable terms. By ensuring that competing PECN providers are therefore not disadvantaged through the application of unfair or unreasonable terms, the requirement promotes competition, ultimately furthers the interests of consumers and citizens, and helps to secure effective and sustainable competition.
- 10.33 Ofcom believes that this condition meets the tests set out in section 47 of the Act. Section 47 requires conditions to be justifiable, non-discriminatory, proportionate and transparent. The condition:
- is objectively justifiable, in that it is aimed at ensuring that call termination services are provided by the five MNOs, such that competition develops to the benefit of consumers.
 - does not discriminate unduly, in that it applies equally to all those MNOs who, in Ofcom’s view, have the ability and have, or could, develop the incentive not to offer access on fair and reasonable terms.

¹²⁰ See http://www.erg.eu.int/doc/meeting/erg_06_33_remedies_common_position_june_06.pdf

¹²¹ See http://www.ofcom.org.uk/static/archive/oftel/publications/ind_guidelines/acce0902.htm

¹²² See http://www.ofcom.org.uk/static/archive/oftel/publications/eu_directives/2003/intercon0503.htm

- is proportionate, since it does not require MNOs to provide access if the request is unreasonable, and only requires access to be provided to public electronic communications network providers.
- is transparent, in that the condition has been drafted to secure maximum transparency, which is aided by the explanation as to the intended operation and effect of the conditions as set out in this document.

10.34 Ofcom in imposing this condition has taken into account all the factors listed in section 87(4) of the Act, in particular the feasibility of the provision of the network access and the need to secure effective competition in the long term – Ofcom believes that it is feasible for the five MNOs to provide such network access and that the proposal will help to secure effective competition in the long term.

Condition MA2: Requirement not to unduly discriminate

10.35 Condition MA2.1 prohibits MNOs with SMP from unduly discriminating in respect of the supply of MCT. For the reasons set out in paragraphs 8.81 to 8.84 above, Ofcom considers that such an SMP condition should be imposed on MNOs with SMP. For the reasons set out in paragraphs 8.82 and 8.83 above, Ofcom does not accept O2's view that such a condition is otiose and that reliance may be placed instead on ex post competition law.

10.36 Section 87(6)(a) of the Act authorises the setting of an SMP services condition requiring the dominant provider not to unduly discriminate against particular persons, or against a particular description of persons, in relation to matters connected with the provision of network access.

10.37 As discussed in Section 8 above, the requirement not to unduly discriminate is intended, principally, to prevent MNOs from discriminating horizontally against other PECN providers, but this does not exclude other forms of discrimination.

10.38 Ofcom considered how it might treat undue discrimination in its Guidelines¹²³ *Undue discrimination by SMP providers* published on 15 November 2005.

10.39 Ofcom, in imposing this obligation has considered all the Community requirements set out in section 4 of the Act, in particular the requirements to promote competition, secure efficient and sustainable competition and secure the maximum benefit for retail consumers. Furthermore, Ofcom has considered its duties under section 3 of the Act, in particular the requirements to further the interests of citizens and to promote competition. In particular, an obligation to not unduly discriminate ensures that other PECN providers are not unfairly disadvantaged in the provision of access to voice call termination services by the MNOs in question. By ensuring that competing PECN providers are not discriminated against so as to materially affect their ability to compete, the requirement therefore promotes competition, furthers the interests of consumers and citizens, and helps to secure effective and sustainable competition.

10.40 Ofcom believes that this condition meets the tests set out in section 47 of the Act. Section 47 requires conditions to be objectively justifiable, non-discriminatory, proportionate and transparent. Ofcom believes that the condition:

¹²³ <http://www.ofcom.org.uk/consult/condocs/undsmp/contraventions/contraventions4.pdf>

- is objectively justifiable, in that it provides safeguards to ensure that competing PECN providers, and hence consumers (who would gain the benefits of competition), are not disadvantaged by an MNO unduly discriminating between them;
- does not discriminate unduly against any MNO, in that they apply equally to all those MNOs who, in the view of Ofcom, have the ability and incentive to unduly discriminate;
- is proportionate in that discrimination is only prohibited if it is 'undue' and it is the least onerous obligation required to address the concerns outlined above; and
- is transparent, in that it has been drafted so as to secure maximum transparency, which is aided by the explanation as to the intended operation and effect of the conditions as set out in this document.

Condition MA3 – Control of Fixed to Mobile Interconnection Charges and Condition MA4 - Control of Mobile to Mobile Interconnection Charges

- 10.41 Conditions MA3 and MA4 control the average charges which MNOs with SMP may levy in respect of termination of, respectively, calls originated on fixed networks and calls originated on mobile networks. Ofcom's reasons for imposing the particular form of these conditions are set out in Section 9 above and also below.
- 10.42 Ofcom intends that the two charge controls applicable to termination of mobile to mobile calls and to termination of fixed to mobile calls should be subject to the same values and adjustments (the purpose of having two separate conditions being simply to ensure that, because MNOs have the scope to set different charges for MCT, relatively high charges for terminating fixed to mobile calls cannot be offset within the same control basket with relatively low charges for termination of mobile to mobile calls). Compliance with each of these two controls will be assessed using the time of day/week traffic profiles in respect of the sum of these two termination.
- 10.43 The condition does not prevent MNOs from varying charges by time of day, subject to compliance with other SMP conditions, provided that the average charges (weighted by voice call termination traffic volumes in each relevant charging period) comply with the charge control. As at present, rather than requiring MNOs to demonstrate compliance against actual traffic weights by time of day/week (which would generate concerns about forecast error), the condition allows MNOs to use the traffic weights actually achieved in the period 12 months before the period in question.
- 10.44 Ofcom has concluded, for the reasons set out in paragraphs 9.6 to 9.10 above, that charge controls should be imposed for a period of four years from 1 April 2007.
- 10.45 For the reasons set out in Section 9 above and Annex 5 below, Ofcom has concluded that the maximum average charges, defined in the SMP conditions as the Target Average Charge ("TAC") of the 2G/3G MNOs during the fourth year of the charge control period should be 5.1ppm (2006/7 prices).
- 10.46 For the reasons set out in Section 9 and Annex 5, Ofcom has concluded that the TAC of H3G during the fourth year of the charge control period should be 5.9ppm (2006/7 prices).

- 10.47 As proposed in the September 2006 Consultation, Ofcom has concluded that it should define the TAC applicable to each MNO in the first three years of the charge control by reference to glide paths. Ofcom has also concluded, as proposed in the September 2006 Consultation, that each TAC (apart from those in the first year, which have been defined in nominal terms) should be adjusted in line with movements in the Retail Prices Index, as set out in paragraphs 9.220 and 9.221 above.
- 10.48 In the case of the four 2G/3G MNOs, Ofcom has concluded that charges should be reduced in four broadly equal percentage steps from the current headline regulated charges of 5.63ppm (Vodafone and O2) and 6.31ppm (Orange and T-Mobile) to 5.1ppm (2006/7 prices) in the final year of the control. As Ofcom has not been able to give 60 days notice of the regulated charge reductions, Ofcom has adjusted the year-one (1 April 2007 to 31 March 2008) charge level (defined by a glide path of four equal percentage steps) by weighting this as though the charge control applies for 10 of the 12 months and as though for two of the 12 months present average charges apply. The size of the first year percentage change is therefore reduced a little, and the second year percentage change is increased a little.
- 10.49 In the case of H3G, Ofcom has concluded that it should reduce its charges in the first year to an average of 8.9.ppm (2006/7 prices). This figure takes into account the fact that, in these particular markets, Ofcom would usually provide around 60 days notice of changes to regulated charges. As this has not been possible on this occasion, Ofcom has increased the year-one charge level by weighting this as though the charge control applies for 10 of the 12 months and as though for two of the 12 months present average charges apply. In each of the three subsequent years, charges are to be reduced by equal percentage amounts such that in the final year of the control (2010/11) they average 5.9ppm (2006/7 prices).
- 10.50 To give effect to the decision to take into account the absence of an extended notice period before implementation of the charges controls, Ofcom has modified the definition of Controlling Percentage in Schedule 1 to the conditions. The definition has been divided into a definition relevant to the Second Relevant Year (thus the words “the Second” have been inserted between “in relation to” and “relevant Year” in the first line”), and a definition relevant to the Third and Fourth Relevant Years. This change reflects the requirement for a larger percentage reduction in the Second Relevant Year as a result of a higher first year TAC resulting from the adjustment. A larger percentage reduction in the Second Relevant Year is appropriate in order to maintain the same Third and Fourth year TAC as previously set out. In addition, Ofcom has added the words “for that Relevant Year” at the end of each of the references to adjusting the TAC in MA3.4 and MA4.4, to reflect the above. Further, Ofcom has amended the rounding of the Controlling Percentage from two decimal places to one decimal place to reflect the accuracy of the stated percentage reductions.
- 10.51 Section 87(9)(a) of the Act authorises the setting of an SMP services condition imposing charge controls in relation to matters connected with the provision of network access.
- 10.52 Section 88(1) of the Act authorises the setting of an SMP condition falling within section 87(9) where there is a relevant risk of adverse effects arising from price distortion; and it also appears that the setting of the condition is appropriate for the purposes of promoting efficiency, promoting sustainable competition and conferring the greatest possible benefits on the end-users of public electronic communications services.

- 10.53 Ofcom in imposing these obligations has considered all the Community requirements set out in section 4 of the Act, in particular the requirements to promote competition, secure efficient and sustainable competition and secure the maximum benefit for retail consumers. Furthermore, Ofcom has considered its duties under section 3 of the Act, in particular the requirements to further the interests of citizens and consumers to promote competition. These obligations will further citizens' interests by addressing the detrimental impacts of unregulated termination charges (namely excessive prices overall, an inefficient structure of prices, distortion of consumer choice, inequitable distributional effects and a risk of anticompetitive behaviour; these impacts are discussed in section 7 of this statement). These obligations will promote competition by ensuring that the PECN Providers competing for customers in the retail market are not exploited by the five MNOs setting excessive prices in the wholesale market and thus promotes effective and sustainable retail competition. Similarly, by addressing distortions to consumers' choice of whether to make a fixed or mobile call these obligations facilitate undistorted competition between fixed and mobile operators.
- 10.54 Ofcom has performed its duties also by ensuring that, for the purposes of imposing a charge control, the tests set out in section 88(1) of the Act have been met. As discussed above in Section 7, it appears from the market analysis that there is a relevant risk of adverse effects arising from price distortion. In particular, Ofcom considers that there is relevant risk of adverse effects arising from price distortion as the five MNOs might so fix or maintain some or all of their prices at an excessively high level as to have adverse consequences for end-users of mobile call termination services. The charge controls are also designed to reflect considerations of economic efficiency and have the intention to maximise benefits to end-users. As required by section 88(1)(b) of the Act, this obligation therefore promotes efficiency, confers the greatest possible benefits on the end-users and, by ensuring that PECN Providers competing for customers in the retail market are not exploited by the five MNOs setting excessive prices in the wholesale market, promotes effective and sustainable retail competition. The charge controls also ensure that other PECN providers are not unfairly disadvantaged in the provision of access to voice call termination services by the MNOs in question. Furthermore, as set out in Annex 5, the charge controls have taken account of the costs and reasonable rates of return on investments required by the five MNOs in providing wholesale voice call termination. As such, the charge controls take account of the extent of the investment in the matters to which the condition relates of the five MNOs, as required by section 88(2) of the Act.
- 10.55 Ofcom believes that these conditions meet the tests set out in section 47 of the Act. Section 47 requires conditions to be objectively justifiable, non-discriminatory, proportionate and transparent. Ofcom believes that these conditions:
- are objectively justifiable, in that they provide safeguards to ensure that competing PECN providers and consumers are not disadvantaged by an MNO setting excessive charges for wholesale voice call termination services.
 - do not discriminate unduly against any MNO, in that they apply to all MNOs who, in the view of Ofcom, have the ability and incentive to set excessive charges for wholesale voice call termination services. Ofcom's conclusion that the TAC to apply in 2010/11 should be the same for all of the 2G/3G MNOs, notwithstanding the modelled network cost differential between 900/1800MHz and 1800MHz-only operators, does not unduly discriminate against T-Mobile and Orange. Ofcom considers that a single charge control level for the provision of MCT by all operators (i) reflects the position that would prevail in a competitive market; and (ii) is supported by the prospects for spectrum trading and liberalisation over the

control period (as set out in paragraphs 9.119-9.126 above). In considering the time at which MNOs' charges are aligned, Ofcom has taken into account objective differences between the positions of T-Mobile and Orange, on the one hand, and H3G, on the other hand. In particular, Ofcom has taken into account the small size of the modelled cost differential between 900/1800MHz and 1800MHz-only operators and the larger size of the modelled cost differential between a 2G/3G MNO and a 3G-only MNO. Given these differences, Ofcom considers that it is objectively justified to (i) align 2G/3G MNOs' charges in 2010/11; and (ii) to narrow the differential between H3G's charges and the charges of the 2G/3G MNOs over the course of the charge control, but not align them.

- are proportionate, in that the charge controls are the least onerous obligations, in Ofcom's view, to address effectively the concerns set out above, as in the absence of such a control there is a serious risk of adverse effects arising from excessive termination charges (namely excessive prices overall, an inefficient structure of prices, distortion of consumer choice, inequitable distributional effects and a risk of anticompetitive behaviour; these impacts are discussed in section 7 of this statement). Furthermore, the charge controls are designed to reflect considerations of economic efficiency and have the intention to maximise benefits to end-users (for example, by reflecting network externalities and taking into account the recovery of MNOs' efficiently incurred costs).
- are transparent, in that they have been drafted so as to secure maximum transparency, which is aided by the explanation as to the intended operation and effect of the conditions as set out in this document.

Condition MA5: Requirement to publish charges

- 10.56 Condition MA5 requires MNOs with SMP to publish charges. Charge changes are to be published not less than 28 days before any such amendment comes into force. For the reasons set out in paragraphs 8.76 to 8.78, Ofcom considers it necessary to impose such a condition. The September 2006 Consultation also proposed that a further condition should be imposed requiring publication of contracts, and this proposal was considered in close alignment with the proposed condition requiring publication of charges. Having considered responses to the September 2006 Consultation, Ofcom has, however, concluded, for the reason set out in paragraph 8.15 above that it would not be proportionate to impose a condition requiring publication of contracts, as proposed in the September 2006 Consultation. The numbering of proposed condition "Requirement to publish charges" has therefore changed from MA6 (as set out in the September 2006 Consultation) to MA5 (as set out in the Notifications at Annex 20 and at the head of this paragraph 10.55).
- 10.57 Ofcom has modified the text as set out at paragraph 10.21 above. In addition to the modifications set out above, Ofcom has modified the text at MA5.4 by adding the words "or new charge" between the words "amendment" and "comes into effect", to clarify that the publication obligation also applies to any charge for new Network Access. Ofcom has also modified the definition of "General Conditions of Entitlement" by adding the wording "or its equivalent" at the end of the definition, to clarify that the definition would apply to any Notification that replaces or modifies the Notification published on the 22 July 2003.
- 10.58 Section 87(6)(b) of the Act authorises the setting of SMP conditions which require a dominant provider to publish, in such manner as Ofcom may direct, all such information for the purpose of securing transparency. Section 87(6)(c) of the Act

authorises the setting of SMP conditions which require a dominant provider to publish, in such manner as Ofcom may from time to time direct, the terms and conditions on which it is willing to enter into an access contract.

- 10.59 Ofcom, in imposing this obligation has considered all the Community requirements set out in section 4 of the Act, in particular the requirements to promote competition, secure efficient and sustainable competition and secure the maximum benefit for retail consumers. Furthermore, Ofcom has considered its duties under section 3 of the Act, in particular the requirements to further the interests of citizens and to promote competition. In particular, this transparency provides certainty to PECN providers and, by increasing transparency to stakeholders, facilitates compliance monitoring by Ofcom. It thus complements the other obligations such as the obligation to not unduly discriminate, without risking commercial confidentiality or network security.
- 10.60 Ofcom believes that this condition meets the tests set out in section 47 of the Act. Section 47 requires conditions to be objectively justifiable, non-discriminatory, proportionate and transparent. The condition:
- is objectively justifiable, in that it ensures that charges are published which will increase transparency to stakeholders and thus facilitate compliance monitoring by Ofcom (for example, compliance with the obligation to not unduly discriminate).
 - does not unduly discriminate in that it applies equally to all MNOs who have the ability and incentive to discriminate and in circumstances where Ofcom is required to monitor other obligations, such as no undue discrimination and a charge control.
 - is proportionate as it is the least onerous obligation to address the concerns described above and facilitate compliance with regulatory obligations without raising issues of commercial confidentiality or network security associated with publishing a reference offer.
 - is transparent, in that it has been drafted so as to secure maximum transparency possible within the confines of commercial confidentiality and network security, which is aided by the explanation as to the intended operation and effect of the condition as set out in this document.
- 10.61 Ofcom has also decided to revoke the notifications at (a) Annex A in the Wholesale mobile voice call termination market review, published by Ofcom on 1 June 2004, and any subsequent modifications to the SMP conditions set by those Notifications, and (b) Annex 3 in the Assessment of whether H3G holds a position of SMP in the market for wholesale mobile voice call termination on its network published by Ofcom on 27 March 2007. The Notifications revoking these provisions, including the Notification revoking notifications in respect of Inquam (which Ofcom does not intend to replace as Inquam has ceased to provide MCT), are attached at Annex 20.

Annex 1

Not used

Annex 2

Not used

Annex 3

Not used

Annex 4

Not used

Annex 5

Network costs modelling

Development of a new mobile LRIC model

- A5.1 In the previous market review of mobile voice call termination (see June 2004 Statement¹²⁴), Ofcom used a Long-Run Incremental Cost (LRIC) model to derive the cost to a 2G network operator of providing 2G voice termination services. The LRIC of voice termination is the additional cost an MNO incurs to provide termination. This can also be seen as the cost that the firm would avoid if it decided not to provide voice termination, taking a long-run perspective. It corresponds more closely to the charges that would prevail in an effectively competitive market than accounting based measures of cost; it is a fundamental goal of price regulation to mimic the effects of a competitive market and this consideration underpins the use of LRIC.
- A5.2 LRIC is widely used as a regulatory costing technique, for example by other National Regulatory Authorities in Europe and by the FCC in the USA. It has also been identified as the most appropriate methodology to use for setting interconnection charges by the European Commission in its 1998 Recommendation on Interconnection. For further details, see *The Use of Long Run Incremental Cost (LRIC) as a Costing Methodology in Regulation*, 12 February 2002¹²⁵. Furthermore, the Competition Commission agreed with the use of LRIC as the appropriate costing methodology for setting termination charges, as stated in paragraph 2.251 of the Competition Commission's 2003 Report¹²⁶.
- A5.3 Ofcom continues to hold the view that a LRIC methodology constitutes the most appropriate means of determining the efficient levels for charges on mobile voice call termination services.
- A5.4 There are two commonly used approaches to the construction of cost models - namely 'top-down' and 'bottom-up'. Under a top-down approach, the historical accounting cost levels of an entity are taken as the starting point; output/cost relationships are then derived from historical observations and costs are projected forward on the basis of output forecasts. Under a bottom-up approach, the model identifies all components of cost at a much more granular level, from the "bottom-up", that will be incurred by the entity over the period of interest. Cost causal relationships are then defined to link the quantity of each of these cost components required with output and other cost drivers, based on practical and theoretical evidence.
- A5.5 Each of these approaches has distinct benefits and drawbacks. Whilst the top-down approach reflects, by construction, a snap shot of cost levels, the cost forecasting is applied at an aggregated level and may not be as robust where the entity faces significant uncertainty or evolutionary change. A top-down approach does not allow the use of economic depreciation to derive an efficient path of cost recovery over time. Furthermore, any existing cost inefficiencies are embedded in the cost forecasts by construction. A bottom-up approach provides a better understanding of

¹²⁴ *Wholesale Mobile Voice Call Termination* – Statement – see:

http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/wmvct/wmvct.pdf

¹²⁵ http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/lric120202.pdf

¹²⁶ <http://www.competition-commission.org.uk/inquiries/completed/2003/Vodafone/index.htm>

underlying cost structures and is able to determine more accurately the changes in cost over time under significant uncertainty or where cost structures are expected to change. However, this approach does not necessarily result in an accurate total level of costs, since it is more difficult to ensure that all efficiently incurred costs have been fully accounted for.

- A5.6 Alternatively, it is possible to combine the strengths of both of these approaches in a top-down / bottom-up 'hybrid' approach. A bottom-up model is first developed as outlined above. This model is then calibrated, by adjusting the unit cost levels and cost causality relationships of each cost component, until the model achieves in aggregate the same level of costs as a top-down approach would achieve in historical years.
- A5.7 In the case of the new mobile cost model, the focus is on the long-run. With the emergence of 3G technology and associated new services, significant changes to the relative cost structures are likely over the horizon of the model. Hence in order to make robust forecasts of a mobile operator's costs over the long-run, and to make use of economic depreciation in deriving a path of cost recovery, it is necessary to adopt a bottom-up approach. Nevertheless, Ofcom believes that the historical cost level properties of a top-down approach are also desirable to ensure that all relevant costs are fully included in the model. The hybrid approach outlined above has therefore been used, with a calibration of the cost model to MNOs' accounting data; this calibration is discussed in detail in Annex 12.
- A5.8 In the June 2004 Statement, Ofcom used a 2G-only LRIC model to derive levels for regulated 2G termination charges, modelling all future voice traffic as if it was carried on the 2G network of a reasonably efficient operator. At the time of the June 2005 Extension Consultation¹²⁷ which proposed an extension to the existing charge controls, all of the 2G MNOs had launched 3G services and had the potential to migrate significant volumes of traffic from their 2G to 3G networks. Ofcom therefore began to consider the impact of reduced volumes of traffic on 2G networks as a result of migration to 3G networks. However, cost analysis at that stage was limited due to the absence of a cost model capable of accurately capturing the impact of 3G network rollout.
- A5.9 Ofcom had begun work on a new mobile cost model in April 2005 and commissioned Analysys Consulting to assist in its development. The model was built upon the June 2005 version of the old 2G LRIC model (hereafter referred to as the "June 2005 model"), but has been extended to include both 2G and 3G network technologies and the effects of traffic migration and cost sharing between these networks.
- A5.10 Throughout the model development process, Ofcom has actively consulted key industry stakeholders (including the five MNOs as well as BT and UKCTA). This industry involvement has been critical in terms of developing Ofcom's understanding of 3G network design and likely future demand scenarios as well as obtaining cost benchmarks for calibration of the new cost model. This process has taken place through a wide range of channels:

¹²⁷ *Wholesale mobile voice call termination markets – a proposal to modify the charge control conditions*, published 7 June 2005 – see: <http://www.ofcom.org.uk/consult/condocs/wholesale/wholesale.pdf>

- **Information requests:** Mobile operators submitted responses to several Ofcom data requests. These requests focussed on obtaining accurate model inputs, realistic network dimensioning algorithms and calibration benchmarks for total GBV and operating costs
- **Workshops:** Ofcom held three workshops with key industry stakeholders to discuss the structure, inputs and outputs of the model at various stages of development
- **Meetings:** A number of face-to-face meetings have been held with each of the mobile operators, BT and UKCTA. Generally these meetings have focussed on modelling implementation and key conceptual issues
- **Model releases:** Ofcom has shared three work-in-progress model versions (“Release 1” in October 2005, “Release 2” in March 2006 and “Release 3” in September 2006) with key industry stakeholders prior to “Release 4” of the model with this final statement.

Overview of the new mobile cost model

Scope included

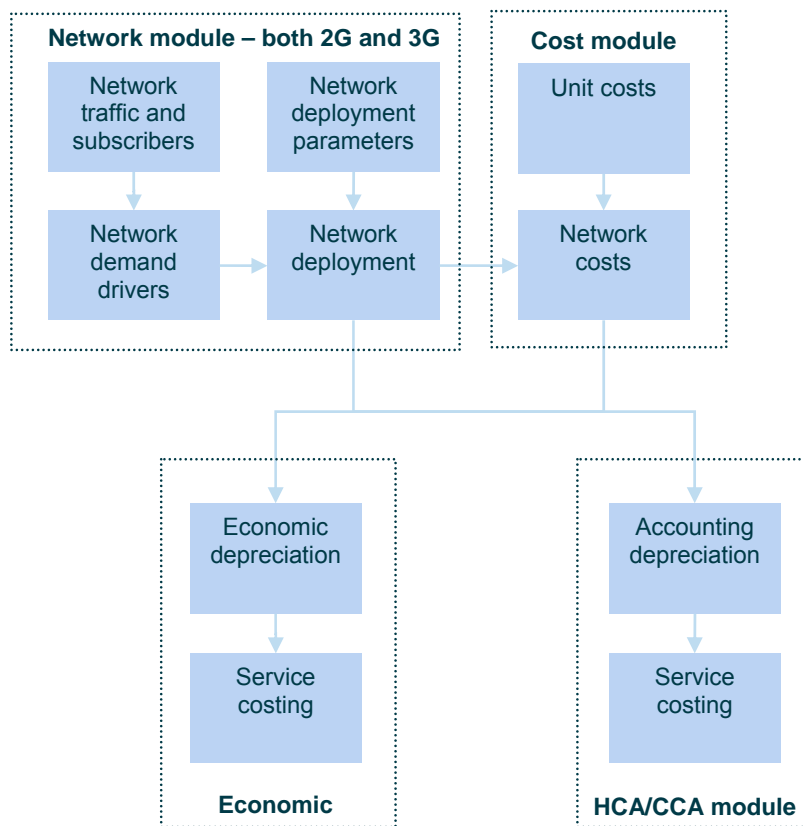
- A5.11 The primary objective of the model is to assess the network costs to a single network operator of delivering voice services over 2G and/or 3G mobile networks. However, there are significant economies of scope in the provision of voice and data services, particularly on 3G networks, and therefore data services have also been included in order to provide an accurate view of the costs of voice services, and voice termination in particular.
- A5.12 The model is based on the use of technologies and spectrum bands which have been, or are currently being deployed in the UK. Specifically it includes:
- GSM in the 900MHz band
 - GSM in the 1800MHz band
 - UMTS using 5MHz paired spectrum in the 2.1GHz band.
- A5.13 The model also has the flexibility to assess the impact of spectrum in other bands becoming available at a later date, or potentially the deployment of new technologies such as High Speed Downlink Packet Access (HSDPA). However, this flexibility has not been employed for the purpose of assessing the efficient level of charges over the timeframe of this statement. In general, Ofcom is of the view that such developments would likely result either in efficiency gains which would result in a lower efficient level of unit costs, or new data services in which case the additional costs should be borne by these services.
- A5.14 The model explicitly calculates the capital and operating costs associated with network equipment, in particular the following:
- Radio network (including base station sites and equipment)
 - Backhaul (i.e. links from the base stations to the core network)
 - Backbone network

- Core network switching equipment and other assets.
- A5.15 In line with the approach taken in the 2G LRIC model from the previous market review, the model includes all network costs from the radio network to the core network, up to and including the gateway switches and interconnect ports.
- A5.16 The model calculates the network costs to an operator in delivering voice and data services to end users. In common with the 2G LRIC model, the new model is driven by three key cost drivers: the number of subscribers, coverage requirements and the total traffic that subscribers consume. The number of subscribers drives a relatively small number of assets e.g. HLRs and handsets, whereas service demand (traffic) drives the majority of costs. Service demand from all traffic services is combined to form aggregated cost drivers. Since certain traffic services use different network resources more or less intensively than others, specific aggregation factors are applied in order to capture these effects. These cost drivers are used to calculate the required deployment of 2G and 3G networks (where appropriate) in order to meet the demands for capacity and coverage.
- A5.17 In order to capture the relevant effects of national roaming, the model is capable of roaming off traffic from the 3G-only operator's network (and onto a combined 2G/3G operator's network) where the extent of its coverage is insufficient to convey calls that are demanded. Commercial costs associated with network roaming for a 3G-only operator are not included within the scope of the network cost model (see paragraph A13.47 in Annex 13 for further details).
- A5.18 Service costs are arrived at by allocating all the costs identified to different services according to service routing factors. To the extent that common costs exist, these are allocated to service increments according to routing factors. The model does not explicitly identify or estimate the level of common costs. The outputs of the model are unit costs that exhaustively include all network costs. Therefore the model output, and in particular the cost of termination, is an incremental cost and an implicit mark-up for an allocation of any potential common costs. This is a particular form of network common cost allocation. Allocation of common costs is discussed in more detail in Annex 17.
- A5.19 The model explicitly calculates the network costs for the period 1990/91 to 2039/40 with a perpetuity based terminal value thereafter, although demand inputs are constrained to be constant from 2020/21 onwards.

Model structure

- A5.20 The new mobile cost model comprises four distinct modules, as shown in Figure A5.1 below.

Figure A5.1 Model structure



- The **network module** forecasts the 2G and 3G network deployment required to support the input level of demand and network coverage over time.
- The **cost module** produces the network costs, based on asset costs (both capital and operating) and a projected network deployment.
- The **economic depreciation module** calculates service costs from the forecast network costs, based on a form of economic depreciation¹²⁸.
- The **HCA/CCA module** outputs the gross book value and service cost based on applying Historical Cost Accounting and Current Cost Accounting forms of depreciation to the network asset costs.

Model outputs

A5.21 The outputs of the model are unit costs in each year for traffic and subscriber services, including incoming voice call minutes. These service unit costs can be stated according to three different paths of cost recovery which have been included in the model; the form of Economic Depreciation used in the previous market review (“Original ED”) as well as HCA and CCA accounting approaches. The entire model is calculated in real 2006/07 terms and all outputs are stated in this form.

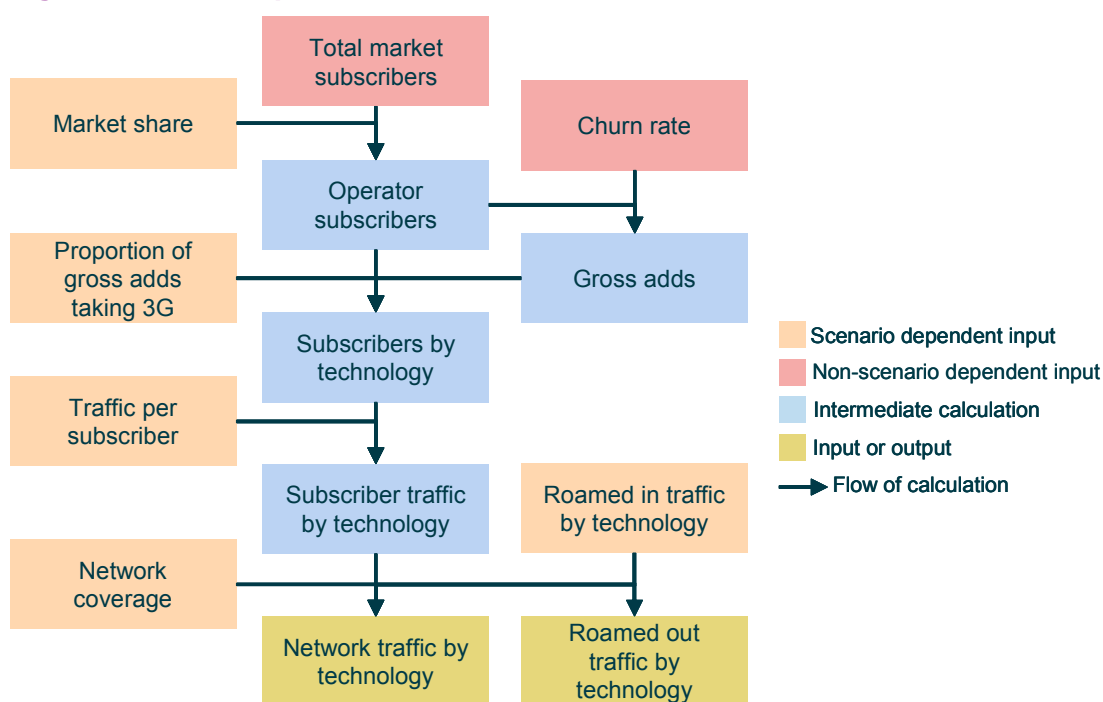
¹²⁸ See <http://www.ofcom.org.uk/static/archive/ofel/publications/mobile/depr0901.htm> for a detailed explanation of economic depreciation and its implementation in the previous market review

Demand and coverage

A5.22 Figure A5.1 shows that the cost model is based on network traffic and subscribers as drivers of network deployment. Taking account of responses to the September 2006 Consultation, this section discusses the key inputs that are used to develop network traffic scenarios and subscriber forecasts, in particular for the 3G-only operator.

A5.23 Figure A5.2 below shows the logic flow for forecasts of subscribers and service demand on the 2G and 3G networks as consulted upon in Annex 5 of the September 2006 Consultation:

Figure A5.2 Development of demand forecasts



Geotype definition

A5.24 “Geotypes” are a means of mapping different UK geographic segments according to the likely density of traffic and building clutter that would be experienced in those segments (e.g. city centres with high traffic density and high building clutter versus rural areas with low traffic density and low building clutter). These factors have a direct influence on the number of sites that would be required to provide:

- a) network coverage; and
- b) sufficient network capacity to carry all of the traffic.

A5.25 Geotype definitions within the model are an attempt to capture these geographic factors, and are defined according to population density (as a proxy for variations in traffic density and building clutter). The new cost model includes a total of nine geotypes¹²⁹:

- Urban

¹²⁹ The June 2005 model had four geotypes – Urban, Suburban, Rural and Highways

- Suburban 1 and 2
- Rural 1, 2, 3 and 4
- Highways
- Railways

A5.26 Ofcom did not receive any responses to the September consultation that questioned the appropriateness of these geotype definitions.

Subscribers and operator market share

Proposal set out in the September 2006 Consultation

- A5.27 The subscriber numbers for the modelled operator were calculated based on the total number of mobile subscribers (assuming population growth at 0.4% per annum¹³⁰ and a take-up S-curve which saturates at 110% penetration of the population with SIMs¹³¹), multiplied by an assumed market share for that operator.
- A5.28 Two alternative market share profiles were used: one for a 2G-only or 2G/3G operator and another for a 3G-only operator. These profiles were consistent with the principle of competitive neutrality, with five players taking equal shares of the market by the end of the explicitly modelled period. This approach is in-line with that taken in the previous market review, where efficient operators were modelled as ultimately having equal market shares.
- A5.29 Ofcom considered that fourteen years (from 2006/07 to 2020/21) was sufficient for the 3G-only operator to reach 20% market share. For 2G/3G operators, the assumed market share declined from 25% prior to the entrance of the 3G-only operator to 20% by 2020/21.
- A5.30 The assumptions in the model about the rate of migration of subscribers from 2G-only to 3G enabled handsets was based on an assumed handset churn rate of 40% and an increasing proportion of churning subscribers taking 3G enabled handsets in each year (for a 2G-only operator this was always assumed to be zero, and for a 3G-only operator this parameter was always assumed to be 100%). Three alternative migration scenarios were evaluated in the model with high, medium and low rates of subscriber migration. These scenarios were intended to include the likely range of realistic market outcomes.

Responses to the September 2006 Consultation

- A5.31 H3G's confidential submission contained updated data for its volume of "active" subscribers, so that the cost model could be consistent and non-discriminatory in its definition of subscriber numbers as between the combined 2G/3G operators and the 3G-only operator. The data supplied by H3G showed that it had [X] subscribers at the end of the second quarter of 2006/07, compared with an estimate of 4.0m in Release 3 of the cost model. Based on these updated figures, H3G suggested that Ofcom should update the short to medium term forecasts of subscriber numbers for the 3G-only operator.

¹³⁰ Based on data from The Economist Intelligence Unit

¹³¹ Assumption that all people over 10 years of age will become mobile subscribers, with 25% of those owning dual SIMs

- A5.32 H3G argued that the cost model's long term forecast of market share for the 3G-only operator is "unsupported, and driven more by Ofcom's desire for what it sees as competitive neutrality than by the available evidence of what is reasonable." [38] In isolation, a slower rate of growth in subscribers for H3G would lead to higher efficient unit cost estimates for voice termination for H3G.
- A5.33 In contrast, Vodafone and O2 expressed the view that the cost model's market share assumption for the 3G-only operator rewards inefficiency on the part of H3G. Vodafone argued that this assumption should be based on a view of a hypothetical efficient new entrant, rather than "an empirical question about when external commentators, or H3G itself, now think that it will achieve uniformity of share with its competitors". Vodafone used a churn-based market share growth model to suggest that an efficient 3G-only operator would achieve equal market share by around 2012. O2 also questioned why Ofcom had changed its previous assumption¹³² that an efficient 3G-only operator would achieve equal market share by 2010.

Ofcom's response to specific points raised by stakeholders

- A5.34 Ofcom's market share assumptions are based on its view of the share that would be achieved by a hypothetical efficient operator. This approach underpinned the proposals set out in the September 2006 Consultation and reflected in Release 3 of the cost model, and has not changed.
- A5.35 In determining the historical market share achievement of a hypothetical efficient operator, Ofcom considers the actual performance of H3G to be representative. This approach is similar to that taken with 2G operators in previous mobile termination charge controls.
- A5.36 For this reason, market share assumptions for the 3G-only operator in historical periods in the cost model have been aligned to the actual market share of H3G in corresponding periods. Ofcom recognises that this position might be conservative. However, it considers actual market share performance for a new entrant to be an important reference benchmark for historical inputs to the cost model.
- A5.37 With regard to forecasts, Ofcom considers the approach presented by Vodafone to estimating the future market share prospects of an efficient 3G-only operator to merit consideration. The basic logic of Vodafone's churn model is analytically reasonable, although the model is not comprehensive and Ofcom does not necessarily agree with the assumptions that underpin Vodafone's stated results. Forecasts of this kind are inherently uncertain, especially over an extended period of time, and Ofcom is mindful of the need to ensure the recovery of the 3G-only operator's efficiently incurred costs.
- A5.38 Having taken account of Vodafone's argument and considered a range of plausible churn parameters, Ofcom considers that an efficient 3G-only benchmark should achieve market share parity with other operators in a shorter period than assumed in the September 2006 Consultation. Ofcom has adjusted its forecast of the 3G-only

¹³² O2 noted that in Release 2 of the cost model, issued in March 2006, H3G was assumed to reach an equal market share by 2009/10.

operator's market share in its final version of the model to reflect the efficient 3G-only operator achieving market share parity in 2016/17¹³³.

- A5.39 In developing a new forecast of the 3G-only operator's market share, Ofcom has been careful to consider how it compares with H3G's forecast. The key consideration in this case is that the efficient benchmark should allow H3G to recover efficiently incurred costs, for which the relevant indicator is the number of voice minutes that H3G expects to carry in the future (because this is the key driver of network dimensions and unit costs). By this measure, Ofcom's forecast appears to be reasonable.
- A5.40 The revised forecasts for subscriber numbers for both 2G/3G operators and the 3G-only operator are presented in Figure A5.3.
- A5.41 The impact of these revised forecasts on efficient unit cost estimates in 2010/11 is limited, because (although the time profile of subscriber growth towards market share parity has changed) the key factor that affects efficient costs is the forecast of lifetime traffic, and this forecast for 3G-only operator lifetime traffic is similar to that assumed in Release 3 of the cost model in September 2006. [X<]

Traffic and Demand scenarios

- A5.42 Traffic in the cost model is based on a build-up of demand per subscriber for a range of services.
- A5.43 Demand for each service per subscriber in the model is based on historical data combined with simple growth-rate based forecasts. The forecasts underpinning the September 2006 proposals (and reflected in Release 3 of the model) were generated with reference to forecasts from MNOs, as well as third-party mobile market research. High, medium and low scenarios were investigated for each of the services below:
- 2G incoming, outgoing and on-net voice calls
 - 2G SMS and MMS
 - 2G packet data
 - 3G incoming, outgoing and on-net voice calls
 - 3G incoming, outgoing and on-net video calls
 - 3G SMS and MMS
 - 3G packet data (including data cards)
- A5.44 A rebalancing adjustment is applied to 2G and 3G traffic to account for 3G subscriber traffic being roamed onto 2G networks where 3G coverage is not available. This rebalanced traffic will be delivered on the operator's own 2G network

¹³³ In this context, "market share parity" does not mean exactly 20% market share. Ofcom has modelled a smooth profile of market share growth for the 3G-only operator. This means that the 3G-only operator's market share growth slows considerably as it approaches the 20% level. The first year in which the 3G-only operator's market share reaches 20% (rounded to the nearest integer percentage) is 2016/17.

if available, or in the case of a 3G-only operator it is assumed that this will be roamed out to a national roaming partner.

A5.45 The September 2006 Consultation included nine scenarios for future demand. Under each of these scenarios, a different combination of assumptions was made in generating forecasts of future demand. Each of the following factors were set to high, medium or low cases, depending on the chosen overall demand scenario, and many of these vary over time:

- rate of subscriber migration from 2G-only to 3G enabled handsets¹³⁴
- average voice minutes (including video calls) per subscriber
- ratio of 3G to 2G voice traffic per subscriber as a proxy for the usage patterns of early adopters
- proportion of 3G users who are active users of video calls
- proportion of active video call user minutes that would be video minutes if both originating and called party are in coverage
- outgoing messages per average subscriber
- ratio of 3G message use to 2G message use as a proxy for usage patterns of early adopters
- proportion of 2G messages that are MMS
- proportion of 3G messages that are MMS
- proportion of 2G subscribers who use data services
- 2G data usage per user of data services
- proportion of 3G subscribers who use data services (including 3G data cards)
- 3G data usage per user of data services (this takes account of the use of 3G data cards)

Responses to the September 2006 Consultation

A5.46 Orange, T-Mobile and H3G all argued that forecasts of voice traffic growth per subscriber in the model were too high and out of line with historical figures. Orange claimed that its forecasts for future voice demand per subscriber were lower than those in Release 3 of the cost model and provided figures from IDC in October 2006 that indicated a compound annual growth rate (CAGR) of 2% in mobile voice demand¹³⁵ (compared with Ofcom's September 2006 proposed forecast of 9% CAGR). Several MNOs suggested alternative specific medium case scenarios for voice traffic growth per subscriber, namely:

¹³⁴ The rate of migration is set to the most rapid under high traffic scenarios and the slowest under low traffic scenarios, since these combinations minimise and maximise blended 2G/3G unit costs respectively.

¹³⁵ IDC: Western Europe Mobile Voice and Data Forecasts Q3 2006 - October 2006

- 4-5% CAGR (Orange);
- halfway between medium (9% CAGR) and low (0% CAGR) case scenarios used in September 2006 (T-Mobile); and
- the low case scenario from September 2006 (H3G) (0% CAGR).

A5.47 Conversely, Vodafone endorsed Ofcom's demand forecast, describing it as "conservative".

A5.48 Despite this overall endorsement, Vodafone argued that the proportion of on-net traffic assumed in the model was too high, because the volume of inter-network traffic could be expected to grow at a faster rate than intra-network traffic.

A5.49 Orange submitted that rebalancing of on-net calls between a single operator's 2G and 3G networks (by treating the call as origination on one network and termination on the other) led to an over-estimated volume of inbound minutes, although it acknowledged that Ofcom's treatment is correct in terms of establishing economies of scale in network costs. It argued that this in turn leads to understated termination charges, once costs are allocated across this increased volume of minutes.

A5.50 H3G reiterated an argument from its May 2006 submission that data and voice busy hours should not be treated as coincident. Network dimensioning in the cost model is driven by the voice busy hour, including the data services that are carried in that busy hour. H3G suggested that Ofcom should also consider a separate busy hour for data services, because this will not necessarily be during the same time period as the voice busy hour. H3G claimed that the cost model's approach overstates the efficient costs of data and understates the efficient costs of voice, since coincidental busy hours imply a larger amount of data traffic in the network busy hour than might otherwise be the case.

A5.51 MNOs made further comments on the demand scenarios that were constructed for the September 2006 Consultation to determine efficient charge ranges. The following points are a summary of these comments.

- H3G argued that the "Voice-only" scenario should not include video calls, and that the traffic level in this scenario was overstated as a result.
- [X] Vodafone suggested that video traffic may be overstated in the Medium scenario.
- Both H3G and Vodafone claimed that data services forecasts were too high in the "High" and "Medium" demand scenarios.
- [X]
- H3G stated that the high demand case should not be considered unless the effect of HSDPA is modelled. It claims that HSDPA has a "fundamental impact on the network requirements for and cost of data". HSDPA would be likely to increase the cost per minute of voice termination.
- [X]

Ofcom's response to specific points raised by stakeholders

- A5.52 Voice traffic per subscriber is a key variable in the cost model. Combined with the number of subscribers, this variable is a major driver of the overall demand forecasts for each MNO.
- A5.53 In response to the information and views presented by MNOs, and the latest information on actual traffic volumes, Ofcom has reconsidered the forecasts of voice traffic per subscriber in the cost model in order to decide whether the CAGR of 9% (underlying the September 2006 Consultation proposals) is appropriate. In particular, Ofcom collected updated forecasts from IDC in December 2006. This data indicated an average CAGR of 7.4% from 2005 to 2010¹³⁶. While not as low as the CAGR forecasts proposed by the MNOs, Ofcom notes that this forecast is below the medium level that was used in the September 2006 proposals. Ofcom has also taken into account revised forecasts from MNOs [3<] which have a CAGR below 8%.
- A5.54 On balance, Ofcom believes that its medium forecast growth rate for voice traffic per subscriber should be reduced from the level used in Release 3 of the model. The new medium case forecast of voice traffic per subscriber in the cost model shows a CAGR of 5% until 2010/11, down from 9% in Release 3. After this point, the CAGR reduces to 1% per annum. In making the revision to 5% prior to 2010/11 Ofcom has deliberately opted for a conservative forecast (as discussed in Section 9). Ofcom notes that this forecast has a lower CAGR than the latest available IDC forecasts in the period to 2010/11. In order to account for the uncertainty that surrounds voice demand per subscriber, Ofcom's approach establishes efficient charge benchmarks that are based on high and low demand scenarios in addition to the medium demand scenario (see Section 9 and Annex 13).
- A5.55 The impact of the reduced growth rate for voice traffic per subscriber on efficient charge benchmarks in 2010/11 is dependent on the particular demand scenario that is selected. Using a medium demand scenario, the impact of this change in relation to network investment and operating costs (excluding spectrum costs) is an increase of 0.14ppm for a 2G/3G combined operator and 0.19ppm for the 3G-only operator¹³⁷.
- A5.56 Ofcom is not persuaded by Vodafone's argument that the volume of inter-network traffic can be expected to grow at a faster rate than intra-network traffic. Historical figures available to Ofcom¹³⁸ indicate a steady proportion of voice traffic going to on-net calls over time, and therefore Ofcom has decided to maintain its assumption for this variable in the model.
- A5.57 Ofcom agrees with H3G that it is possible for the busy hours of voice and data traffic to not coincide. However, Ofcom also notes that the cost model is intended to reflect an average efficient operator. Average operator information available to

¹³⁶ Ofcom collected figures that relate to total market voice minutes and total market subscribers. These data are the key traffic outputs upon which the cost model is based. Voice minutes per subscriber and resulting CAGR were derived from these overall data.

¹³⁷ The reduced growth rate for voice traffic results in a lower level of lifetime voice traffic which also affects the unit cost recovery for 3G spectrum. In establishing efficient unit cost benchmarks, Ofcom has taken account of this factor, which can magnify the stated increases by up to 2.5 times (see Annex 13). The reduced growth rate for voice traffic per subscriber is also incorporated into Ofcom's consideration of non-network costs in Annex 15.

¹³⁸ Unreported data collected for Ofcom's *Telecommunications Market Data Tables* (see <http://www.ofcom.org.uk/research/cm/> for further details on this report)

Ofcom (as opposed to the information pertinent to any specific operator) does not support the proposition that the data busy hour is materially different from the voice busy hour.

- A5.58 However, even if were the case that voice and data busy hours were non-coincidental for an average efficient operator, it would not make a material difference to Ofcom's efficient charge outcomes, because voice traffic is the key driver of the network busy hour loading upon which the network is dimensioned and costs are allocated in the cost model. In this context, Ofcom has considered several different scenarios for the total volume of data traffic, and has modelled a voice-only demand scenario to indicate the potential effect of forecast error in data traffic volumes, including the proportion of data traffic that occurs in the network busy hour.
- A5.59 Finally, Ofcom has investigated the proportion of data traffic that would need to be concentrated in a data busy hour (i.e. a busy hour for data that did not coincide with the voice busy hour) in order for data, rather than voice, to drive the network busy hour. The results did not correspond to realistic forecasts of data traffic volumes.
- A5.60 Orange is correct in its understanding of the model's rebalancing of on-net call minutes. The cost model estimates on-net calls for a 2G/3G operator that cross from its 2G network to its 3G network (or vice versa) as an outbound call on the originating network and an incoming call on the terminating network. This approach is designed to correctly estimate the volume of call minutes that make use of the 2G and 3G radio networks. However, as Orange notes, a by-product of this methodology is that the volume of incoming minutes for the MNO in question could be mildly overstated by the model.
- A5.61 Ofcom has analysed this issue, and considers that the impact is negligible; Orange's own calculation is that Ofcom's approach reduces the estimate of efficient termination costs by 0.03ppm. Addressing the problem would add further complexity to the cost model, and Ofcom believes that such an amendment would be inappropriate in the context of greater degrees of uncertainty (e.g. voice traffic growth assumptions) to which Ofcom has taken a conservative approach.
- A5.62 The level of future video call demand is highly uncertain, and Ofcom has not seen sufficient evidence to suggest that its forecasts of video call demand are unreasonable. The comments from H3G and Vodafone in relation to video demand levels (in the High scenario and Medium scenario respectively) do not justify a change in the base forecasts for video calls in the cost model. The medium scenario forecast in the cost model is for a nominal level of video call demand from 3G subscribers at the start of 2006/07 (0.1% of voice call minutes), increasing to 2% of all voice call minutes between 3G subscribers in 2010/11. Ofcom believes that this is a reasonable forecast given the high levels of uncertainty around the future of video calls.
- A5.63 While its overall video traffic forecasts are unchanged, Ofcom has decided to exclude video calls from the Voice-only scenario. This scenario has been developed to examine the diseconomies of scale in relation to network costs that would occur if the MNOs only carried standard voice traffic. With this objective in

mind, Ofcom agrees that excluding video traffic is appropriate and all such demand should be treated as standard voice traffic¹³⁹.

A5.64 The effect of excluding video minutes from Voice-only scenarios is to increase the underlying network costs for that scenario by 0.13ppm for the 3G-only operator and 0.06ppm for a 2G/3G combined operator.

A5.65 Ofcom's approach to forecasts of data traffic levels in demand scenarios is not designed to estimate the costs of data services. Rather, the cost model is designed to estimate the costs of voice termination only, and data services are modelled to facilitate this. Therefore, data traffic is modelled to a reduced level of detail.

A5.66 With this in mind, a major concern for Ofcom in making data services forecasts is to ensure that these forecasts are not too aggressive. In general, higher data forecasts will lead to lower efficient charge estimates in the model, due to economies of scale and scope in the provision of network services. This creates a risk that the charge control level (derived from the model) may lead to under-recovery of costs on voice termination if demand for data services falls short of the forecasts. It was this concern that led Ofcom to reduce data services forecasts in the September 2006 Consultation (reflected in Release 3 of the cost model). Ofcom also considers the Voice-only demand scenario in order to estimate an upper bound on the potential impact of reduced data services forecasts on the efficient unit costs of voice termination. In this context, it is not appropriate to assume that the data services forecasts in the cost model (or any extrapolation of these data) represent anything other than a plausible range of estimates, or that they have any relevance beyond the estimation of voice termination charges.

A5.67 [X]

A5.68 [X]

A5.69 Similarly, Ofcom does not believe that its High demand case should be amended to include the impact of HSDPA. This issue was discussed in the September 2006 Consultation. In general, Ofcom expects that deployment of new technologies should lead to efficiency gains (which would result in a lower efficient level of unit costs), or new data services (in which case additional costs should be borne by customers of the new services). Ofcom is also satisfied that the Voice-only scenario addresses any concerns that the efficient charge level for voice termination is understated due to uncertain treatment of data services, which H3G suggests would be the case with HSDPA.

A5.70 [X]. Ofcom does not believe that it is appropriate at this point to speculate on the possibility of new MNOs offering a national mobile network and taking a significant share of the total market volume of termination minutes during the next four years. In any case, Ofcom already considers a low demand scenario when determining efficient termination charges (see Annex 13), which would have a similar impact to reduced market share for existing operators].

¹³⁹ The cost model uses a forecast for the total volume of voice minutes and assumes a small proportion (up to 2% in the Medium demand scenario) are conveyed as video calls. The amendment to the Voice-only scenario involves setting this proportion to zero.

Coverage scenarios

- A5.71 National coverage requirements are a key driver of radio network deployment for a mobile operator.
- A5.72 Ofcom has assumed that the final 2G network rollout would reach 99% of the UK population.
- A5.73 For final 3G network rollout, in Release 3 of the cost model in September 2006, Ofcom took the view that an efficient 2G/3G operator would not necessarily be motivated to rollout a 3G network to the same extent as existing 2G networks¹⁴⁰, due to relatively low demand from the least densely populated regions that could be met using the existing 2G networks. On this basis, Release 3 of the model assumed that 2G/3G operators' 3G networks would ultimately be rolled out to give 90% population coverage, with a focus on servicing higher density urban and suburban geotypes. The model assumed a 3G network rollout higher than 90% (up to [X] population coverage) for the 3G-only operator, because this operator does not have its own 2G network to support roaming in rural areas. This rollout fell short of the 99% level of 2G network coverage and therefore assumed some reliance on the ability to roam out traffic to another operator's 2G network.
- A5.74 Furthermore, Ofcom recognised that there is an important relationship between traffic and coverage in the early stages of 3G network rollout. Assumptions about the build-up of 3G traffic contained within the new cost model must be consistent with the assumptions about the rate of 3G network coverage rollout. The new cost model assumes two separate 3G rollout scenarios; one for a 3G-only operator based on H3G's stated network coverage, which was removed from the Release 3 of the model in September 2006 for confidentiality reasons; and another for the 2G/3G operators which was an average based on the stated rollout profiles of the four other MNOs.

Responses to the September 2006 consultation

- A5.75 In relation to coverage, Vodafone and O2 disagreed with the assumption that a 3G-only operator would roll its network out further than the 3G network of 2G/3G operators. It described this assumption as "perverse", because such a strategy would allow the 3G-only operator a competitive advantage in offering 3G data services to 7% of the population.
- A5.76 O2 suggested that the prospect of 2G network shutdown supports an assumption of full 3G rollout by 2G/3G operators. It argued that 2G shutdown could happen in the medium term, at least partially, citing the potential for an 1800MHz operator to shut down parts of its network and use national roaming from a 900/1800MHz operator to maintain coverage. O2 also noted that, to the extent that some rural and remote areas are unprofitable, current 2G/3G operators might even choose to reduce population coverage in response to new entrants.

¹⁴⁰ Ofcom has considered scenarios under which the 2G network is switched-off in future and 3G networks are rolled out further, so as to provide the same overall level of coverage. However, under realistic assumptions these switch-off scenarios result in similar levels of unit costs to a no switch-off scenario within the period of interest as the cost reductions on the 2G network are offset by the additional cost of rolling out 3G network coverage in rural areas.

Ofcom's response to specific points raised by stakeholders

- A5.77 Ofcom believes that it may well be reasonable to have 3G rollout assumptions for 2G/3G operators that are not the same as for the 3G-only operator. In areas of low demand where 2G/3G operators already have a 2G network in place, they stand to gain only additional data revenues with the rollout of a 3G network. The 3G-only operator, however, stands to gain additional voice and data coverage in any additional areas in which its network is rolled-out. This mismatch of incentives supports the assumption that the 3G-only operator may well have a fuller 3G network rollout than the 2G/3G operators, to reduce the reliance on a national roaming partner.
- A5.78 In any case, Ofcom has tested scenarios in which 2G/3G MNOs shut down their 2G networks in 2014/15, and rollout their 3G networks to coverage equivalent to that of their existing 2G networks (99% population coverage) over a three year period prior to shutdown. Ofcom has also considered scenarios in which 2G/3G MNOs rollout their 3G networks to a level equivalent to the 3G-only operator by 21014/15. The impact of both of these scenarios on the efficient termination charge in 2010/11, for example, is less than 0.1ppm for all operators.

Ofcom's conclusions with respect to demand and coverage

- A5.79 Release 4 of the cost model includes several changes that have been made since the September 2006 Consultation. The most notable amendments are:
- a reduction in the forecast CAGR in voice minutes per subscriber from 9% to 5% under the Medium demand scenario;
 - the path of the 3G-only operator's market share has been revised to:
 - take account of updated historical subscriber information from H3G¹⁴¹; and
 - reach parity with the market share of other operators in 2016/17 rather than 2020/21;
 - the removal of video minutes from the Voice-only scenario.
- A5.80 A by-product of any change in demand assumptions is that the network loading in the cost model will change, which might affect the rate and/or quantity of network assets deployed (e.g. site counts) in capacity-constrained areas. While the effect of most of the changes described above is minimal in this regard, the change in the voice minutes per subscriber assumption has altered the number of sites deployed by MNOs in the cost model. Annex 12 has further details about final asset counts in the model and calibration of these results to accounting data from the MNOs.
- A5.81 Release 4 of the model includes 8 alternative demand scenarios. These comprise the following four traffic scenarios, applied to both the 2G/3G combined operator and the 3G-only operator:
- high voice and data traffic;
 - medium voice and data traffic;

¹⁴¹ Total market subscriber figures have also been updated to reflect this latest information.

- low voice and data traffic; and
- medium voice-only traffic.

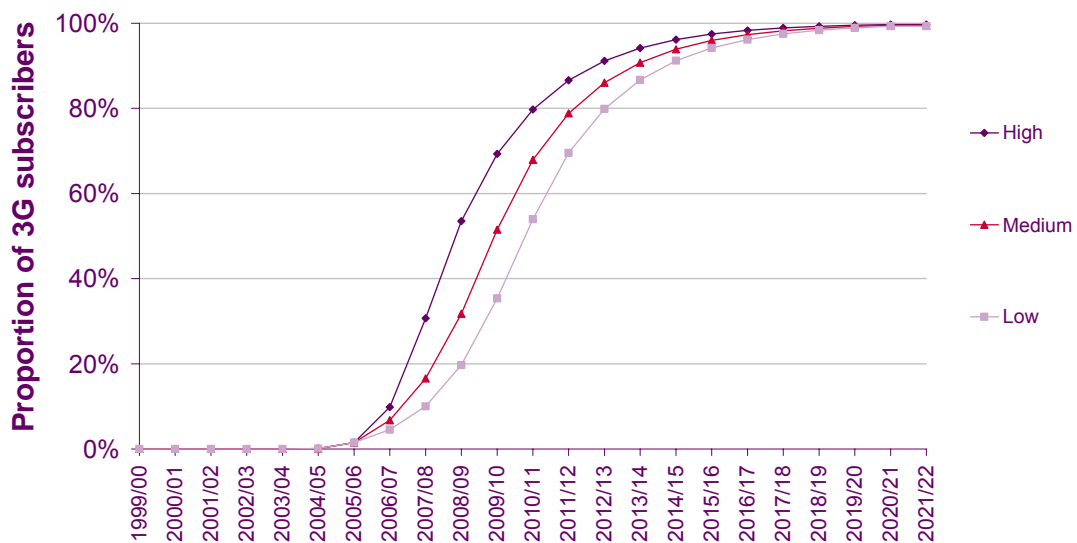
A5.82 The key demand assumptions over time which have been generated by the approach described above are shown in the figures below:

[X Figure A5.3 Subscriber forecasts]

A5.83 These subscriber forecasts give five efficient operators equal market shares by the end of the explicit modelling period. The 2G/3G combined operator market share reflects a fall from 25% to 20% market share due to the entry of the 3G-only operator which is assumed to gradually gain market share. The growth in market share for the 3G-only operator has been revised following the September 2006 Consultation (see paragraphs A13.34-41), rising from 0% in 2003/04 to 20%¹⁴² in 2016/17. In the previous release of the model in September 2006, the 3G-only operator was assumed to reach market share parity in 2020/21.

Figure A5.4 Subscriber migration forecasts

Subscriber migration scenarios (2G/3G operator)

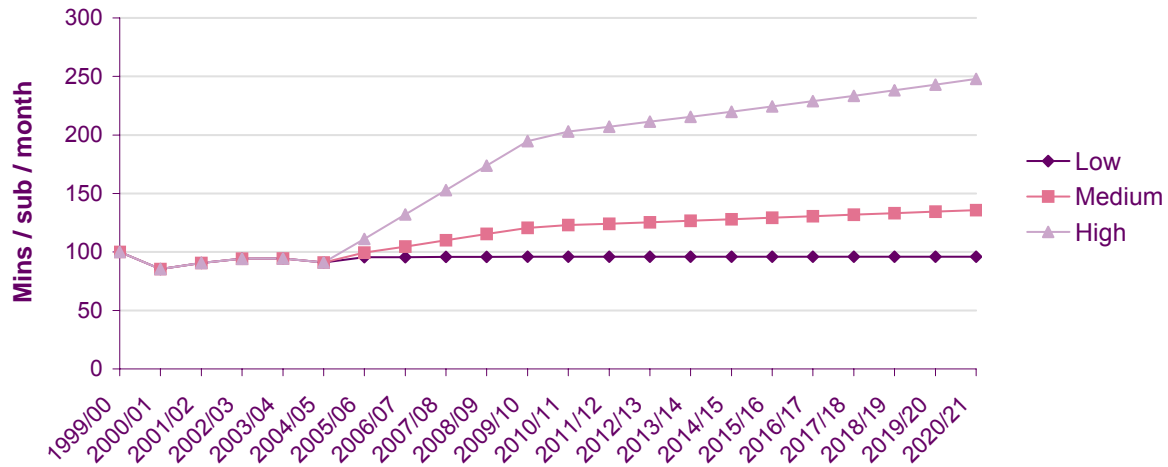


A5.84 These migration scenarios all exhibit the same historical starting point in 2004/05, prior to which the 2G/3G MNOs’ traffic was carried entirely on 2G networks. However, different assumptions on the 3G take-up rates of churned subscribers lead to a range of migration S-curves. All of these curves reach 100% by the end of the explicit modelling period.

¹⁴² Rounded to the nearest integer percentage

Figure A5.5 Outgoing voice call forecasts (2G and 3G subscriber weighted average)

Outgoing voice call scenarios (voice and video)

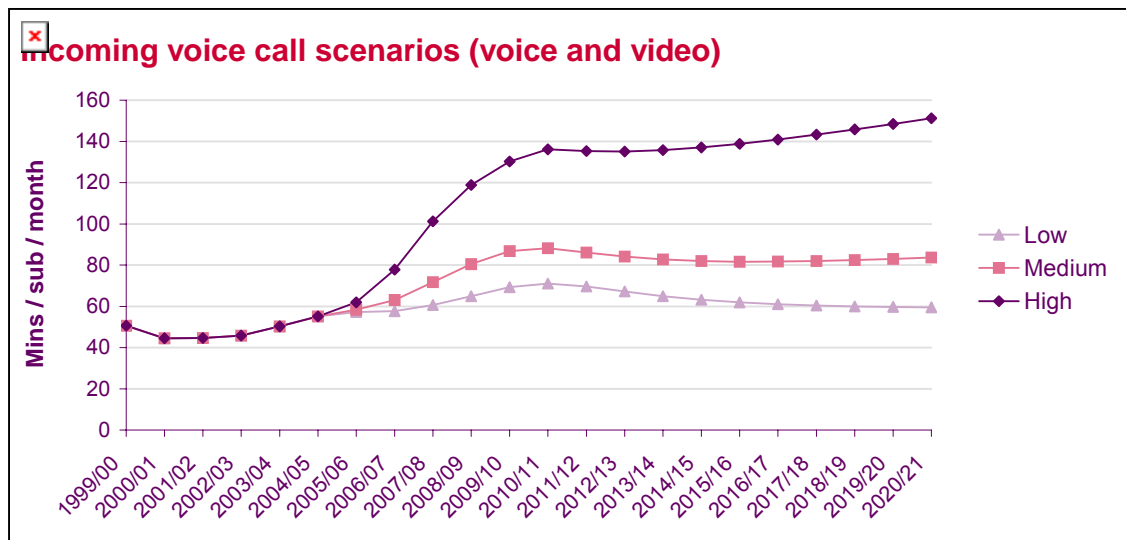


A5.85 The outgoing voice usage scenarios in the new cost model can be summarised as follows:

- **Low case:** No growth in subscriber voice call usage
- **Medium case:** Moderate voice usage CAGR of 5% up to 2010/11
- **High case:** Higher voice usage CAGR of 16% up to 2010/11

A5.86 The medium case outgoing voice traffic scenario lies towards the lower end of a range of forecasts obtained from MNOs, brokers’ reports and third party market research from IDC.

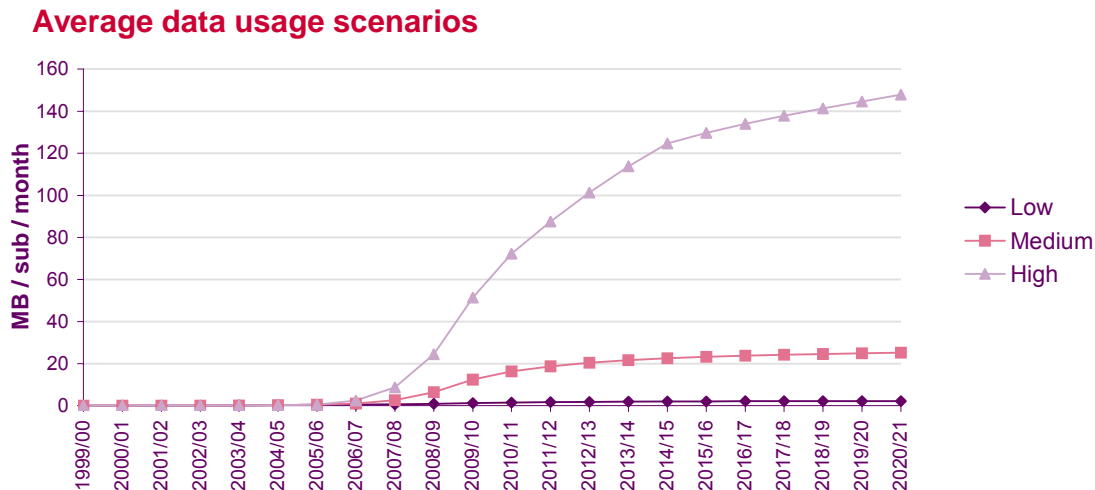
Figure A5.6 Incoming voice call forecasts (2G and 3G subscriber weighted average)



A5.87 The incoming voice call scenarios included within the new cost model are similar to the outgoing voice call scenarios in terms of the range of different forecasts which have been considered. The level of these forecasts is based on historical data and model assumptions around the relative proportion of voice calls which will be

incoming versus outgoing. The temporary demand peak around 2010/11 is caused by the rebalancing of on-net calls which cross both the 2G and 3G networks; these calls are separated into an incoming call on one network and an outgoing call on the other in the new cost model for the purpose of accurately capturing their costs. Orange commented on this issue in their response to the September 2006 Consultation which is addressed in paragraphs A5.60-61 above.

Figure A5.7 Data forecasts (2G and 3G subscriber weighted average)



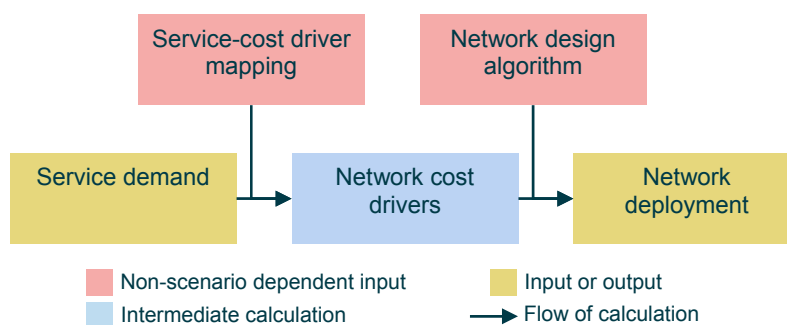
A5.88 Currently the market for 3G data services is not well established and the outlook for growth in this area is therefore highly uncertain. The divergence of the three data usage scenarios shown above is intended to reflect the extent of this present uncertainty. The medium case scenario is based on a conservative interpretation of the consensus of demand forecasts which Ofcom has obtained from mobile operators as well as third party market research from IDC.

A5.89 In summary, Ofcom has made two changes in relation to demand scenarios since the September 2006 Consultation that have had a significant impact on efficient unit cost benchmarks in 2010/11. These are a reduction in the forecast growth rate for voice traffic per subscriber and a revision to the market share growth profile for the 3G-only operator, and are discussed in paragraphs A5.54-55 and A5.38-41 respectively. Together these revisions increase the efficient level of unit network investment and operating costs (excluding 3G spectrum costs) by about 0.2ppm to 0.3ppm under the medium demand scenario.

Network module

Overview

A5.90 The network module calculates the deployment of each type of 2G and 3G network asset required to meet the input levels of service demand and coverage in each year. The flow of calculation in this module is illustrated in Figure A5.8 below:

Figure A5.8 Calculation flow

Modelling of different operator types

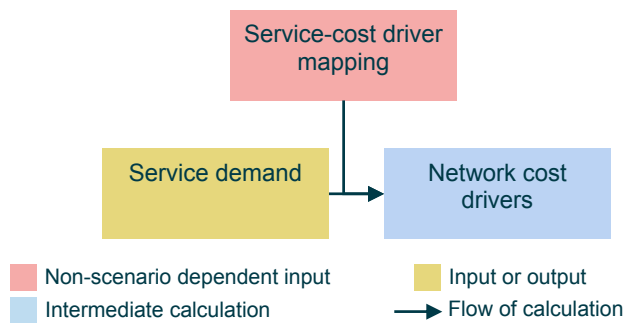
- A5.91 The purpose of the new cost model is to provide relevant benchmarks to inform the appropriate levels for charge controls on mobile voice termination. The network module has therefore been designed to model (a) an operator with a 2G network only, as in the previous market review, as well as (b) an operator with both a 2G and a 3G network and (c) an operator with a 3G network only. The network design algorithms used to determine the deployment of all three types of operator are consistent (although different dimensioning rules exist for 2G and 3G specific equipment). However, for an operator with both 2G and 3G networks, certain assets (e.g. radio sites) may be shared between the 2G and 3G networks.
- A5.92 As previously stated, traffic generated by 2G and 3G subscribers has been adjusted to estimate the proportion that will be carried on the 2G and the 3G networks given 3G coverage limitations. During this process, on-net calls between subscribers on the 2G network and subscribers on the 3G network are converted into an outgoing call on one network and an incoming call on another. For a 2G/3G operator, this assumes that the cost of an on-net call between an operator's 2G and 3G network is equal to the cost of an outgoing call on one network and an incoming call on the other. In the 3G-only operator case, it has been assumed that the own-network cost of an on-net call is that of an outgoing call if the receiving party is outside 3G coverage or that of an incoming call if the calling party is outside 3G coverage.

Cost drivers

- A5.93 In order to dimension 2G and 3G networks on the basis of cost causation relationships, the network model first converts the demand for each service under the selected input scenario into a number of specific cost drivers, each of which drives the deployment of certain network assets. A common measure of traffic output is required so that demand from multiple services can be aggregated appropriately; traffic on each service is therefore converted into busy-hour Mbit/s¹⁴³. A matrix of routing factors is then applied in order to map the services into a full set of network cost drivers.

¹⁴³ On the radio network, this is calculated in voice-equivalent terms. This is a more predictable measure than data-equivalent terms, since the efficiency with which data can be carried depends on the bandwidth provisioned.

Figure A5.9 Cost driver typical calculation flow



A5.94 A key issue in terms of the conversion of services into cost drivers is the relative efficiency with which voice (circuit-switched) and data (packet-switched) is carried on the radio network, since this impacts the relative proportions of costs which are driven by and therefore attributable to voice and data services. The model uses a “data downlift factor” to account for the relative efficiency of packet-switched traffic on the network.

A5.95 Ofcom determined that a data downlift factor of two was appropriate on theoretical grounds however this was increased to three in light of further evidence (reflected in the cost model since Release 2 in March 2006). Ofcom has also included a voice-only traffic scenario, which provides an upper-bound estimate of the potential impact of this factor.

Responses to the September 2006 consultation

A5.96 Vodafone made several arguments in relation to cost drivers, notably that:

- 3G radio and traffic drivers should be restructured to account for both uplink and downlink traffic, because “the correct approach is to look at the resources that are required for both the [downlink] and the [uplink] collectively” (Vodafone believes that, by focussing on the downlink, the approach in Release 3 of the cost model overstates the resource consumption of data, which is likely to use the downlink more intensively than the uplink);
- switch site costs should be allocated using a cost driver that is based on MSCs, rather than the “all traffic” driver, since switch sites are used to house MSCs;
- the 2G NMS driver is inappropriate since it reflects traffic loading in the radio network, whereas Vodafone considers that it should reflect traffic loading for the whole network including the core (Vodafone suggests a new cost driver for NMS that weights the radio traffic by 70% and core traffic by 30%); and
- cost recovery for some potentially shared assets (e.g. cell sites) should consider the true extent of sharing. For example, some cell sites were built for 2G and are never used by 3G, some were built for 3G and are never used by 2G, and some are shared. Vodafone argued that the current treatment of cell sites leads to 3G costs being erroneously recovered from 2G services, and a cross-subsidy between products and between years.

Ofcom's response to specific points raised by stakeholders

- A5.97 Ofcom believes that its approach of basing the 3G radio and traffic drivers on downlink traffic only is reasonable and consistent with the "busy hour traffic" dimensioning principle used throughout the model. Ofcom agrees with Vodafone that voice traffic uses an equal measure of uplink and downlink spectrum capacity, whereas data traffic is more likely to be asymmetric, making greater use of the downlink. This means that the driver of the network capacity constraint is the spectrum required for downlink in the network busy hour, therefore the cost model allocates costs on the basis of the downlink demand. Vodafone's suggested approach would not be consistent with the model's overall dimensioning principles.
- A5.98 Ofcom accepts that the "all traffic driver" is an imperfect allocation mechanism for determining the number of switch sites in the model, however it does not accept that Vodafone's suggestion of an "all MSC" driver would necessarily be an improvement. Switch site costs are related to the total number of switches of all types, relative floor space, power consumption and other factors. The number of MSCs can be used to predict the number of switch sites, however this approach will not be an accurate reflection of the overall costs, because the switch sites also depend on the number of TSCs and GSNs. An "all MSC" driver would have the effect of allocating no switch site costs to data services (which use GSNs rather than MSCs), even though data services rely on GSNs that are located at switch sites. In any case, Ofcom notes that the potential impact on voice termination charges of Vodafone's suggested change would be very small: less than 0.1ppm for a 2G/3G operator.
- A5.99 Ofcom agrees with Vodafone that the NMS cost driver should reflect the traffic loading for the whole network, but it is not confident that Vodafone's proposed alternative cost driver would be superior in this respect. For example, Ofcom has not seen evidence to suggest that the weightings used by Vodafone in its alternative cost driver would be appropriate for other operators. Given that the impact of Vodafone's change would be negligible, Ofcom does not think that there are sufficient benefits of implementing the additional complexity of a new cost driver, rather than using the 2G total traffic driver, for allocation of NMS costs.
- A5.100 Ofcom acknowledges that cost recovery for some potentially shared assets could be improved with further sophistication. However, Ofcom agrees with Vodafone that the further complexity involved is not appropriate for a change that is unlikely to have a significant impact in the relevant year for setting termination charges (2010/11).

Network dimensioning

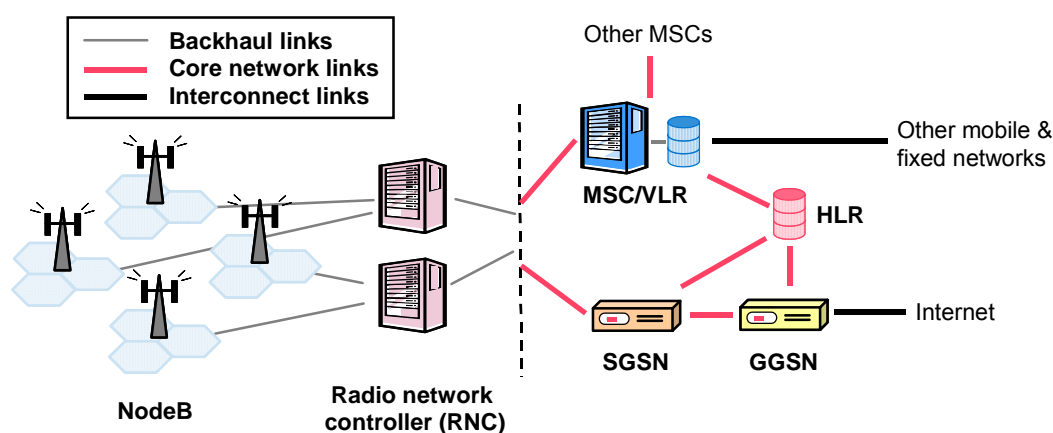
- A5.101 As set out in Annex 5 of the September 2006 Consultation, a number of technical parameters are required in order to establish quantifiable relationships between cost drivers and network deployment. The key parameters which affect the dimensioning of 2G and 3G networks in the model are as follows:
- Cell radii for the radio network (defined separately by geotype for GSM 900MHz, GSM 1800MHz and 2.1GHz UMTS spectrum)
 - Equipment capacities (from the radio network through the backhaul and backbone networks up to the core network)

- Utilisation factors (including design utilisation, scorched node allowance and the look-ahead period)¹⁴⁴
- A5.102 In order to derive a realistic assessment of cost structures for a mobile operator, Ofcom has developed a bottom-up approach that calculates the quantities of each type of network asset required. These assets are dimensioned in the model according to the cost drivers discussed previously, either directly or indirectly (in the case of assets which are dimensioned on the basis of other asset quantities).
- A5.103 The approach that has been taken for dimensioning 2G networks is broadly consistent with that taken in the last market review, with most of the calculations being based on those of the June 2005 model. Under this approach the radio network is dimensioned for whichever is the greater of coverage and capacity requirements within each geotype.
- A5.104 The model takes account of the opportunity that the four 2G MNOs have for sharing costs between their existing 2G networks and their new 3G networks¹⁴⁵. In particular, many sites used for 2G transmitters are likely to be used for 3G transmitters as well.
- A5.105 A series of network design algorithms is applied to create asset requirement projections for the 2G network, starting at the level of the radio network. These algorithms are based on those implemented in the June 2005 model, although some minor adjustments and improvements have been applied.
- A5.106 The network design algorithms used for 3G networks are similar to those used for the 2G network, but have been adjusted to take into account the different assets with different technical characteristics used in a 3G network as compared to a 2G network. The diagram below provides a simplified representation of some of the 3G network elements included in the new mobile cost model:

¹⁴⁴ See paragraph A5.152

¹⁴⁵ Ofcom is aware that Vodafone and Orange have publicly discussed plans to share parts of their radio network, but it does not believe that these plans justify a change to its cost modelling approach. Ofcom has adopted an average efficient operator approach to establish efficient charge benchmarks. Whilst Ofcom has taken into account 2G/3G site-sharing between networks belonging to the same MNO, Ofcom does not believe that it would be appropriate to set a lower efficient benchmark based on potential sharing between operators which is still highly uncertain. To the extent that MNOs are able to achieve greater efficiencies than the average efficient operator benchmark, it is reasonable that they should gain the associated benefits.

Figure A5.10 Simplified UMTS network diagram

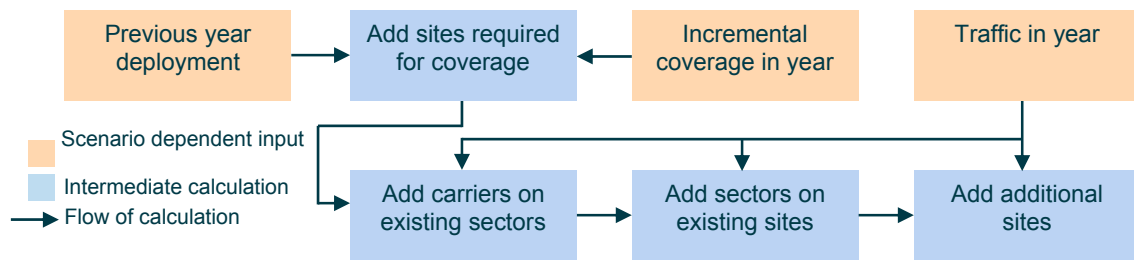


- Node-Bs, Radio network controllers and backhaul links form the radio access network
- The circuit-switched core network is similar to that for a 2G network, including an HLR and core network links. The MSC equivalents are MSC servers and Media Gateways (MGWs)
- The packet-switched core network includes SGSNs (Serving GPRS Support Nodes) and GGSNs (Gateway GPRS Support Nodes) which connect to the Internet

A5.107 There is a single Node-B per base station site. A Node-B can be deployed with a variety of sector configurations (omni-sector, bi-sector, tri-sector, etc.), similar to a 2G base station. While in a 2G base station the amount of spectrum in use is determined by the number of TRXs per sector, in a 3G Node-B, spectrum usage is determined by the number of carriers deployed in a given sector. Each additional carrier uses an additional 2×5MHz of spectrum and adds to the traffic capacity of the cell.

A5.108 An incremental approach has been implemented in calculating the number of required carriers, sectors and sites, as illustrated in Figure A5.11 below. Several of the key parameters which govern the network deployment (e.g. maximum cell radius, number of available carriers) have been configured so that they may change over time and the network design must adapt to account for these changes without exhibiting unusual behaviour. However, in the special case when these parameters are fixed over time, this incremental approach does not differ in output from the approach of the 2G network design algorithm in the current model, which assesses the network deployment required each year without reference to historic deployment.

Figure A5.11 Calculation of the number of required carriers, sectors and sites



A5.109 These radio network dimensioning algorithms first calculate the number of sites needed to give the required increase in geographic coverage which occurs in each year, based on the maximum cell radii within each geotype. The additional number of carriers, sectors and sites required to support the assumed level of demand in that year is then calculated, given that spectrum allocation constrains the number of carriers per sector and physical capacity constrains the number of sectors per site. The resulting in-year total deployment is finally adjusted to take into account the expected utilisation of these assets, giving the total deployment of assets for the radio network.

A5.110 The remaining 3G network assets included in the new cost model are described in Figure A5.12 below (as set out in the September 2006 Consultation). The cost drivers which drive deployment of each of these assets are also shown in detail; these are combined with assumptions about effective utilisation, including look-ahead allowances similar to those included in the June 2005 model, and the capacity of individual assets in order to define cost-causal network dimensioning relationships.

Figure A5.12 Dimensioning of 3G network assets

| Asset | Function | Cost driver(s) | Other comments |
|---------------------|---|---|--|
| Backhaul links | Transfers traffic from the Node-Bs to the RNCs | 3G radio traffic within each geotype | These links are dimensioned on the basis of a tree and branch structure and are shared with 2G backhaul |
| RNCs | Sit between the Node-Bs and the core network and control functions including encryption and radio resource management | Total circuit-switched and packet-switched traffic in the radio network | Deployment is the sum of RNCs required for circuit-switched traffic and for packet-switched traffic, and also subject to a maximum number of Node-Bs per RNC |
| Node-B facing ports | Deployed on RNCs for connection to backhaul links | Required number of 2Mbit/s backhaul links | |
| Core facing ports | Deployed on RNCs for connection to the core network | Total radio network traffic | |
| Remote RNC backhaul | Connects remotely located RNCs to the core network | Traffic per RNC and an assumed proportion of RNCs which are remote | |
| MSC server | Subscriber-related services including location | 3G subscriber numbers for location updates; incoming, | Location update costs are driven by |

| | | | |
|---------------------------|---|---|--|
| | updates; call-related processing functions | outgoing and on-net call attempts for call processing | subscribers but recovered across incoming services |
| MGW | Interface between the radio network and the core network for circuit switched traffic. Contains the switching matrix | Ports required to accommodate traffic from RNCs, inter-switch links and interconnection links | |
| SGSN | Serving GPRS Support Node – Central element in the packet-switched network which contains subscriber and location information | Busy-hour data sessions and busy-hour data traffic | Minimum deployment of two SGSNs for resilience |
| GGSN | Gateway GPRS Support Node – routes incoming and outgoing calls between SGSNs and the IP network | Busy-hour data sessions and busy-hour data traffic | Minimum deployment of two GGSNs for resilience |
| SMSC | Switches the messaging traffic | Busy-hour SMS and MMS messages | Minimum deployment of two SMSCs for resilience |
| Core transmission network | Carries traffic between core network nodes | Traffic between RNCs and MGWs, RNCs and SGSNs, intra MGWs and between SGSNs and GGSNs | Based on an assumed proportion of traffic which traverses the core network |
| NMS | Network management functions | Single asset deployment in first year of 3G operation | |

A5.111 Mobile operators purchased their 3G licences in the 2000/01 financial year, and for ease of reference to the auction payments in this year, this document expresses spectrum costs in 2000/01 terms¹⁴⁶. However, the new cost model does not deploy a 3G spectrum asset until the first year of demand on the 3G network. This approach has been taken so as to avoid under-recovery of costs on an HCA or CCA basis (which would assume depreciation charges in years where there is no 3G output from which to recover these charges). Nonetheless, the cost model ensures that the value of the 3G spectrum asset in the model is consistent with the present value in 2000/01.

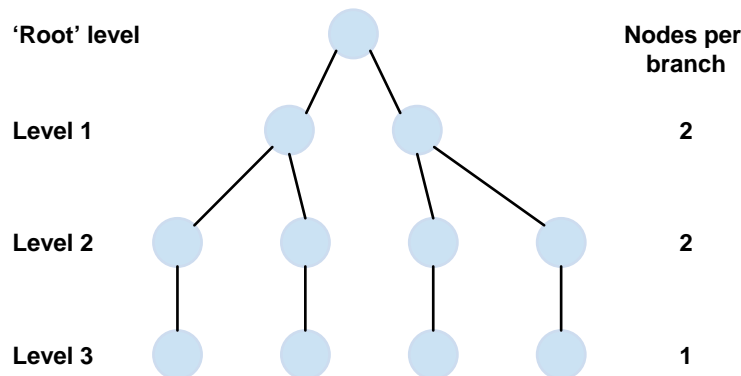
A5.112 As mentioned previously, the model takes account of the opportunity that the four 2G MNOs have for sharing costs between their existing 2G networks and their own 3G networks. Ofcom's modelling approach to this cost sharing is described below.

A5.113 The 2G and 3G network dimensioning algorithms separately calculate the site requirements for each network. These requirements are then passed to a site sharing algorithm which establishes how many of these sites can be shared rather than purchased as standalone sites; the proportion of incremental 3G sites which will be shared with 2G sites is assumed as an input to this calculation and is allowed to vary over time. This leads to a restatement of the number of sites required, all of which are now classified as either standalone 2G, standalone 3G or shared.

¹⁴⁶ As outlined in Annex 14, some scenarios for spectrum cost inputs are based on the MNOs auction payments in 2000/01, though Ofcom's views on the value of spectrum are not based on these payments – see Annex 14 for more detail.

A5.114 In order to model the effects of backhaul sharing, calculations are made for the total backhaul capacity that would be required in a geotype for both the 2G and 3G network cell sites. Backhaul is then deployed to accommodate the implied average traffic per site. The configuration of the modelled backhaul network is tree-and-branch, as illustrated in Figure A5.13 below. The defined tree-and-branch structure is deployed multiple times such that all sites are served by backhaul. The impact of this approach is that transmission links from sites, other than from those at the lowest levels in the tree, will carry traffic from several sites and therefore use higher bandwidth backhaul links, resulting in economies of scale for backhaul.

Figure A5.13 Example backhaul tree-and-branch structure



A5.115 HLRs are driven by the number of active subscribers. The new cost model assumes that HLRs are shared between the 2G and 3G networks, therefore HLRs are dimensioned based on total 2G and 3G subscribers.

A5.116 Switch sites in the model are also shared between the 2G and 3G networks. Deployment of switch sites is driven by whichever is the greatest number of assets in the following three asset classes – MSCs in the 2G network, and MSC Servers and MGWs in the 3G network. The model assumes four switches per site to calculate the number of sites required, along with an assumed maximum of thirty and minimum of three switch sites in total.

A5.117 The total number of core network transmission links required is the sum of the requirements from the 2G and 3G networks.

Responses to the September 2006 Consultation – site counts

A5.118 MNOs' concerns about site counts were generally not related to overall levels. Rather, responses focussed on differences between:

- 2G/3G operators and the 3G-only operator; and
- 900/1800MHz combined operators and 1800MHz-only operators.

A5.119 Vodafone suggested that the model did not accurately estimate the proportion of sites in the model that were shared between 2G and 3G networks, and proposed an alternative approach. This alternative approach would lead to a slightly higher overall site count that, according to Vodafone, "more closely reflect[s] operator reality".

- A5.120 H3G argued that 3G cell radii for the 3G-only operator were overstated by 8% [X] Therefore, H3G argued that the model should use smaller cell radii for the 3G-only operator in comparison with other MNOs.
- A5.121 [X]
- A5.122 [X]
- A5.123 Conversely, Vodafone argued that the 3G-only operator should be able to construct its network more efficiently than the 2G/3G operators, due to reduced constraints on site location (i.e. the constraint created by the incentive to share existing 2G sites). Vodafone also stated that 2G/3G operators cannot use 4-sector cells, because “existing sites and planning schemas cannot accommodate more than 3 sectors per site”. Such a restriction would mean that 2G/3G operators must acquire relatively more cell sites than the otherwise optimal level, thus operating at a relative disadvantage to the 3G-only operator (whose sites would be closer to the optimal level if it can use 4-sector cells), since Ofcom’s model does not constrain the 2G/3G operators to 3-sector cells per site.
- A5.124 Orange argued that 1800MHz operators will never get down to the same number of sites as 900/1800MHz combined operators. It claimed that the 1800MHz:900MHz ratio for rural cell radii was too low in Release 3 of the model (September 2006), stating that this ratio should be 1.25:1 to reflect the different propagation characteristics of 900MHz and 1800MHz GSM spectrum in such areas (the deployment of cell sites in rural areas tends to be driven by coverage).
- A5.125 Vodafone questioned the change (from Release 2 to Release 3 of the model) in cell radii within the model for 2G 900/1800MHz combined operators in the period 1999-2001 (from 1.9 km to 1.2km for urban sites and from 3.3km to 2.3km for suburban sites). It argued that the lower cell radii should be used in earlier modelled years “to ensure proper coverage from first network build”.
- A5.126 Vodafone and O2 proposed that the TRX per sector limit for 1800MHz operators should be raised from 4.5 to 6 “to reflect the removal of a previously perceived technical limitation”. This change would reduce the site count estimates for 1800MHz operators in the cost model, because the model would assume that operators using 1800MHz spectrum would have greater capacity available in geotypes where their networks are currently capacity constrained, which might allow the model to avoid or delay the deployment of additional sites.
- A5.127 Finally, Vodafone commented that the model has a high proportion of traffic in urban and suburban areas for 1800MHz operators that is covered by microcells, and suggested reducing this proportion of traffic from 11% to 5% for the urban geotype and from 10% to 4% for suburban geotype. If implemented, this change would reduce the number of microcells deployed by 1800MHz operators in the cost model, with a consequent increase in the number of macrocells deployed to capture total traffic. The net effect would be a slight reduction in efficient unit costs for the 1800MHz operators (Vodafone estimated this reduction to be between 0.04 and 0.28ppm).

Ofcom’s response to specific points raised by stakeholders - site counts

- A5.128 Ofcom notes Vodafone’s comments in relation to the proportion of sites that are shared between 2G and 3G networks, but does not agree that an adjustment to site counts is appropriate based on calibration data. The cost model slightly overstates

the number of sites deployed by MNOs (see Annex 12 for further details), and the amendment proposed by Vodafone would make this site calibration less accurate. Therefore, in the absence of any further evidence, Ofcom does not agree that Vodafone's proposed amendment would improve the model fidelity. In making this decision, Ofcom notes that the impact of Vodafone's suggested change would be small in any case. Vodafone calculates a potential reduction of around 0.07ppm for 2G/3G MNOs in both lower and upper cases in 2010/11.

A5.129 [Redacted]

A5.130 [Redacted]

A5.131 Ofcom has tested the impact of reducing cell radii steadily by a total of 8% between 2005/06 and 2010/11, and found the impact of such an adjustment to be negligible. The difference in the efficient termination charge in 2010/11 for the 3G-only operator was found to be less than 0.01ppm. This result occurs because 3G-network investment in urban and suburban areas in these years is driven primarily by the need to provide additional capacity rather than coverage. Therefore, changing the cell radii in such circumstance does not affect the cost model's estimate of the required number of sites.

A5.132 [Redacted]

A5.133 [Redacted]

A5.134 Ofcom is not convinced by Vodafone's suggestion that H3G has an advantage in site location as a new entrant. Whilst H3G might have some advantage in areas where site locations are not scarce, it might also be disadvantaged in areas where a reduced number of potential sites are available.

A5.135 On balance, taking account of MNOs' arguments about the relative advantages and disadvantages of new entrants (such as H3G), Ofcom does not believe that it is appropriate to make further amendments, especially given the site count calibration exercise. Site count calibration indicates that Release 4 of the cost model corresponds well to MNO actual site count data (See Annex 12).

A5.136 The change in cell radii for 2G 900/1800MHz combined operators for the period 1999 to 2001 represents an increase in the quality of network coverage in the earlier years of network deployment and is not intended to reflect the level of coverage from the first network build. Vodafone has not presented new evidence to support its argument that lower radii should be used for all time. Therefore, Ofcom does not believe that adjusting the 900MHz cell radii for all time, as suggested by Vodafone, would be appropriate.

A5.137 Site calibration testing by Ofcom does not support O2 and Vodafone's desire to modify the TRX per sector assumption for 1800MHz operators in the cost model. As mentioned above, the level of this assumption affects the modelled cell site count. Given that the cell site count has been calibrated to actual operator data (see Annex 12 for further details), Ofcom believes that its TRX per sector assumption is reasonable for the purpose of establishing an efficient charge level for mobile voice termination. Any change to this assumption would need to be offset by changes to other parameters in order to recalibrate the site count, such that the net affect on the unit costs of voice termination would be de-minimus.

- A5.138 Similarly, site count information suggests that Ofcom's current 1800MHz:900MHz ratio for rural cell radii is reasonable in terms of aggregate cell sites generated. The estimate in the cost model of 1:1.2 is very close to Orange's estimate of 1:1.25 and, as above, any change in this assumption would need to be offset by changes to other parameters in order to recalibrate the site count, such that the net impact would be negligible. [X]
- A5.139 MNO microcell site count data available to Ofcom does not support Vodafone's claim in relation to the proportion of 1800MHz operator traffic that is covered by microcells. The cost model calibrates well to MNO average data and therefore presents no concrete reason for making further adjustments (See Annex 12 for calibration results).

Responses to the September 2006 Consultation - other network dimensioning issues

- A5.140 H3G claimed that the model understates the required number of RNC [X].
- A5.141 Vodafone stated that the calibration of 2G equipment quantities was not accurate in 2001, particularly for TRXs. It argued that "this seems to suggest that the 2G part of the model is not installing capacity early enough and hence is understating lifetime costs".
- A5.142 Vodafone contended that operating cost savings associated with 3G site-upgrades in the model are defective. It cited examples where the effect of a site-upgrade in the cost model is to generate such large savings that the overall operating costs for the site become negative.
- A5.143 Vodafone and Orange expressed concern over the data downlift factor, which represents the relative efficiency of data traffic in comparison to voice traffic. Both parties argued that this factor should be four - Vodafone believes that the factor should reflect more effective use of spectrum by HSDPA/HSUPA, while Orange argued that a factor of four is relevant to practical operation of networks (and a higher factor would be appropriate if faster data rates were used).
- A5.144 Vodafone also reiterated an argument from a previous submission¹⁴⁷ to Ofcom: that 2G utilisation factors should not be constant, but should increase over time.
- A5.145 H3G questioned Ofcom's treatment of MMSC costs, given that MMSCs are omitted from the model at present.

Ofcom's response to specific points raised by stakeholders - Other network dimensioning issues

- A5.146 In considering H3G's concerns in relation to RNCs, Ofcom notes that an important requirement of the cost model is that full cost recovery should be achieved for an average efficient operator. Confirmation of meeting this requirement is provided by the total cost calibration results (see Annex 12). Unit costs for RNCs in the model currently reflect an average across all operators, partly because this type of asset is not homogenous. For a non-homogenous product, Ofcom would expect a trade-off between RNC capacity and price: larger capacity RNCs would be expected to have a higher price. Given that overall cost levels currently calibrate closely with financial data from the MNOs, Ofcom does not believe that the use of lower RNC capacity assumptions would be justified without an equivalent trade-off in the investment

¹⁴⁷ Vodafone originally made these comments in a submission to Ofcom dated May 2006.

costs of these assets, such that the total estimated efficient costs would remain roughly similar and in line with the average aggregate cost levels from the MNOs' accounts.

A5.147 [X].

A5.148 [X]

- A5.149 Ofcom does not believe that it would be appropriate to adjust the cost model in response to Vodafone's concern regarding calibration of the quantity of TRXs in 2001. Ofcom seeks to calibrate the cost model according to the asset counts of an average efficient operator, rather than individual operators. Confidential MNO data shows large discrepancies amongst individual operators' quantities of many assets. TRX counts show particularly large variations between operators. For this reason, Ofcom believes that the asset counts of any individual operator do not necessarily represent an accurate calibration benchmark for a hypothetical average efficient operator. Further, the TRX data received from operators is more limited for 2001 than for 2004, hence Ofcom has placed greater weight on calibration of asset counts in more recent years.
- A5.150 Vodafone's suggestion that 3G site-upgrade costs are defective appears to have arisen from its interpretation of some simplified labelling in the cost model. While the model refers to the operating cost savings in question as 'site upgrade' costs, they more accurately represent the savings in operating costs associated with maintaining macrocell equipment at a single site rather than at two separate sites. The site operating cost item in the model remains constant in the event of a 3G site-upgrade, because this item relates only to the site itself. The model also includes the full stand-alone operating costs for the 3G macrocell equipment that is added to a site as part of an upgrade. However, if 2G/3G combined operators choose to co-locate 3G macrocell equipment with the 2G macrocell equipment at an existing site, then Ofcom expects that this would lead to short term operating cost savings on this equipment. The 3G site-upgrade costs item in the cost model represents these equipment savings.
- A5.151 Ofcom considered the estimation of the data downlift factor in detail prior to Release 2 of the model in March 2006, and has not received new evidence to prompt a review of this factor in the cost model. The current factor of three already takes account of the evidence presented by MNOs. As noted earlier in this Annex, Ofcom previously determined that a data downlift factor of two was appropriate on theoretical grounds, but adjusted this parameter in response to MNO information. In addition, the purpose of the Voice-only traffic scenario is to provide an upper-bound on unit costs of voice termination in light of uncertainties such as these.
- A5.152 Ofcom agrees with Vodafone that the effective utilisation of assets should not be constant over time. The cost model uses several parameters together with traffic demand to determine network asset deployment. These parameters ensure that the model takes account of practical constraints in building network capacity such that the deployed capacity is greater than the theoretical minimum capacity needed to service the modelled demand. Effective utilisation of total network assets is a product of these deployment parameters, which include:
- a scorched node allowance for each asset type, which respects the geographic constraint on location of assets (e.g. site location may be sub-optimal due to planning restrictions);

- a maximum design utilisation parameter for each asset type, which is the maximum typical loading allowed before deploying an additional unit (e.g. 80% in the case of 2G TRXs);
- modularity effects, which recognise that assets (and their associated capacity) can only be added to the network in discrete increments; and
- look-ahead factors, which recognise that assets must be acquired and deployed in advance of their actual utilisation.

A5.153 Whilst specific parameters, such as the maximum design utilisation parameter, have constant values over time, the combined effect of these parameters generates increasing effective asset utilisation over time across the network as a whole. Ofcom is satisfied that the cost model reflects reasonable effective asset utilisation results when considered in aggregate. In any case, Vodafone notes that its suggested amendment would only make a difference of about 0.02ppm to efficient unit cost estimates in 2010/11.

A5.154 Ofcom does not explicitly model MMSCs because the cost model is designed to estimate the efficient costs of voice termination, to which MMS costs make no direct contribution¹⁴⁸. As noted in paragraph A5.65, data services are therefore modelled to a reduced level of detail. On a broad level, Ofcom's aggregate cost calibration ensures that MMSC costs are effectively taken account of within the overall modelled costs. With regard to the allocation of these costs, given that MMSC costs comprise only a very small proportion of overall network costs, the impact on voice termination costs would be negligible¹⁴⁹.

Ofcom's conclusions with respect to the network module

A5.155 Having taken into account the responses of stakeholders, Ofcom has not changed the structure or key parameters of the network module from Release 3 of the cost model which supported the proposals in the September 2006 Consultation. Furthermore, Ofcom believes that the cost drivers in Release 3 of the model remain appropriate for the purposes of establishing the efficient costs of mobile voice termination, and does not believe that the alternatives proposed by the MNOs are necessary in this context.

A5.156 As an output of the network module, the asset deployment has reduced slightly in most cases. However, this is a consequence of the changes described earlier in relation to demand scenarios.

A5.157 A by-product of the changes to voice traffic forecasts is that site calibration has improved (see Annex 12). Ofcom believes that this improved calibration will help to address some of the concerns raised by MNOs in response to the September 2006 Consultation, particularly in relation to site counts.

¹⁴⁸ An MMSC (Multimedia Messaging Service Centre) is only used to manage MMS services (storing and forwarding MMS messages).

¹⁴⁹ If Ofcom were to include MMSCs explicitly within the model, the costs would be driven by MMS volumes, and therefore be allocated to MMS rather than to incoming voice termination.

Cost module

Overview

- A5.158 In order to determine the appropriate level of the charge controls on voice call termination, the model estimates the costs that would be incurred by efficient mobile network operators operating different combinations of 2G and 3G network technologies.
- A5.159 The cost module forecasts the total cash flows (including investment and operational expenses) that would be incurred in each year to purchase, renew and maintain the required level of deployment of each type of network asset, as calculated by the network module.
- A5.160 Consistent with the approach adopted in the previous market review, these forecasts have been based on a Modern Equivalent Asset (MEA) approach, which takes into account changes in the investment and maintenance costs associated with each asset type, as well as technological developments which improve asset productivity. For example, an asset which is expected to halve in price and double its effective capacity over a given period of time would have an MEA investment price at the end of that period equal to a quarter of the original price.

Investment costs

- A5.161 The investment costs calculated in each year take into account increases in the required quantity of each network asset and the replacement of assets which have reached the end of their economic life, as well as MEA investment costs per unit for each asset type.
- A5.162 The number of assets purchased is calculated as the number of incremental assets required in that year, plus the number of assets whose economic lifetime has expired and therefore need replacement. Incremental asset deployment in the cost module is smoothed so as to avoid artificial behaviour and over-purchasing in relation to equipment which declines in quantity but then recovers in later years in response to changes in demand¹⁵⁰. Typically the required level of deployment of an asset climbs to a peak before declining over its lifetime. A smoothing algorithm ensures that up until the lifetime peak requirement is reached, the required deployment of that asset can only increase or remain constant in any year, while after the peak requirement has been reached, the required deployment must always decrease or remain constant. This smoothing is intended to reflect the fact that in reality, it would be inefficient for an operator to remove network assets in response to a transitory fall in demand for that asset.
- A5.163 The new cost model does not assume any payment for assets in advance of deployment, consistent with information supplied by the MNOs.
- A5.164 MEA unit investment costs are calculated on the basis of input absolute values for 2004/05 which are extrapolated forward and backward according to historical MEA trends for 2G networks and forecast MEA trends for 2G and 3G networks. Further information is contained in Annex 5 of the September 2006 Consultation.
- A5.165 For information on the treatment of investment costs for 3G spectrum, which are evaluated in the model, see Annex 14.

¹⁵⁰ See December 2003 Consultation, Annex C, paragraphs C.17-C.22

Operating costs

- A5.166 Operating costs are modelled for each type of network asset included in the model, taking into account the costs that would be incurred in maintaining the deployed 2G and 3G network assets. These are calculated based on the deployment of each network asset multiplied by an MEA operating cost per unit specific to that asset.
- A5.167 In years where asset deployment is decreasing (due to decommissioning), the model assumes that there will be a lag between the point in time from which the asset is no longer required in the network and the point in time from which it will no longer incur operating expenses. This is the same approach as adopted in the June 2005 model.
- A5.168 In the June 2005 model, age-on-age unit operating cost trends were applied in combination with MEA trends and were intended to model the effects of increasing maintenance costs on older assets. However, operators subsequently argued that equipment lifetimes are usually curtailed by the withdrawal of after-sales support by suppliers and that such age-on-age effects are less important in determining operating costs or asset lifetimes. Ofcom has therefore removed these age-on-age trends from the new cost model, but has applied shorter asset lifetimes. Removal of the age-on-age effects has resulted in substantial simplifications to this part of the model.
- A5.169 The approach that has been taken on MEA operating cost trends over time is similar to that described above for capital costs. However, for asset types where less information is available on levels of operating costs, greater reliance has been placed on the calibration process.
- A5.170 Additionally, factors have been applied to the 3G operating costs of a 2G/3G operator in the early life of the 3G network which reduce the level of costs incurred. The rationale for these factors is explained in Annex 12.

Responses to the September 2006 Consultation

- A5.171 Most of the comments regarding the cost module came from MNOs, who concentrated on investment and operating cost trends in the model.
- Vodafone suggested that MEA investment cost trends for HLRs and transit switches should not cease in 2009/10, as they did in Release 3 of the model, but instead extend to 2020/21. This amendment would be “in line with other shared assets”.
 - Similarly, Vodafone argued that the investment cost trends for 2G equipment should continue to 2020/21, although at a reduced rate to reflect reduced global demand for 2G equipment (it suggested using 50% of the annual rate applied in 2008/09).
 - Orange suggested two possible alternative investment cost trends for 2G equipment to those included in Release 3 of the model:
 - “Profile 1: The decline profile should be pushed out by several years, reflecting a more plausible timescale for 2G switch off ...; or
 - Profile 2: The steady profile should be retained, as there is an assumption within the model that 2G will not be switched off entirely”.

- In relation to macrocell sites, Vodafone suggested that the investment cost trend should stop rising in 2020/21 and beyond, as “demand for new builds falls away”. It suggested that operating cost trends for sites should be halved beyond 2010/11 and stopped at 2020/21 “as the network build approaches saturation”. (Vodafone comments on operating cost trends relate to all property assets; macrocell sites, microcell sites, picocell sites, main and remote switching sites).
- Orange argued that the investment cost trend for remote switch sites should be same as main switch sites “in order to be consistent with other categories”.
- Orange also suggested that backhaul investment costs should be kept at a steady -5% per annum trend through to 2020/21, rather than an easing negative trend in 2019/20 and 2020/21, because “there is no justification for the change in steady profile”.

A5.172 Furthermore, Orange noted that the unit cost for interconnect interface, switching support plants and 2Mbit/s microwave links appeared to have been omitted from the model.

A5.173 H3G noted that the cost module did not convert the 3G spectrum cost input into 2006/07 terms (from 2000/01 terms), and that this should be corrected.

A5.174 H3G also argued that 3G spectrum costs should not be recovered in perpetuity, but rather should be fully recovered by 2020/21, when the current UK 3G licences are due to expire. It stated that “[w]hatever the assumed scenario for spectrum allocation and cost beyond 2021/22, it cannot be correct for the current licence fee to be recovered beyond the expiry of the licence”.

Ofcom’s response to specific points raised by stakeholders

A5.175 Ofcom has made a number of detailed amendments to the cost module in response to comments from the MNOs.

A5.176 Ofcom notes that HLRs and transit switches are not only used by 2G networks but also by 3G networks, which leads Ofcom to agree with Vodafone’s view that the downward investment cost trends for these assets should continue beyond 2010/11. However, the rate of reduction in investment costs will probably be lower than for many other 3G assets, given that these assets are already mature products. Ofcom has updated the cost module such that the rate of decline in investment cost trends for HLR and transit switches is steady at 2% per annum from 2011/12 until 2019/20 (compared with a decline of 4% per annum at present), and then falls to zero beyond 2020/21. The impact of this change on efficient charge benchmarks in 2010/11 is negligible. Under a medium demand scenario, the efficient unit cost estimate for both a 2G/3G operator and the 3G-only operator would increase by about 0.01ppm in 2010/11 as a result of these new investment cost trends.

A5.177 Similarly, Ofcom agrees that 2G investment cost trends might be expected to continue beyond 2010/11, although not as strongly as suggested by Vodafone since 2G is already a mature technology. Release 4 of the model now shows investment costs declining for 2G assets post 2010/11, falling gradually to zero before 2020/21. This approach is broadly consistent with Profile 1 proposed by Orange for 2G investment costs. Orange did not provide a compelling case to justify

its Profile 2. Ofcom believes a trend that reflects Orange's Profile 1 is more appropriate, even in the absence of a 2G switch off, because constant negative cost trends applying indefinitely do not seem as plausible as trends where the reductions in costs become slower over time and eventually cease. In its June 2004 Statement on Wholesale Mobile Voice Call Termination¹⁵¹ Ofcom noted: "whilst it is typical for rapid reductions to occur in the unit cost of production in the early stages of a product's lifecycle due to significant increase in volume production and economies of scale, it seems optimistic to assume that prices will decline indefinitely and, in the limit, tend to zero". Under a medium demand scenario, the efficient unit cost estimate for a 2G/3G operator would increase by about 0.08ppm in 2010/11 as a result of these changes to investment cost trends. The corresponding impact for the 3G-only operator is negligible given its very limited use of associated assets¹⁵².

- A5.178 As a result of responses on these issues to the September 2006 Consultation, Ofcom has been prompted to reconsider operating cost trends more generally. For 2G assets, Ofcom has applied an operating cost trend that is similar to the revised 2G unit investment cost trends. Some assets in Release 3 of the model had declining operating cost trends for only a few years before reverting to zero cost trends. These assets now have declining operating cost trends until 2010/11, although the rate of decline is slower in later years than in earlier years. Ofcom has also implemented declining operating cost trends for 3G assets until 2010/11 to improve overall operating cost calibration (see Annex 12 for calibration results). The impact of these changes to operating cost trends on efficient unit costs in 2010/11 is a decrease of around 0.4ppm for both a 2G/3G combined operator and the 3G-only operator
- A5.179 Following Vodafone's suggestion, Ofcom has amended the investment cost trend for macrocell sites. Investment costs rise by 1% per annum until 2020/21, and remain steady thereafter. The effect of this change on termination charges is negligible. Ofcom has amended unit investment cost trends in the model for microcell and picocell sites, as well as main switch sites and remote switch sites, to match the macrocell site trend.
- A5.180 Vodafone's suggested change to the operating cost trend for macrocell sites has also been broadly reflected by Ofcom in Release 4 of the model. Vodafone suggested an upward trend of 5% per annum to 2010/11, but reduced growth of 2.5% per annum beyond this point. Release 4 now includes a growth rate for macrocell site operating costs that declines by 0.25% per year, from 5% in 2001/02 down to 2.5% in 2011/12 and 0% by 2021/22. Ofcom has implemented a gradual decline to the reduced rates as a reflection of a more plausible evolution in cost trends. The effect of this change on termination charges is minimal.
- A5.181 Ofcom agrees with Orange's position that, for consistency, the investment cost trend for remote switch sites should be same as main switch sites since both are related to the cost of land and office space. Trends for both investment cost and operating cost trends have been amended accordingly. The impact of this change on efficient unit costs in 2010/11 is negligible.
- A5.182 In relation to backhaul, Ofcom does not agree with Orange's proposition of maintaining a trend of -5% per annum. Microwave backhaul is a relatively mature

¹⁵¹ See http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/wmvct/wmvct.pdf

¹⁵² There are some assets which are relevant to the 3G-only operator where there is no explicit 3G substitute asset.

product, and cost savings are more likely to decrease in the future. Using a cost trend that reaches zero by 2020/21 is also consistent with the treatment of other assets.

- A5.183 Ofcom agrees with Orange that unit costs for interconnect interface and switching support plants should be included explicitly in the model, especially given that unit costs are included for 2G interconnect interface and switching support plants. This issue arose because of the presentation of Release 3 of the model, in which the unit costs for 3G interconnect interface and switching support plants were included in the MSC server asset category. The unit costs for interconnect interface and switching support plants have now been removed from the MSC server and recorded separately. The applicable cost driver for the separately identified interconnect interface and switching support plants asset differs from the cost driver applicable to the MSC server. This has resulted in a very small increase in total modelled costs, however the impact on termination costs is negligible.
- A5.184 In response to Orange's concern, Ofcom has not added an incremental investment unit cost for 2Mbit/s microwave links, because the cost for 2Mbit/s microwave links is included in the backhaul base unit cost. The costs attributable to link capacity therefore only need to be noted when that capacity exceeds 2Mbit/s. For example, the total investment cost of an 8Mbit/s link is the cost of a backhaul base unit (which provides for 2Mbit/s of capacity) plus the incremental cost of an 8Mbit/s link, as noted in the model.
- A5.185 Ofcom agrees with H3G that the 3G spectrum cost input should be converted to 2006/07 terms. It has amended the cost module accordingly.
- A5.186 With regard to the recovery of 3G spectrum costs, Ofcom does not agree with H3G's view that full cost recovery should be achieved by 2020/21. Such an approach would be inconsistent with the approach to cost recovery of other assets in the cost model, which considers lifetime network costs (and corresponding lifetime output). Ofcom does not believe that 3G spectrum should be treated differently to other assets, and has therefore considered 3G spectrum costs on a lifetime basis in its modelling and in developing efficient unit cost benchmarks for setting the level of the charge control. Ofcom notes that 3G spectrum costs over the lifetime of the network are difficult to establish, especially given uncertainty beyond 2020/21, and has taken steps to address this uncertainty as part of its spectrum cost scenarios. In particular, Ofcom has considered a lower bound represented by a scenario in which there are no further payments. At the other end of the range, as an extreme upper bound in the absence of any reasonable estimates of the potential value of the spectrum in 2021, Ofcom has considered a scenario in which it is assumed that MNOs incur a payment equal in real terms to the payments made in 2000 (see Annex 14 for further details).

Ofcom's conclusions with respect to the cost module

- A5.187 Release 3 of the cost model in September 2006 proposed investment and operating expenditure inputs for the cost module, as well as historical and forecast MEA trends by asset type.
- A5.188 In light of comments received in response to the September 2006 Consultation, Ofcom has reconsidered operating cost trends and investment cost trends in the cost module for Release 4 of the cost model.

- A5.189 A similar approach is now taken for both investment and operating cost trends for 2G assets.
- A5.190 In general, investment cost trends have been smoothed and extended to 2020/21 taking into account operator responses. Remote switch sites now have the same investment cost trend as main switch sites. Following Vodafone's suggestion, Ofcom has amended the investment cost trend for macrocell sites - these costs now rise by 1% per annum until 2020/21, and remain steady thereafter.
- A5.191 Some assets in Release 3 of the model had declining operating cost trends for only a few years before reverting to flat cost trends. These assets now have declining cost trends until 2010/11, although the rate of decline is slower in later years than in earlier years.
- A5.192 The operating and investment cost trends for 3G assets have also been amended to better calibrate the total levels of operating expenditure for both the 2G/3G combined operators and the 3G-only operator.
- A5.193 The combined impact of these changes to investment and operating MEA trends is a reduction in efficient unit cost estimates for both 2G/3G combined operators and the 3G-only operator. Using a medium demand scenario, the efficient unit cost benchmark in 2010/11 for a 2G/3G combined operator has decreased by about 0.3ppm. For the 3G-only operator, this benchmark has decreased by about 0.4ppm.

Economic module

Overview

- A5.194 The economic module implements a form of economic depreciation, "Original ED", which is similar to that used in the June 2005 model, to calculate a cost per unit of output in each year for every asset in the model. These are then used to estimate the unit service cost for each service modelled using service routing factors.

Conceptual approach

- A5.195 In the context of the cost model, the aim of any depreciation methodology is to determine how the costs of network assets and operating expenses should be recovered over the lifetime of the network. Since the charge control period is significantly shorter than the period over which lifetime network costs would be recovered, the timing of cost recovery is an important factor in determining the appropriate level of the charge control.
- A5.196 There are two theoretical objectives in determining the appropriate path of cost recovery. Firstly, the profile of cost recovery should provide efficient signals for consumption and investment. This implies in general that the profile of cost recovery should be consistent with the path of prices that would occur in a competitive market. Secondly, regulation should avoid denying operators the opportunity to recover their efficiently incurred costs, including a reasonable return on investment.
- A5.197 Economic depreciation seeks to set an optimal path of cost recovery over time by mimicking the outcomes of a competitive market. The conceptual approach to cost

recovery taken in the previous market review¹⁵³ has been maintained in the new cost model and is summarised in the following paragraphs.

- A5.198 In order to determine a unique path of cost recovery under economic depreciation, it is necessary to define the competitor constraints which would characterise a hypothetical benchmark competitive market. In the previous market review, Ofcom adopted a competitor constraint which took account of both potential competition from new entrants as well as actual competition between incumbents. In the benchmark competitive market, it was assumed that new entrants would impose constraints on the incumbents, reflecting the investment and operating costs that they faced. So, for example, with declining MEA prices over time, later entrants would incur lower investment costs than earlier entrants/incumbents and so impose a tighter pricing constraint. However, it was assumed that new entrants would face similar time to build up asset utilisation as incumbents and therefore would not derive a lifetime utilisation advantage. In the hypothetical benchmark competitive market, competition amongst incumbents was assumed to be sufficiently strong to ensure no excessive pricing (i.e. prices that would recover but not over-recover costs). Ofcom has maintained this same conceptual approach to the characterisation of competitive constraints in the hypothetical benchmark competitive market for the purpose of economic depreciation in the new cost model.
- A5.199 To derive a unique profile of unit costs over time, Ofcom made the further assumption that unit cost was constant over time in real terms in the absence of any changes in MEA prices or operating costs. The consequence is that the unit costs generated under an economic depreciation approach do not depend on the level of utilisation at that point in time, but on the level of utilisation achieved over the lifetime of the network. Consequently, the total costs recovered in a year are directly proportional to output in that year.
- A5.200 However, hypothetical new entrants in later years would be expected to experience different levels of input costs, particularly MEA investment and operating costs. If future input costs were lower, future new entrants would derive an associated cost advantage over incumbents in this respect; given the assumption of a competitive market, these reduced costs would be expected to be passed through in the form of future price reductions. Changes in input cost levels therefore change the shape of the profile of cost recovery determined under an economic depreciation approach.

Implementation

- A5.201 As in the June 2005 model, the economic depreciation algorithm in the new cost model has been implemented in three additive steps to calculate a cost recovery profile:
- i) The theoretical level of constant unit cost recovery is calculated as if the final year utilisation and input cost levels applied over the entire lifetime of the network.
 - ii) A second constant unit component is added to the profile of cost recovery to recover the additional costs caused by earlier under-utilisation of the network versus the final year level.

¹⁵³ See <http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/depr0901.htm> for a detailed explanation of economic depreciation and its implementation in the previous market review.

- iii) A third and final component of unit cost is added to recover the remaining unrecovered costs due to input costs being different from the final year level in earlier years. The shape of this component is determined by the arithmetic difference between in-year and final-year input costs, and is therefore zero in the final year.

A5.202 A desirable feature of this implementation is that the final year unit cost is the competitive price, consistent with the benchmark competitive market and at a level that is exactly as expected under the given cost assumptions.

Changes since the June 2005 model

A5.203 Ofcom identified improvements in the implementation of this approach that were included in Release 3 of the new cost model in September 2006:

- Previously a simplified functional form (an annuity) was used to calculate the constant unit cost in step 1. Whilst this gave a very close approximation to the theoretical unit price, further investigation showed that this simplified approach could give rise to slightly inaccurate results under certain circumstances. Therefore, this calculation was expanded and made more explicit so as to give an exact calculation of the theoretical unit price.
- Actual discount rates were previously used for calculating present values of cost and output in steps 2 and 3. This approach was revised so that theoretical discount rates, based on the final year cost of capital, are used in all calculations up to step 3. The effect of this modification is that costs arising due to variations in the cost of capital versus the long-term level are now recovered solely in step 3, rather than across steps 2 and 3. This revised approach is in-line with the view that variations in the cost of capital should be treated in a similar way to input cost trends on the basis that both are accessible by new entrants in that year.
- In the June 2005 model, an amendment was applied to the way that economic depreciation treated the shaping of cost recovery for the 2G licence fee, in order to rectify an instability issue in step 3 associated with the arithmetic determination of a shaped profile for cost recovery¹⁵⁴. In Release 3 this amendment was applied consistently to the treatment of operating costs across all asset types.
- The treatment of 3G spectrum costs included in the model was also modified following comments from some mobile operators. For this asset, the dependence of the shape of the cost recovery profile on variations in the cost of capital were removed, since inclusion of this effect gave rise to unusual behaviour caused by small variations in the cost of capital in the early years of the licence, where the cost of capital on the 3G spectrum investment is high but output volumes are very low.

Additional ED approach

A5.204 An additional form of economic depreciation, "Simplified ED", was implemented in Release 3 of the cost model issued in September 2006. This approach was intended to retain many of the characteristics of the current methodology, whilst using a simplified functional form which may give a more natural relationship of the

¹⁵⁴ See June 2005 Extension Consultation, Annex E, footnote 17

unit cost profile to changes in input costs levels over time. In this approach, the shape of the path of unit cost recovery remains independent of the level of in-year utilisation and is therefore determined by changes in input costs alone, as in the Original ED methodology. However, the entire profile of cost recovery for an asset is given a shape which exactly mimics the profile of input cost trends, scaled so as to achieve full cost recovery for incumbents.

A5.205 The inclusion of this approach was intended to serve both as a cross-check on the profiles generated under the Original ED methodology, and as an alternative means of generating profiles of cost recovery to inform the appropriate levels of charge controls.

Responses to the September 2006 Consultation on the relative merits of Original and Simplified ED

A5.206 Vodafone and T-Mobile challenged Ofcom's use of the Original ED methodology, claiming that it has no major theoretical advantages over, and is more complex than, the Simplified ED approach. This position was based on several arguments, in particular that Original ED:

- does not fully recover costs up to 2039/40, particularly for 3G spectrum;
- does not perform well "when faced with falling or vanishing demand" (e.g. a 2G shutdown scenario); and
- is unstable:
 - for assets with varying operating costs, in which it might produce negative unit cost recovery in some years; and
 - in the face of changes to the cost of capital.

A5.207 T-Mobile argued that the Simplified ED "is more reasonable in theory than the alternative methodologies except for the final year results – it is consistent with general principles and is much simpler than the current methodology or perfect contestability!". It believes that concerns about the final year "may not be such an issue", given that it occurs well after the conclusion of the charge control period.

Ofcom's response to specific points raised by stakeholders on the relative merits of Original and Simplified ED

A5.208 In response to Vodafone and T-Mobile's concerns over the theoretical underpinnings of the Original ED approach, Ofcom maintains that, by construction, the resulting unit cost recovery in the final year is consistent with the benchmark competitive market and cost assumptions. Whilst Ofcom agrees with T-Mobile that, in practice, there is significant uncertainty in deriving final year unit costs, Ofcom notes that the Original ED algorithm's derivation of these levels is consistent with its theoretical basis and internally consistent with the assumptions about costs included in the model. In contrast, the final year unit cost resulting from the Simplified ED approach is more arbitrary, and merely a by-product of scaling the shape of the cost recovery profile to achieve full cost recovery. In the Simplified ED approach the final year unit cost is not "model consistent" in the sense that, given the cost assumptions, it is not the price in a competitive market in that final year. Ofcom acknowledges that Simplified ED may have a more intuitive relationship with

the changes in input cost levels over time, but disagrees that it has any stronger theoretical basis than Original ED.

- A5.209 Vodafone raised concerns that Original ED does not achieve full cost recovery, specifically regarding the 3G spectrum asset. Ofcom acknowledges that the treatment of the 3G spectrum asset in Release 3 of the cost model produced cost recovery results that were slightly inaccurate. This occurred because the present value of costs in the implementation of Original ED for the 3G spectrum asset did not include a terminal value (although the corresponding present value of output did). Ofcom has corrected this issue in Release 4 of the model, such that a terminal value for costs has been included for the 3G spectrum asset. The effect of this adjustment is a minor increase in efficient charge benchmarks¹⁵⁵.
- A5.210 Having made this adjustment in the specific case of the 3G spectrum asset, Vodafone's more general concerns regarding full cost recovery by 2039/40, relate to the inclusion of terminal values (of both costs and outputs) in the Original ED approach, but their exclusion from the Simplified ED approach. The implementation of Simplified ED was intended to capture the main characteristics of the economic depreciation approach, but using a much simpler functional form. As a result, this implementation omitted the consideration of terminal values. However, Ofcom notes, that this is not a question about the conceptual advantages of one ED approach over another – allowing for full cost recovery is a fundamental aspect of both Original and Simplified ED. The key requirement is that the treatment of terminal values for costs and outputs should be consistent as noted in the paragraph above. The differences noted by Vodafone reflect different implementations as between the two approaches, not differences integral to the approaches.
- A5.211 Regarding the issue of whether or not terminal values should be included in the economic depreciation calculation, Ofcom notes that the implementation of ED in the last market review included terminal values, and MNOs have not advanced reasons why truncating this calculation and excluding terminal values would be a superior approach. In any case, the impact of excluding terminal values from the Original ED approach is small – Ofcom estimates that the termination charge for a 2G/3G operator would be reduced by around 0.04ppm in 2010/11.
- A5.212 Ofcom has considered the performance of Original ED in response to falling or vanishing demand, following Vodafone's comments. Whilst Ofcom acknowledges that the Original ED algorithm has been developed primarily within the context of demand profiles which are increasing, Ofcom does not believe that the model produces incorrect results in situations where demand is falling or even vanishing. The second step of the algorithm described in paragraph A5.201 is designed to add a constant unit component for under-utilisation in earlier years of the network's lifetime. In some extreme cases, such as for 2G assets under a 2G shutdown scenario, the final year utilisation may be very low due to vanishing demand, and hence the second step may generate a constant unit component which is negative (reflecting over-utilisation in earlier years in relation to the final year utilisation). However, this behaviour is entirely consistent with the underlying principles and when considering the output of the three components of the algorithm taken in aggregate, the model produces reasonable paths of cost recovery. As part of its overall analysis for this charge control, and in response to the comments of

¹⁵⁵ The precise impact will depend on the value of 3G spectrum chosen for a particular scenario. In a medium demand scenario for a 2G/3G operator, a value of £4.0bn for 3G spectrum costs leads to an increase of 0.07ppm in efficient unit costs in 2010/11.

stakeholders, Ofcom has considered the potential impact of several 2G shutdown scenarios. In each case, Ofcom has been careful to ensure that the paths of cost recovery produced by the model are reasonable.

- A5.213 The remaining concerns raised by the MNOs relate to the third component of the ED algorithm, which defines the shape of the cost recovery path for each asset over time. Ofcom agrees that the simple arithmetic functional form of this component can produce some isolated cases of unusual behaviour which may be undesirable. For example, as noted by Vodafone, variations in the cost of capital over time can produce this unusual behaviour in some cases where other cost trends do not change¹⁵⁶
- A5.214 Ofcom has been careful to adjust the Original ED algorithm to address the risk of potentially unreasonable results, and as noted in paragraph A5.203, has implemented a number of refinements prior to Release 3 of the cost model in September 2006. For example, Vodafone noted in its submission that Release 3 of the model had adjusted the algorithm to handle 2G shutdown scenarios in an improved way, compared with previous versions of the model. Ofcom believes that any residual unusual behaviour has a negligible effect on the efficient charge benchmarks in 2010/11.
- A5.215 Ofcom acknowledges that the Original ED approach is more complex to implement than Simplified ED, and can exhibit unusual behaviour in some specific cases. However, overall, the Original ED approach has strengths and Ofcom does not believe that the potential advantages of adopting the Simplified ED approach are sufficient to merit changing the economic depreciation calculation, especially given the use of Original ED to determine the previous charge controls.

Responses to the September 2006 Consultation in relation to perfect contestability

- A5.216 H3G argued that, rather than adopting Original ED, Ofcom should instead have adopted a path for cost recovery either defined by perfect contestability or by a “fair proxy” for perfect contestability such as CCA. As explained in paragraph A5.244 below, Ofcom does not accept that CCA is a “fair proxy” for perfect contestability. However, Ofcom notes that a number of H3G’s arguments, although made in the context of perfect contestability, could be inferred as advocating the use of accounting approaches to depreciation on their own merits (regardless of whether they proxy perfect contestability). These points are addressed separately in the following paragraphs.
- A5.217 Perfect contestability involves departing from Original ED assumption that new entrants are not able to increase their utilisation more rapidly than incumbents. Instead, the profile of unit cost recovery is defined by new entrants in a market which is assumed to be perfectly contestable. The unit cost in each year is determined by a hypothetical new entrant in that year, which is able to instantaneously generate the same level of output and utilisation as an incumbent. This new entrant determines the level of unit cost required to realise full cost recovery over the lifetime of its network, taking account of the constraint imposed by later generations of similar new entrants, who are likely to benefit from further reduced input costs and higher lifetime utilisation. Application of this approach

¹⁵⁶ Vodafone also referred to administration (i.e. non-network) costs. Annex 15 discusses the use of ED in relation to non-network costs.

requires a backwards induction based calculation, starting in the final year of the model, and the modelling of a new entrant in each and every preceding year.

A5.218 H3G's response to the September 2006 Consultation advanced the following key reasons for using perfect contestability rather than Original ED:

- Original ED assumes that new entrants can only attract customers at the same rate as the incumbent's original acquisition of customers. Accordingly, H3G considered that Original ED assumes that there is a barrier to entry and thus cannot be considered to mimic a "competitive" market, unlike perfect contestability. Accordingly, in H3G's view, there is no reason to believe that Original ED results in a cost recovery path which yields efficient signals for consumption and investment.
- H3G claimed that, under Original ED, prices in the final modelled year are above the minimum level of "long-run average cost" due to "the premium added to recover additional costs caused by earlier under-utilisation". H3G considered that this results in inefficient levels of long-run consumption.
- In contrast, H3G claimed that "perfect contestability generates prices equal to [long-run average cost] at every point in time".
- [redacted]

A5.219 H3G also referred to the Competition Commission's 2003 Report. Perfect contestability results in an inverse relationship between unit costs and utilisation. In its response to the September 2006 Consultation, H3G claimed that this inverse relationship was "explicitly endorsed" in the Competition Commission's 2003 Report. [redacted]

Ofcom's response to H3G's arguments on perfect contestability

A5.220 In order to specify the path of cost recovery under economic depreciation it is necessary to specify the nature of the competitive constraint. H3G's objections are focused upon the issue of the appropriate competitive constraint i.e. should it reflect competitive pressure:

- From both incumbents and potential entrants (albeit potential entrants that cannot instantly attain the same utilisation levels achieved by incumbents) i.e. Original ED; or
- Solely from potential entrants (specifically entrants that can instantly attain the same utilisation levels achieved by incumbents) i.e. perfect contestability.

A5.221 There are a number of options for specifying the competitive constraints in a fully competitive market, i.e. in which firms are constrained by competition to set prices equal to costs. In other words, there are a number of approaches that would mimic the path of cost recovery in a market that could reasonably be described as "competitive"¹⁵⁷. Ofcom accepts that in certain situations the use of a perfectly contestable market as a benchmark might be appropriate. However Ofcom does not consider that it is appropriate in this context. Rather, Ofcom considers that,

¹⁵⁷ See the discussion at paragraphs 9-33 (particularly paragraphs 10-12) of: <http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/depr0901.htm>

given the choice of two competitive constraints, both of which could reasonably be described as “competitive”, it is appropriate to select the one that:

- Is closer to reality (i.e. Original ED) rather than the one that is less realistic (i.e. perfectly contestability). In reality, it is not plausible to assume that new entrants can immediately match incumbents’ utilisation; indeed this is a point that H3G has emphasised elsewhere in its response.¹⁵⁸ Further, competition between incumbents plays a key role in the competitive constraints in other markets in which MNOs operate (such as retail markets) rather than the entirety of the competitive constraints arising from the *threat* of entry by potential entrants, as in a perfectly contestable market. Note that elsewhere in its response H3G has argued that its presence in the market has generated significant competitive pressure on other MNOs.¹⁵⁹ Ofcom has considered H3G’s observation that perfect contestability is a “construct” which regulatory policy should mimic because of its desirable welfare properties rather than because it is realistic. However, given the choice between two approaches, both of which are “competitive” (and thus both of which are likely to exhibit attractive welfare properties), Ofcom does not consider that H3G’s observation implies that Ofcom should abandon the one which is more realistic.
- Would not result in large variation in unit costs between years and therefore in prices. Perfect contestability, unlike Original ED, is likely to result in a very steep cost recovery profile in a market where utilisation is growing. Avoiding undue unit cost variation is consistent with the approach adopted in the Competition Commission’s 2003 Report (see below). Ofcom also notes that H3G’s actual MCT charges have been constant since H3G entered the market, rather than varying sharply over time.
- Would not result in windfall gains/losses. Ofcom considers that there are strong advantages from adopting the same competitor constraint for all MNOs (on consistency grounds and because adopting different competitor constraints is likely to lead to a wider spread in regulated MCT charges as a result of inconsistent methodologies which may affect MNOs’ incentives and increase the risk that forecast errors may give rise to asymmetric impact on MNOs). Previous charge controls on the 2G/3G MNOs reflected Original ED and thus a change from Original ED to perfect contestability for these MNOs may result in undesirable windfall gains or losses.
- Is practicable to implement. Ofcom considers that implementing perfect contestability would be particularly challenging and has not identified a robust way in which it could be implemented in the cost model.

A5.222 In addition, Ofcom does not accept the reasons given in H3G’s response to the September 2006 Consultation for favouring perfect contestability over Original ED:

- Since the competitor constraint in Original ED assumes that there is a barrier to entry, H3G considered that it fails to mimic a “competitive” market. Ofcom does not accept that this is the case since, under Original ED, incumbents are

¹⁵⁸ [X].

¹⁵⁹ For example, H3G asserted that “[d]uring 2006 a number of other mobile operators have introduced increasingly competitive tariffs in response to the competitive pressures of H3G ... this competitive force is forcing other operators to become more competitive as well” (page 72 of H3G’s response to the September 2006 Consultation). Similarly H3G claimed that its entry has “led to a reduction in overall retail consumer prices” (page 10).

constrained by fully effective competitive pressures. In contrast to H3G’s characterisation of the choice being between an approach that is “competitive” and one that is not, the difference between Original ED and perfect contestability relates to the nature of competition within a “competitive” market (e.g. whether it is driven solely by potential entrants or whether competition between incumbents exists and plays an important role).

- H3G argued that Original ED results in unduly high prices in the terminal year. However under both Original ED and perfect contestability, firms make normal profits – it is simply the *profile* of cost recovery that differs. Perfect contestability is likely to result in a much steeper cost recovery profile and hence a lower unit cost in the final year compared to Original ED (albeit higher prices in earlier years). This lower unit cost in the final year reflects the assumption that a new entrant in that year can instantaneously match incumbents’ utilisation, in contrast to the benchmark of competition underpinning Original ED which assumes they are subject to the same build-up in utilisation as incumbents. Ofcom does not consider that it is appropriate to select perfect contestability, rather than Original ED, on the basis that perfect contestability leads to a lower unit cost in the final modelled year which is the result of a less realistic competitive assumption.
- Moreover, H3G claimed that perfect contestability results in a price equal to “long run average cost” at all points in time and criticised Original ED for generating terminal prices that are above “long run average cost” because they reflect “earlier under-utilisation”. Ofcom considers that H3G’s definition of “long-run average cost” appears circular. In Ofcom’s view, H3G seems to be defining average cost in any particular year to be the unit cost of a hypothetical new entrant that can instantly attain the incumbent’s utilisation (and which therefore – using H3G’s words – does not suffer from “earlier under-utilisation”). In other words, H3G appears to have defined “long run average cost” (which it considers to be the appropriate cost recovery profile) as the cost recovery profile resulting under perfect contestability and then relies on this definition as justification for adopting perfect contestability.

A5.223 [redacted]

A5.224 [redacted]

A5.225 Ofcom recognises that traffic forecasts are subject to uncertainty. However Ofcom does not consider that the appropriate response to this uncertainty is to change the competitor constraint adopted for the purposes of economic depreciation [redacted]. Rather, Ofcom has taken uncertainties into account in two ways.¹⁶⁰ First, as explained in Section 9, by selecting conservative traffic forecasts (and Ofcom has reduced its medium voice forecast growth rate from the level used in Release 3 of the model – see paragraph A5.54 above). Second, in Ofcom’s overall approach of placing weight on different scenarios when setting the charge controls.

A5.226 [redacted]

A5.227 H3G claimed that the Competition Commission’s 2003 Report “explicitly endorsed” an inverse relationship between unit costs and utilisation.¹⁶¹ Ofcom does not

¹⁶⁰ [redacted]

¹⁶¹ H3G referred to paragraph 2.277 of the Competition Commission’s 2003 Report. In fact, this paragraph relates to a (temporary) adjustment allowing T-Mobile time to adjust to a charge control

consider that this is correct. In fact, paragraph 2.283 of the Competition Commission's 2003 Report stated that "[i]n our view economic depreciation is the appropriate method to use because it most accurately matches the costs incurred in order to carry traffic to the periods in which that traffic is carried." The method of economic depreciation that the Competition Commission was endorsing in this comment was Original ED.

A5.228 [X]

Ofcom's reasoning and conclusions with respect to the Economic module

- A5.229 Release 3 of the cost model, issued in September 2006, included an additional form of economic depreciation - "Simplified ED". The inclusion of this approach was intended to serve both as a cross-check on the profiles generated under the Original ED methodology, and as an alternative means of generating profiles of cost recovery to inform the appropriate levels of charge controls.
- A5.230 Some responses to the September 2006 Consultation supported the use of Simplified ED. These responses focussed on perceived weaknesses in the Original ED methodology.
- A5.231 Having taken these responses into account, Ofcom remains of the view that the Original ED approach has theoretical advantages over the Simplified ED approach, for example in deriving a final year unit cost recovery that is consistent with the benchmark competitive market and the cost assumptions in the model. Ofcom acknowledges that there are specific instances where the behaviour of the Original ED approach may not be ideal. However, Ofcom has taken steps to address these, and given that the Original ED approach was used to set previous mobile call termination charge controls, Ofcom does not believe that there is sufficient additional benefit to be gained from adopting alternatives, such as Simplified ED, to merit a change in approach.
- A5.232 Ofcom has also given careful consideration to H3G's arguments that a "perfect contestability" approach should be adopted for the path of cost recovery. Ofcom accepts that such an approach, which defines the competitive constraint exclusively in terms of the competitive pressure from potential entrants, is a useful benchmark in many situations. However, in this context, Ofcom has concluded that it remains appropriate to set a path of cost recovery (Original ED) based on a competitor constraint which takes account of competitive pressure both from incumbents and potential entrants. For example, given the choice between two approaches, both of which are "competitive", Ofcom does not consider that it should abandon the one which is more realistic – Original ED – for the one that is very unrealistic – perfect contestability.

HCA/CCA module

- A5.233 The HCA/CCA module uses the same approach as used in the June 2005 model, calculating GBV and operating costs based on historic cost accounting and current cost accounting methods. The module also produces unit costs for services

based on higher market share. Such an adjustment is not appropriate in the case of H3G in this market review since Ofcom has addressed the corresponding issue for H3G in a much more direct manner in the cost modelling, by deriving a hypothetical 3G-only operator benchmark reflecting the actual historical subscriber numbers of H3G and reasonable, competitively neutral forecasts thereafter.

(including voice termination) based on the depreciation profiles derived under each of these accounting approaches.

A5.234 While both of these approaches result in the same level of total cost recovery over the timeframe of the model, the chief difference between them lies in the timing rather than the total amount of cost recovery. The key characteristics of the timing of cost recovery under either of these accounting depreciation approaches are as follows:

- Capital costs are recovered as the sum of depreciation and the cost of capital employed. Depreciation is calculated for each asset as the gross book value of that asset divided by its lifetime, whilst total capital employed is calculated as the cost of capital multiplied by the net book value of the MNO's total asset base. Gross and net book values are dependent on the asset valuation concept used, (i.e. HCA or CCA). In the case of CCA, annual depreciation charges are dependent on the choice of capital maintenance concept used; in this case, the Financial Capital Maintenance (FCM) methodology has been chosen.
- Straight-line depreciation is not deferred from years when utilisation is lower to those when it is higher, as under an economic depreciation approach. Consequently, unit capital costs tend to be inversely related to utilisation.
- Operating costs are recovered in the year in which they are incurred, meaning that unit operating costs are also inversely related to utilisation. The level of recovery of operating costs in each year is identical under HCA and CCA approaches.

A5.235 Under HCA, an asset's value (the Net Book Value, NBV) is the Gross Book Value (GBV) less accumulated depreciation. The GBV represents the price paid by the firm at the time of purchase. Annual depreciation charges on each asset are therefore calculated as $(GBV \div AL)$, where AL is the length of the asset's useful economic lifetime (UEL). The annual cost of capital employed is equal to $(NBV \times WACC)$, where WACC is the weighted average cost of capital.

A5.236 Under CCA, an asset's value (the Net Current Cost, NCC) is the lower of its Net Replacement Cost (NRC) and its recoverable amount (the higher of an asset's likely sale price and its economic value). In this case the NRC has been used, which represents the cost of replacing the asset with an asset of similar characteristics and age. The NRC is calculated as the Gross Replacement Cost (GRC) less accumulated depreciation.

A5.237 GRC can be calculated in a number of different ways. The valuation process could use open market value or various forms of indexation. In this case GRC is calculated with respect to MEA prices as described in paragraph A5.161. Under the FCM approach which has been adopted, annual depreciation charges are calculated as $[(GRC \div AL) + AHGL]$, where AHGL is the annual holding gain or loss. AHGL is calculated as the difference between:

- $(GRC \div AL)$; and
- the annual depreciation charge required such that the NRC reflects the proportion of the asset's UEL that has been consumed (i.e. the annual charge required so that $NRC = GRC \times AL \text{ remaining} \div AL$)

- A5.238 The annual cost of capital employed under the CCA approach is equal to $(NRC \times WACC)$.
- A5.239 Ofcom did not receive any responses that related specifically to the HCA/CCA module itself. Most responses that related to calibration were directed at the network module of the cost model, and some changes to the demand and cost modules have also made an impact on calibration results. Annex 12 discusses the financial calibration results that were derived from the HCA/CCA module.

H3G's arguments in favour of accounting cost approaches

- A5.240 In its response to the September 2006 Consultation, H3G argued that if perfect contestability is impractical to implement then Ofcom should instead use CCA or a low market share adjustment.
- A5.241 Further, H3G could be inferred as advocating the use of accounting approaches on their own merits (rather than as a proxy for perfect contestability). Ofcom's reasons for this interpretation are, in particular, the following:
- [X]
 - [X]

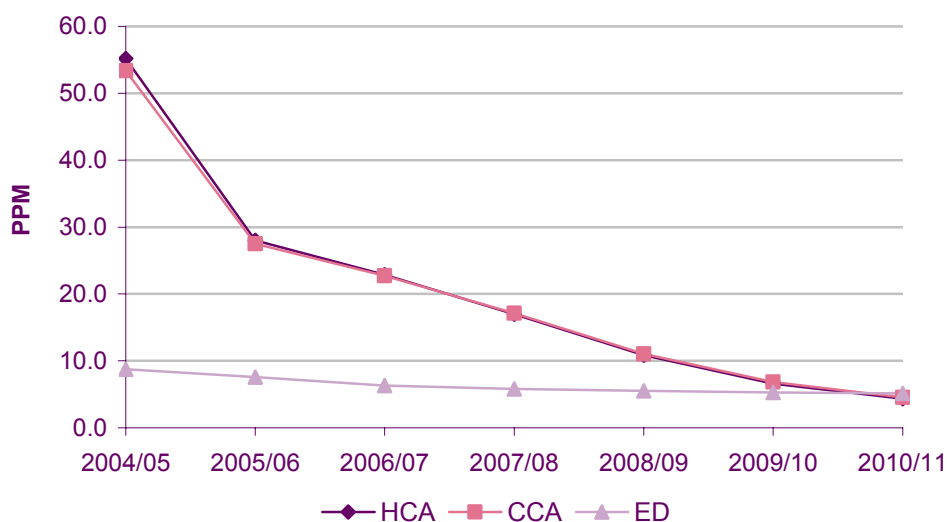
Ofcom's response to H3G's arguments on accounting cost approaches

- A5.242 For the reasons explained in paragraphs A5.221-229, Ofcom does not consider that the use of perfect contestability is appropriate. Accordingly, it does not believe it is necessary to consider potential proxies for perfect contestability.
- A5.243 Moreover, Ofcom does not accept H3G's assertion that CCA might be expected to be a "fair proxy" for perfect contestability. These two approaches have very different conceptual foundations (for example, CCA does not explicitly consider competition and the costs in any year do not depend on future cost movements, which is a fundamental feature of perfect contestability). In addition to their different conceptual bases, there is some practical evidence to suggest that the two methods lead to quite different results. In a simple example implementation of perfect contestability which was shared with stakeholders during the development of the cost model¹⁶², perfect contestability produced consistently steeper profiles than straight-line accounting depreciation.
- A5.244 [X] Accounting methods result in an inverse relationship between unit costs and utilisation. In the context of mobile voice termination, where demand (traffic) is growing sharply, such a relationship is particularly unattractive because it results in large changes in unit costs between years. This is illustrated in figure A5.14 below, which shows that HCA and CCA both lead to very steep network unit cost profiles for mobile call termination for a 3G-only operator (over 50ppm in 2004/2005 falling to under 5ppm in 2010/2011). In contrast, in more mature industries, the fact that demand and utilisation are more stable means that accounting methods do not result in the same level of unit cost variation and may therefore be more appropriate. Further, as discussed above, other regulators – and in particular the Competition Commission – have applied economic depreciation in the context of voice termination on 2G networks.

¹⁶² Neither Ofcom nor stakeholders developed the much more complex implementation that would have been needed to implement perfect contestability in the cost model.

Figure A5.[14] Network unit cost estimates for MCT (ppm) for 3G-only operator

Network costs for 3G-only operator (excluding non-network costs and network externality)



A5.245 Further, Ofcom notes that many new businesses tend to show accounting losses during their early years of operation. For example, H3G had accumulated losses of about £4.0bn as at 31 December 2005¹⁶³. Ofcom considers that this is often a reflection of accounting approaches to cost allocation that fail accurately to reflect economic costs (i.e. accounting distortions). Ofcom notes that were one to believe that accounting approaches were the appropriate way to derive unit costs and therefore prices, it would imply that new businesses should price far higher than they do in practice. In reality, such high pricing is unsustainable and Ofcom does not consider that it is an appropriate benchmark for charges in (monopolised) MCT markets.

A5.246 Finally, accounting approaches are incompatible with the approach adopted in previous market reviews and (as with perfect contestability) is likely to result in windfall gains and losses for 2G/3G MNOs, fixed operators and consumers.

A5.247 Ofcom has therefore concluded that it is reasonable to derive estimates of efficient unit costs for mobile call termination on the basis of economic depreciation.

¹⁶³ Source: Hutchison 3G UK Holdings Limited financial statements

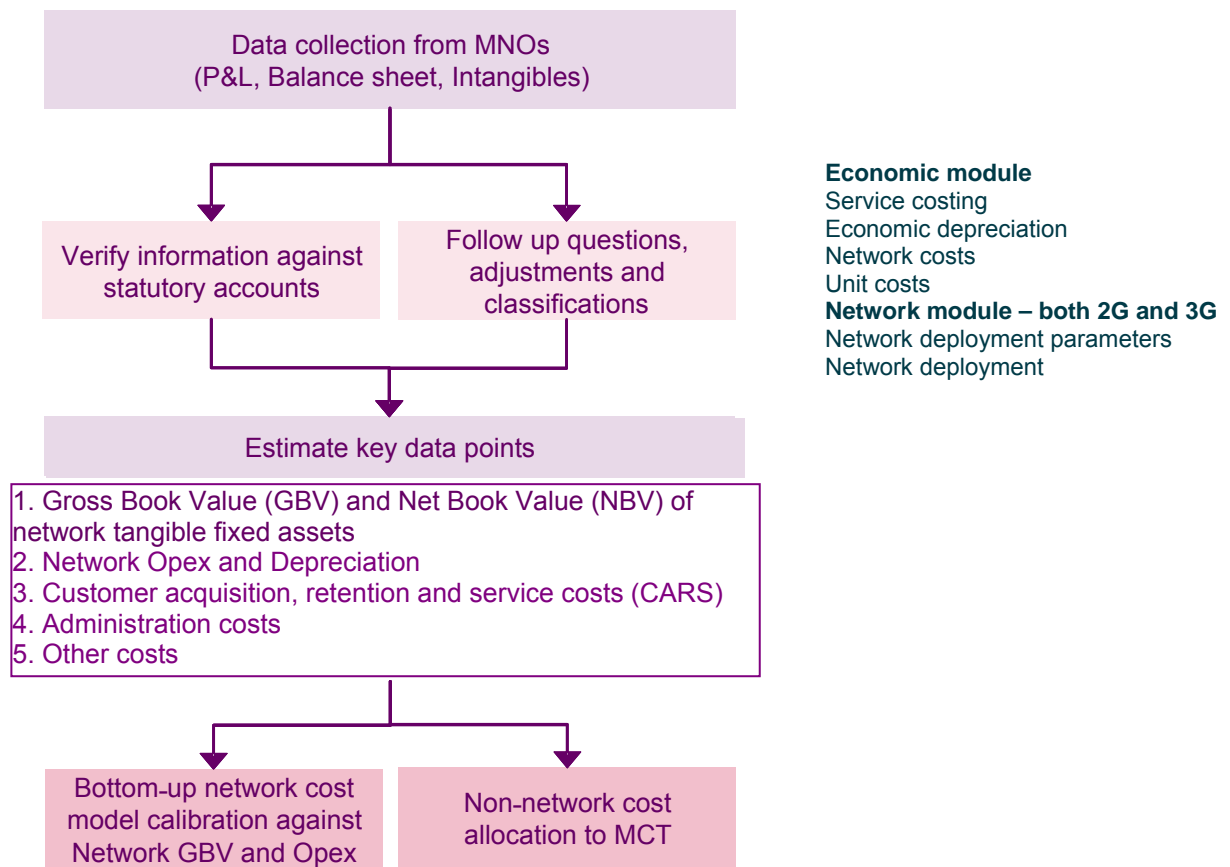
Annex 6

MNO cost information (non confidential)

Introduction

A6.1 This Annex sets out Ofcom's analysis of accounting data that was collected from MNOs during the course of the review. It explains the methodology Ofcom has employed in order to estimate key data points with which to assess the reasonableness of Ofcom's bottom-up network cost model. It also outlines how the data was obtained to inform the level of non-network costs. In Annex 12 Ofcom sets out in detail how this information was used to calibrate the bottom-up cost model and Annex 15 sets out Ofcom's approach to non-network costs. Ofcom's overall approach is summarised in the figure below:

Figure A6.1 Ofcom's approach to its analysis of MNOs' cost information



A6.2 Since the MNOs' detailed accounting information is confidential Ofcom has presented its analysis in terms of average costs across operators. However, each MNO has also been provided with a confidential Annex that sets out in detail the analysis Ofcom has carried out on their specific information.

A6.3 The years analysed and presented are 2002, 2003, 2004 and 2005. For simplicity, these are referred to by the year in which the majority of the accounting period falls: for example "2005" would refer to both 1 April 2005 to 31 March 2006 and to 1 January 2005 to 31 December 2005. Orange, T-Mobile and H3G have 31 December year-ends, whereas Vodafone has a 31 March year-end. For the periods

2002 to 2004, O2 had a 31 March year-end. As a result of the acquisition of O2 by Telefonica, O2 shortened its period end to 31 January 2006. In order to arrive at profit and loss account data for the 2005 year, Ofcom has pro-rated O2's 10 month results to estimate results for the 12 months ended 31 March 2006. Regarding balance sheet data for O2 for 2005, Ofcom has taken the assets as stated at 31 January 2006.

Stakeholder responses to the September 2006 consultation document

A6.4 There was only one comment specifically relating to the MNO cost information. Orange commented that the treatment of Brand Fees and Brand Income was inconsistent and that both items should be included within "Other" costs. After consideration of Orange's comments, Ofcom agrees that Brand Fees should be in "Other" costs and has concluded that Brand Income should be excluded from the results because it represents a revenue item and is therefore not relevant to Ofcom's analysis of MCT. This is discussed at paragraph 15.88.

Changes to MNO Cost Information since the September 2006 consultation

A6.5 MNO cost information for 2005, which is the latest available, has been added to the accounting cost estimates set out in the September 2006 consultation. The new calibration has taken account of this (see Annex 12). The treatment of non-network costs has similarly been updated (see Annex 15). At the time of the September 2006 consultation, not all MNOs had finalised and signed their 2005 accounts. All MNOs have now finalised and signed these accounts.

A6.6 At the time of the consultation, there remained some matters of clarification outstanding regarding earlier years. Ofcom estimated appropriate values where necessary. Since the consultation, Ofcom has worked closely with the MNOs. All these items have now been resolved. The prior accounting cost estimates presented by Ofcom have been revised to reflect these clarifications. The revised results have been used in both the new calibration and the treatment of non-network costs. Specific details are explained in the relevant MNO confidential annexes.

Data collection, Ofcom's analysis and results

A6.7 The remainder of this annex sets out Ofcom's analysis of accounting data that was collected from the MNOs. This annex builds upon the analysis set out in Annex 6 of the September 2006 consultation and has been updated, where appropriate, for any changes to the method and revisions to cost estimates.

Data Collection

A6.8 MNOs were required to provide Ofcom with specified information in accordance with a formal notice under Section 135 of the Communications Act 2003 dated 6 December 2005. This requested MNOs' accounting information for the years 2002, 2003, and 2004. A further request was made for the 2005 accounting information on 16 June 2006.

A6.9 The MNOs were given the following five schedules, with a guidance note explaining how to complete them:

- Profit and Loss Account

- Balance Sheet
- Analysis of intangible assets
- Reconciliation of information provided in the Profit and Loss Account to information in the statutory accounts
- Reconciliation of information provided in the Balance Sheet schedule to the information in the statutory accounts.

A6.10 In the sections that follow the analysis undertaken with respect to each schedule is discussed. Prior to that Ofcom provides definitions for the different cost categories that are discussed in the rest of this annex.

Definitions

UK network operating costs

A6.11 These are the operating costs of the UK network, before administration costs, and they relate to the MNOs' own network activities, i.e. setting up and running their UK mobile network. They comprise network operating expenditure and network depreciation.

A6.12 Network operating costs have been used by Ofcom in two different respects:

- As part of the bottom-up network cost modelling to calibrate the level of network operating costs. In this case depreciation of fixed assets and amortisation of 3G spectrum costs and other intangible assets has been excluded from the cost estimates since the objective of the calibration exercise is to ensure Ofcom's bottom-up cost estimates (which exclude depreciation and amortisation) of network physical equipment and labour costs are reasonable and are compared on a like-for-like basis. Depreciation and amortisation have been modelled separately within the bottom-up cost model. See Annex 12 and Annex 5.
- To estimate the allocation of administration costs to network activities. In this case amortisation of 3G spectrum costs has been included in order to assess the relative proportion of operating network costs compared to retail and other operating costs. See Annex 15.

Customer acquisition, retention and service costs ("CARS")

A6.13 CARS consist of customer acquisition, retention and service costs (CARS) – comprising advertising and marketing, handset costs, discounts and incentives, customer care, billing and bad debts.

A6.14 In this Annex CARS costs are presented gross of handset revenues. Further discussion of gross and net CARS is set out in Annex 15 in relation to Ofcom's approach to estimating the allocation of non-network costs across different services.

Support costs i.e. administration costs

A6.15 Administration costs include the costs that should be recovered across all areas of an MNO's business, including both network and retail services. These consist of

non-network depreciation (relating to IT, furniture and office equipment) and overheads from property, human resources, finance, legal and IT activities.

Other Costs

A6.16 Other costs do not relate to the running of the UK network and/or MCT. Therefore they do not fall into any of the above three categories. Other costs include payments to other operators that are not part of network costs and are not part of administration costs, such as roaming charges. No allocation of administration costs has been made to Other costs.

Network assets

A6.17 The UK fixed assets associated with the network.

Non-network assets

A6.18 The UK fixed assets not associated with the network. These were calculated as the balance of UK fixed assets remaining, after deduction of the network assets.

Profit and Loss Account (Schedule A)

A6.19 The purpose of the data collection exercise and the subsequent analysis is the identification of the MNOs' UK network costs and non-network costs. Ofcom has sought to identify costs wholly related to the network, CARS and administration costs and other costs that Ofcom does not consider are relevant to the analysis of MCT costs.

A6.20 MNOs were asked to provide a breakdown of network costs between voice, data and shared costs. They were asked to identify and separate out those other network costs that Ofcom does not consider are relevant to the consideration of the cost of MCT, namely:

- interconnection charges (these costs are not incurred in relation to a MNO's own network but are costs incurred in the provision of retail (outgoing) calls)
- roaming charges (these costs are also not incurred in relation to an MNO's own network)
- leased lines not associated with backhaul or core (these may be used to provide services other than UK voice call origination and termination).

A6.21 MNOs were asked to separate CARS expenditure between handset costs, vouchers, SIM costs, as well as operational selling expenses.

A6.22 MNOs were asked to identify administration costs with as detailed a breakdown between key cost categories as possible.

A6.23 In addition to the above, MNOs were subsequently asked if they could provide a further breakdown of IT costs between the activities Ofcom defined. These activities are network voice, data and shared; other costs of sales (bought in goods and services); sales/account management/distribution; and support of UK activities.

Balance Sheet (Schedule B)

- A6.24 The schedule required the separate identification of the GBV and NBV of sites and switch assets in the radio network, the backhaul network and the core network. In addition Ofcom requested that within these categories MNOs split assets between the network categories i.e. 2G, 3G and shared assets. A breakdown of transmission assets was also requested, disaggregated to a level that would allow direct assignment to the three network categories.
- A6.25 Information was required as to the GBV and NBV for property, plant and equipment not associated with the UK network. This allowed the non-network assets to be identified. The latter figure was used in the allocation of non-network costs (see Annex 15). Information was also required on overall current assets and liabilities.

Intangible Fixed Assets, excluding Goodwill (Schedule C)

- A6.26 This was a short schedule which required the MNOs to show the movements in GBV and accumulated depreciation in intangible assets during the accounting period, split between the 3G licence, other licences and 'other'. As discussed 3G licence costs have been excluded from network costs for the purposes of calibration. However, the amortisation costs of 3G licences have been included in network costs for the allocation of non-network costs. 3G licence costs are discussed in detail in Annex 13 and in Annex 14.

Reconciliation of Profit and Loss Figures (Schedule D)

- A6.27 Analysis of Profit and Loss (discussed above) led to the classification of these costs into four categories: network costs, CARS, administration and other costs e.g. payments to other operators.
- A6.28 Schedule D reconciles the total of these four categories with the relevant figure in the statutory accounts. There could have been legitimate reasons why they are not equal. An explanation for any material difference was required.

Reconciliation of Balance Sheet Values (Schedule E)

- A6.29 Schedule E reconciles the inputs at Schedule B with the relevant figures in the statutory accounts. There could have been legitimate reasons why they are not equal. An explanation for any material difference was required.

Analysis of MNOs' information

- A6.30 Ofcom's analysis was limited to the extent that MNOs were unable to extract from their accounting systems costs split between voice, data and shared activities. In addition the 2G/3G operators were unable to analyse their assets between 2G and 3G activity with the exception of one MNO who was able to split radio assets between these categories.
- A6.31 In addition to the reconciliations required in the responses, Ofcom obtained statutory accounts for each MNO for the relevant time periods and compared data in the responses to the statutory accounts. Although the statutory accounts are less granular than the information received from the MNOs, particularly with regard to the profit and loss account, basic checks of the MNOs' information were carried out to give some assurance that the responses were consistent with the MNOs' audited

costs. Some anomalies were found, which were discussed with the MNOs and adjustments were made where appropriate.

A6.32 In addition, Ofcom compared MNO's levels of assets and costs against each other, looking at historical trends and considering the response data in the light of other operational and business information, such as volume growth. In some cases, the MNOs were asked to justify unusually large or small items. For some of the large items, a further breakdown was sought from the operators to provide further assurance.

A6.33 Having reviewed the MNOs response data, further information was required in order to clarify Ofcom's understanding of some of the costs. For example, breakdowns of administration costs and CARS into further cost categories were required in order to assist with employing consistent approaches across MNOs and in order to facilitate comparison with the information collected by the Competition Commission during its last inquiry into mobile call termination. In Ofcom's view key areas of inconsistency between operator's data have been addressed following Ofcom's additional questions to MNOs.

A6.34 Ofcom made the following adjustments to the original MNO's responses:

- Depreciation was removed from network costs and separately identified. For the purposes of calibration, network costs excluding depreciation and amortisation were used. (See Annex 12 for details of the calibration and Annex 5 for details of the approach to estimate the path of cost recovery and economic depreciation in particular). However, for the allocation of non-network costs, the accounting cost information has been relied upon and accounting depreciation and 3G licence amortisation was included in the calculation (see Annex 15 for details).
- 3G licence fee amortisation was removed from network costs. As set out in Annex 14 Ofcom has explored a range of scenarios to take account of 3G licence costs and therefore these have been identified separately from the MNOs accounting costs. As discussed above in paragraph A6.12, 3G amortisation has been included for the allocation of non-network costs but excluded for the calibration exercise.
- "Other amortisation" was removed from network costs and placed in "Other" costs. MNOs confirmed that these costs were not related to the network.
- Amortisation of goodwill was removed and placed in "Other" costs. Ofcom did not consider that the goodwill was a relevant cost from the perspective of estimating the cost of MCT. The reasons for this are one operator's goodwill had been internally generated and the other operators confirmed that their goodwill was non-network in nature.
- Reclassifications were made where a breakdown submitted by an operator showed that costs had been, in Ofcom's view, inappropriately classified e.g. an administration type cost had been included in network activity.
- Two operators revised their responses, one of these as a result of draft statutory accounts being finalised.
- Voucher costs were removed from CARS and included in "Other" costs. These costs relate to pre-paid top-up vouchers and their treatment varied between operators: it appears some operators netted them against revenue whereas

others included them in selling costs. Ofcom has included them in “Other” costs to firstly achieve consistency across operators, and secondly because they do not fall into any of the other cost categories.

A6.35 For each of the MNOs, as presented in their specific, confidential annexes, the following key data points have been estimated:

- GBV and NBV of UK network assets, excluding intangible assets (e.g. the 3G licence fee)
- NBV of non-network assets and 3G licences
- The operating costs of the UK network, excluding: depreciation, amortisation of 3G licence fees and other intangible assets, interconnection costs, roaming charges and, leased lines not related to backhaul or core
- Network depreciation
- Amortisation of 3G licences
- CARS
- Administration costs
- Other costs

A6.36 The figures below set out Ofcom’s estimates of the key data points listed above. They present estimates averaged across the MNOs excluding H3G. H3G is excluded from the average of the four 2G/3G MNOs because it is a 3G only operator and is at a different stage in its business development. The first table shows, for comparison purposes, the values originally set out in the September 2006 consultation. The second table represents the revised and updated final values, including data for the additional 2005 year.

**Figure A6.2. As presented in the September 2006 consultation.
Average costs across MNOs (excluding H3G) based on accounting cost information.**

| | Average cost (excluding H3G) £m | | | |
|----------------------|---------------------------------|-------|-------|------|
| | 2002 | 2003 | 2004 | 2005 |
| GBV Network | 3,092 | 3,311 | 3,629 | N/A |
| NBV Network | 1,869 | 1,821 | 1,811 | N/A |
| | | | | |
| Opex | 327 | 338 | 340 | N/A |
| Network depreciation | 342 | 362 | 377 | N/A |
| CARS | 1,251 | 1,383 | 1,534 | N/A |
| Administration | 266 | 279 | 275 | N/A |
| Other | 789 | 906 | 948 | N/A |

**Figure A6.3. Revised and updated final values, including 2005.
Average costs across MNOs (excluding H3G) based on accounting cost information**

| | Average cost (excluding H3G) £m | | | |
|---------------------------------------|---------------------------------|-----------------|--------------|--------------|
| | 2002 | 2003 | 2004 | 2005 |
| Balance sheet items: | | | | |
| GBV Network | 3,092 | 3,311 | 3,629 | 3,850 |
| NBV Network | 1,828 | 1,803 | 1,810 | 1,802 |
| NBV Non-network | 425 | 427 | 450 | 424 |
| NBV 3G licences | 4,401 | 3,833 | 3,691 | 3,477 |
| Profit and loss items: | | | | |
| Opex | 324 | 326 | 324 | 334 |
| Network depreciation | 338 | 360 | 373 | 377 |
| Amortisation of 3G licences | 46 | 50 ¹ | 143 | 220 |
| CARS | 1,262 | 1,382 | 1,536 | 1,705 |
| Administration | 270 | 279 | 302 | 285 |
| Other ² | 732 | 904 | 875 | 947 |
| Total of profit and loss items | 2,972 | 3,301 | 3,553 | 3,868 |

¹ This does not include a substantial write-down of a 3G licence by one operator this year (a result of an impairment review)

² Ofcom has modified its approach to the allocation of non-network costs: the amortisation costs of 3G licences have been removed from the "Other" grouping and have been included in network costs. See A6.12 for further explanation.

A6.37 The individual operator's costs as well as the averages set out above have been used to calibrate the bottom-up network cost model (specifically GBV and Opex data points for all MNOs). This is discussed in detail in Annex 12.

A6.38 As discussed in Annex 15 the data points in the above table have also been used to estimate the non-network costs recoverable from MCT.

Annex 7

MNO cost information – H3G (confidential)

Introduction

A7.1 [REDACTED].

Annex 8

MNO cost information – O2 (confidential)

Introduction

A8.1 [X<

Annex 9

**MNO cost information – Orange
(confidential)**

Introduction

A9.1 [X]

Annex 10

MNO cost information – T-Mobile (confidential)

Introduction

A10.1 [X]

Annex 11

MNO cost information – Vodafone (confidential)

Introduction

A11.1 [X]

Annex 12

Calibrating the new cost model

Overview

- A12.1 Cost models can be constructed in both ‘top-down’ and ‘bottom-up’ forms. Under a top-down approach, relationships between outputs and costs are estimated from historical accounting information, and costs are projected forward on the basis of output forecasts. Under a bottom-up approach, the components of cost are identified at a more granular level. Cost causation relationships are then defined to link the quantity of each of these cost components with output and other cost drivers, based on practical and theoretical evidence.
- A12.2 As discussed in Annex 5, for the purpose of this market review a top-down / bottom-up ‘hybrid’ approach has been developed - with the intention of capturing the strengths of both approaches. The new model has been developed along the lines of a bottom-up cost model. However, the model has also been calibrated, by adjusting the unit cost levels and cost causality relationships of different cost components, so as to ensure the model is reasonably in line with MNOs’ actual costs in historical years (where suitable accounting data is available). This approach differs from that taken in the last market review (and the Competition Commission inquiry), in which the output unit costs from the 2G LRIC model were adjusted exogenously to take account of MNOs’ actual gross book value and operating costs data. Ofcom considers that its approach of calibrating inputs rather than adjusting outputs is more appropriate ensuring the model produces reasonable outputs in its own right i.e. no exogenous adjustments are required.
- A12.3 The purpose of this annex is to describe the methodology which has been applied to calibrate the new model to accounting data, and to summarise the results of the calibration (to the extent that MNO data confidentiality allows this information to be disclosed).

Calibration benchmarks

- A12.4 The new model has been calibrated according to two different types of high-level benchmarks obtained from the MNOs: counts of different types of network equipment (e.g. cell sites, MSCs) and accounting costs based on data from the operators’ management accounts (discussed in Annex 6).
- A12.5 Ofcom requested equipment inventories from operators in July 2005 to obtain the latest counts of the key types of network equipment included in the new model. These counts related to equipment at all levels of the 2G and 3G networks, ranging from 2G and 3G cell sites through backhaul and BSCs and RNCs to equipment in the core network. Whilst none of the MNOs were able to provide complete responses to this detailed request, Ofcom regards the information it received as sufficiently comprehensive for calibrating the bottom-up cost model. Cell site counts are of particular significance, because the deployment of many other network components is driven (directly or indirectly) by the number of cell sites. All five operators provided useful high level information on these assets.

- A12.6 Consistent with the form of the accounting cost benchmarks obtained by the Competition Commission (and used in the previous market review¹⁶⁴), Ofcom has also obtained updated figures from each of the MNOs for network gross book value (GBV) and network operating costs. The derivation of these calibration benchmarks is discussed in detail in Annex 6.
- A12.7 Ofcom considers that GBV is a more appropriate calibration benchmark than actual in-year capital investment. GBV provides a snapshot of the total value of assets for a MNO, and is therefore less sensitive to year on year fluctuations in investment. Network operating costs, on the other hand, are likely to fluctuate less than capital costs on a year to year basis since these represent ongoing network maintenance and overhead costs; hence network operating costs have been used directly as a calibration benchmark. However, Ofcom notes that there are still likely to be year to year fluctuations in these cost benchmarks which are not explainable solely in terms of factors included within the new model.
- A12.8 Ofcom acknowledges that the use of more granular accounting data might allow more detailed calibration. However, given the different cost definitions and levels of detail in accounting systems used by the five MNOs, Ofcom does not consider that in practice it is proportionate to collect a robust and consistent set of more granular accounting information.
- A12.9 In the previous market review, a single full year of accounting data was obtained for each of the four 2G MNOs in 2001¹⁶⁵. For this market review, Ofcom obtained a longer time series of accounting benchmarks to allow a more refined calibration of the model. Each of the five MNOs provided GBV and operating cost data for 2002, 2003, and 2004, which was taken into account in the proposals in the September 2006 Consultation. Since that consultation, the five MNOs have provided further accounting data relating to 2005 so that five years of data are available for each operator including the calibration points obtained from the previous market review¹⁶⁶.

Model inputs

- A12.10 The objective of the cost modelling exercise is to establish the unit cost benchmarks for voice termination of an efficient average operator, rather than operator-specific unit cost benchmarks.
- A12.11 However, the MNO calibration benchmarks described above are based on the historical asset counts and accounting costs of specific operators. They reflect historical factors specific to each of the MNOs, such as the levels of traffic on each of their networks and their specific approach to 3G network deployment. In order to compare the outputs of the bottom-up cost model with a specific MNO's information, it is therefore appropriate to configure the model to reflect the actual position of a specific MNO in terms of spectrum allocation, number of subscribers, traffic and 3G network coverage over time. This approach seeks to ensure that a

¹⁶⁴ See the Competition Commission's 2003 Report paragraphs 2.284-2.319

¹⁶⁵ The 2001 data collected by the Competition Commission reflects the 12 month period ending 31 March 2001 for Vodafone and O2; and ending 31 December 2001 for Orange and T-Mobile. In general the stated year refers to the year in which most of the accounting data falls; for 3G-only (H3G) and 1800MHz-only 2G/3G operators (Orange and T-Mobile), the stated year is a calendar year. For 900MHz/1800MHz combined operators (Vodafone and O2), the stated year is the financial year ending on the 31st March of the following year (though after 2005, following acquisition by Telefonica, O2 has changed its year end to 31st December). All values are stated in nominal terms.

¹⁶⁶ With the exception of H3G, whose costs were not assessed within the previous market review.

like-for-like comparison is made between the outputs of the cost model and a specific operator's costs and asset counts.

A12.12 The asset count and cost benchmarks (network GBV and network operating costs) discussed previously for each of the five MNOs have therefore informed the values of efficient operator model input parameters and network dimensioning rules in the model. Ofcom believes these factors to be similar across the industry and reasonable for an average efficient operator (e.g. design utilisation). Calibration of these key inputs has resulted in a configuration of the new cost model such that high level asset count and cost outputs (specifically GBV and opex) for the modelled efficient average operator are in line with typical observed industry values.

A12.13 This process can be summarised in terms of adjusting non-operator specific inputs in order to produce the closest calibration of the model to operator specific data. These inputs are as follows:

- 900MHz GSM cell radii by geotype¹⁶⁷
- 1800MHz GSM cell radii by geotype
- 2.1GHz UMTS cell radii by geotype
- Traffic shares by geotype
- Distribution of traffic by cell type (e.g. macro, micro, picocells)
- Design utilisation factors¹⁶⁸
- Scorched node allowances¹⁶⁹
- Look-ahead planning periods¹⁷⁰
- Proportion of cell sites which are shared between 2G and 3G networks
- Proportion of RNCs and BSCs at remote switching sites
- MEA investment costs per unit over time
- MEA operating costs per unit over time

A12.14 As described in Annex 5, other sources of data have been used in conjunction with the calibration data from the MNOs in directly informing the appropriate values for a number of parameters. Ofcom has mainly used the calibration process to adjust parameters for which the data available to inform input values directly has been less reliable.

A12.15 Whilst the 2G related input parameters from the June 2005 model formed the starting point for the inputs to the new model, some of these parameters have subsequently been adjusted to different levels during the calibration process.

¹⁶⁷ See Annex 5, for definition and explanation of geotypes

¹⁶⁸ Design utilisation reflects the maximum working level of utilisation used by network designers

¹⁶⁹ Scorched node utilisation reflects the fact that utilisation is constrained by the history of deployments

¹⁷⁰ Look-ahead allows for equipment purchase in advance of the exact date at which it is required

Ofcom has made these adjustments after taking into account more detailed and up to date data in relation to the benchmarks described above, as well as other technical and unit cost data received from MNOs.

Asset count calibration

- A12.16 The aim of the asset count calibration exercise has been to ensure that the high level asset counts produced by the model are consistent with average operator data.
- A12.17 As described in the September 2006 Consultation, and noted in paragraph A12.11 above, the model has been run using operator specific spectrum allocation, traffic and 3G coverage inputs, in order to achieve consistency with operator data on a like-for-like basis. In assessing the deployment of 2G-specific and shared 2G/3G network equipment, Ofcom has taken account of the modelled and actual equipment levels of the four 2G network operators. For 3G-specific equipment, information from all five operators has been considered. Ofcom notes that, in the latter case, there are more significant differences between the level of deployment of each of the five operators, due to differing 3G launch dates and rollout strategies. These differences have been controlled for in the model through the use of operator specific levels of 3G traffic and network rollout¹⁷¹.
- A12.18 Cell radii are a crucial input parameter for accurately modelling the deployment of cell sites in areas which are driven by coverage rather than capacity requirements (e.g. rural areas). Ofcom is mindful of the different propagation characteristics of 900MHz and 1800MHz GSM spectrum, and the need to reflect potential differences in cell radii parameters assumed in the new model. It has therefore used cell radii for each operator type that reflect theoretical evidence as well as the actual site deployments of the four 2G MNOs.
- A12.19 The asset count calibration focussed on adjusting the cell radii, traffic by geotype and cell type distributions, design utilisation, scorched node and look-ahead parameters.
- A12.20 In response to the September 2006 Consultation, Orange expressed a concern that Ofcom's approach to model calibration differs from that taken by the Competition Commission since Orange understands Ofcom to have considered all four 2G/3G operators in aggregate, rather than 1800MHz-only and 900/1800MHz separately. As a result Orange argued that this "leads to a lack of visibility to the operators, reducing our ability to scrutinise and challenge the assumptions."
- A12.21 Ofcom notes that the Competition Commission in the first instance compared model output averaged across both operator types with average information from all four 2G/3G MNOs, and then considered any small relative adjustments to take account of relevant differentials¹⁷². Ofcom has adopted a broadly similar approach by focusing calibration on the overall levels of the model to average operator data for all 2G/3G MNOs since the averaged data is more likely to give reliable estimates of overall industry figures rather than those which reflect specific operator strategies. This is the case both for asset counts as well as cost levels. Nevertheless, as noted

¹⁷¹ In the case of combined 2G/3G MNOs Ofcom acknowledges that there are also differences in 2G network deployment strategies. Given the objective of obtaining unit costs for an efficient average operator with a benchmark level of 2G coverage, Ofcom has considered operators' 2G cell site counts to the extent that their coverage aligns with the benchmark 2G coverage assumption.

¹⁷² See paragraph 2.313 of the Competition Commission's 2003 Report

above, Ofcom has also configured the model to specific MNO characteristics, such as spectrum allocation, and in so doing has given careful consideration to the differences between 1800MHz-only and 900/1800MHz operators where appropriate, as well as to the differences between 2G/3G combined operators and 3G-only operators.

A12.22 While Ofcom respects and agrees with Orange’s desire to give as much visibility to the operators as possible, given that there are only two 1800MHz-only operators (and two 900/1800MHz operators), Ofcom notes that it is not possible to reveal average 1800MHz-only actual data (or average 900/1800MHz actual data) without allowing confidential information to be deduced easily by another operator.

A12.23 Figure A12.1 below shows the counts of key network equipment in the model compared to the operator benchmarks after complete calibration of the new model. This is shown on an average basis¹⁷³ for the four 2G/3G MNOs, and separately for the 3G-only operator (although the H3G benchmarks cannot be shown for confidentiality reasons).

Figure A12.1 Comparison of asset counts of key network equipment between model output and MNOs data in 2004/05¹⁷⁴

| Asset type | 2G/3G operator | | | 3G-only operator* | | |
|------------------------|----------------|---------------|---------------|-------------------|-------|---------------|
| | MNO average | Model average | Sep 06 condoc | H3G | Model | Sep 06 condoc |
| 2G macrocells | 7,770 | 8,077 | 8,132 | - | - | - |
| 2G micro and picocells | 2,217 | 2,597 | 2,637 | - | - | - |
| 3G Node-Bs | 3,330 | 3,439 | 3,439 | [<] | [<] | [<] |
| TRXs | 67,350 | 63,481 | 63,985 | - | - | - |
| BSCs | 221 | 159 | 161 | - | - | - |
| RNCs | 24 | 27 | 27 | [<] | [<] | [<] |
| MSCs and MSC servers | 68 | 77 | 77 | [<] | [<] | [<] |

* The 3G coverage scenario assumed in the 3G-only operator model is confidential and disclosed only to H3G.

A12.24 The overall asset count calibration results of the model have improved since the September 2006 Consultation following the reduction in forecast voice traffic per subscriber for the medium demand scenario (see Annex 5, paragraphs A5.53-54). Given that some of the cell sites in urban and suburban geotypes are capacity constrained, this lower traffic forecast has reduced the number of sites deployed resulting in better alignment with MNOs’ actual data. The RNC asset calibration for the 3G-only operator has also improved.

¹⁷³ The average model output is the average of the 900/1800MHz combined and 1800MHz-only 2G/3G non-operator specific scenarios from the new model

¹⁷⁴ Model output is 2004/05; MNO data is described in Annex 6

- A12.25 Ofcom notes that, in general, there is a good agreement between the model output of asset counts and the MNO average data, with the model generally slightly over-estimating rather than under-estimating the quantities of network equipment required. Whilst the model includes lower counts of some types of network equipment (e.g. TRX) than the average MNO data, in these cases there is generally a large discrepancy between the counts of different operators' equipment.
- A12.26 Stakeholders' responses to the September 2006 Consultation included comments on various network design parameters in the model that could potentially improve the asset count calibration. Ofcom's response to these comments is found in Annex 5.

Cost calibration

- A12.27 Similarly to the asset count calibration, the aim of the cost calibration exercise has been to adjust model inputs such that the levels of GBV and operating costs produced by the model are broadly consistent with average operator data. However, in this case multiple years of GBV and operating costs benchmarks have been used to ensure that not only the absolute levels but also the changes in costs over time are reflected in the new model.
- A12.28 The cost benchmarks obtained from MNOs could not be split consistently between 2G-specific, 3G-specific and shared costs, so total network costs for each operator have been considered for the purpose of calibration. However, the 2001 data points obtained by the Competition Commission provide a view of 2G specific costs prior to the introduction of 3G networks, whereas H3G's cost benchmarks are entirely 3G-specific. These benchmarks have therefore been used for initial 2G and 3G specific cost calibrations of the model. Thereafter, the full range of 2G/3G operator cost benchmarks has been assessed and further adjustments made to the model input parameters accordingly.
- A12.29 The cost calibration has been focussed on adjusting MEA levels for investment and operating unit costs over time.
- A12.30 The figure below shows the levels of GBV and operating costs from the model in each relevant year compared to the operator benchmarks, after calibration of the new model. This is shown on an average basis¹⁷⁵ for the four 2G/3G MNOs, and separately under the 3G-only operator (although the H3G benchmarks cannot be shown for confidentiality reasons).

Figure A12.2 Comparison of aggregate costs between model output and MNOs' data

| | | 2001 | 2002 | 2003 | 2004 | 2005 ¹⁷⁶ |
|----------------|---------------|-------|-------|-------|-------|---------------------|
| 2G/3G GBV (£m) | MNO average | 2,680 | 3,092 | 3,311 | 3,629 | 3,850 |
| | Model average | 2,705 | 2,906 | 3,158 | 3,534 | 3,887 |

¹⁷⁵ The average model output is the average of the 900MHz/1800MHz combined and 1800MHz-only 2G/3G non-operator specific scenarios from the new model

¹⁷⁶ For 3G-only and 1800MHz-only 2G/3G operators, the stated year is a calendar year. For 900MHz/1800MHz combined operators, the stated year is the financial year ending on the 31st March of the following year (though after 2005, following acquisition by Telefonica, O2 has changed its year end to 31st December). All values are stated in nominal terms.

| | | | | | | |
|------------------------------|---------------|-------|-------|-------|-------|-----|
| | Sep 06 model | 2,726 | 2,921 | 3,198 | 3,605 | - |
| 2G/3G operating costs (£m) | MNO average | 323 | 324 | 326 | 324 | 334 |
| | Model average | 324 | 348 | 356 | 353 | 364 |
| | Sep 06 model | 309 | 339 | 361 | 376 | - |
| 3G-only GBV (£m) | H3G | - | [X] | [X] | [X] | [X] |
| | Model* | [X] | [X] | [X] | [X] | [X] |
| | Sep 06 model | - | [X] | [X] | [X] | - |
| 3G-only operating costs (£m) | H3G | - | [X] | [X] | [X] | [X] |
| | Model* | [X] | [X] | [X] | [X] | [X] |
| | Sep 06 model | - | [X] | [X] | [X] | - |

* The 3G coverage scenario assumed in the 3G-only operator model is confidential and disclosed only to H3G.

A12.31 The cost benchmarks for the MNOs have been revised since the publication of the September 2006 Consultation document. Details of these revisions can be found in Annex 6.

A12.32 Operating costs for the 2G/3G MNOs have not risen sharply since the deployment of 3G networks. Significant increases in operating costs over this period might have been expected, due to the additional maintenance required on new 3G network equipment. Indeed, increases were originally forecast in the uncalibrated model. However, feedback from the MNOs suggests that 3G operating costs might have been delayed, in part due to initial agreements obtained on 3G equipment which included maintenance contracts for a limited period.

A12.33 In order to account for these effects and to provide a better alignment of the model to revised MNOs' costs, Ofcom has applied an adjustment factor to the 3G related operating costs of a 2G/3G operator so that maintenance costs in the early life of the network are reduced. However, in the case of a 3G-only new entrant, Ofcom does not consider that such costs savings are appropriate. This is supported by H3G's actual accounting cost information. Furthermore, changes in operating cost trends (as described in Annex 5) provide better calibration of costs over the whole calibration period. However, for both the 2G/3G combined operator and the 3G-only operator, modelled operating costs are still higher than the average of MNOs' actual costs (as set out in the figure above).

A12.34 It might be misleading to compare the modelled capital and operating costs to the MNO average capital and operating costs in isolation, without considering the total annualised costs. Modelled investment costs in some years are slightly lower than those of the average MNO benchmarks; however, capital and operating costs may be partly substitutable depending on an operator's commercial strategy, and the lower capital costs in each case are approximately offset by the higher operating

costs in the same year. On balance, and within the context of the accuracy of the accounting information available, Ofcom considers that its approach is reasonable in terms of any potential impact on the level of unit costs for voice termination arising from the small differences between the accounting benchmarks and modelled costs.

Annex 13

Charge Control Benchmarks

Overview

- A13.1 Ofcom's approach to determining the appropriate levels for MCT charge controls is to consider the appropriate target level at the end of the proposed charge control period (in this case 2010/11) before considering the most reasonable path of charges to reach that target. The purpose of this annex is to set out the relevant unit cost benchmarks that have been used for determining the efficient target level for the end of the charge control period.
- A13.2 Ofcom considers that there are a number of components which should be combined additively in order to derive appropriate benchmarks for the efficient charge level for voice termination charges:
- i) **Network costs of mobile termination**, which can be separated into a unit cost element for recovery of network investment and operating expenditure discussed in Annex 5, and a unit cost element to recover an appropriate portion of 3G spectrum costs discussed in Annex 14.
 - ii) **Non-network costs of mobile termination**, for recovery of administrative overhead common costs related to operation of the mobile networks. This component is discussed in Annex 15.
 - iii) **Network externality mark-up**, which takes into account the external benefits to mobile and fixed subscribers of having a larger number of mobile subscribers with whom they can communicate. This component is addressed in Annex 16.
- A13.3 This annex describes Ofcom's approach to estimating the appropriate values for each of these components, and builds them into a representative set of benchmarks that have been used to set the charge control level.

Network costs of mobile termination

- A13.4 As noted above, network costs of mobile termination can be separated into:
- a unit cost element for recovery of network investment and operating expenditure; and
 - a unit cost element to recover an appropriate proportion of 3G spectrum costs.
- A13.5 This section sets out the key elements behind Ofcom's determination of the efficient network costs of mobile call termination, including:
- its approach to the most critical forward-looking variables in its cost modelling, namely:
 - i) demand forecasts; and
 - ii) spectrum costs;
 - the path of cost recovery used; and

- movements in the levels of key indicators of efficient unit costs over time.

Demand Forecasts

- A13.6 Demand is a key input into the cost model in two ways.
- A13.7 First, demand is a driver of costs. The cost model uses assumptions about demand levels to calculate network loading and asset deployment. More detail is available in Annex 5, but broadly this means that the model calculates the quantities of each type of network asset that are required to service the demand.
- A13.8 Second, demand is a major input into cost allocation within the cost model, because total service costs are allocated across units of output of different services in order to arrive at unit service costs. In general, higher levels of demand will generate higher total costs but lower cost per unit of output to the degree that the network exhibits economies of scale.
- A13.9 As discussed in Annex 5, a range of demand forecasts has been considered for use in the model to derive appropriate efficient charge benchmarks. The starting point for each of these scenarios is a single forecast of total mobile subscribers to 2020/21, which is then apportioned to each operator. This apportionment is consistent with the principle of competitive neutrality and with an evolution which ultimately results in five operators with equal market share. For 2G/3G operators, high, medium and low migration rate forecasts are applied to apportion their subscribers between their 2G and 3G networks.
- A13.10 Having apportioned subscribers amongst the MNOs, aggregate demand is calculated by applying forecasts for voice and data service usage per subscriber. High, medium and low forecasts are considered, with a breadth that is intended to reflect the likely range of realistic outcomes. All of these demand forecasts have been developed in light of historical data as well as forecasts from MNOs, brokers' reports and third party market research (including IDC and WCIS¹⁷⁷).
- A13.11 Data forecasts are included in the model because they contribute to economies of scope in the network and allow cost allocation. Ofcom's model is not designed to estimate the efficient costs of data services.
- A13.12 The future of demand for data services is very uncertain, and Ofcom understands the need to be cautious about the impact of data forecasts in the cost model. Ofcom has developed a voice-only scenario in order to understand the potential magnitude of the impact of data forecasts. Responses to the September 2006 Consultation made a number of points in relation to data forecasts that are addressed in detail in Annex 5. For the purposes of setting charge control levels, Ofcom notes that a number of these points are addressed by placing weight on the benchmarks derived from voice-only scenarios.
- A13.13 Ofcom has made a number of revisions to key demand assumptions since September, following responses from stakeholders and further analysis. These changes are also discussed in detail in Annex 5, and include:
- a reduction in the medium case growth rate of voice minutes per subscriber, from 9% per annum to 5%;

¹⁷⁷ Ofcom cannot make these third party forecast available to stakeholders due to copyright. However, they are available to purchase from the suppliers.

- a change in the market share profile of the 3G-only operator; and
- a change in the construction of the voice-only scenario so that none of the calls are forecast to be video calls (a small proportion of calls were assumed to be video calls in this scenario in the September 2006 Consultation).

A13.14 Ofcom has developed four overall demand scenarios, separately for 2G/3G and 3G-only operators:

- High voice and data traffic
- Medium voice and data traffic
- Low voice and data traffic
- Medium voice-only traffic

A13.15 These demand scenarios are a key basis of the efficient cost benchmarks that Ofcom has developed. The relative impact of each demand scenario is discussed later in this section.

3G Spectrum Costs

A13.16 The treatment of 3G spectrum costs and 3G spectrum cost allocation has a significant impact on the level of the 2010/11 unit cost benchmarks. The forward-looking value of 3G spectrum is also very uncertain, which presents Ofcom with a complex challenge in terms of setting MCT charge controls.

A13.17 The purpose of this annex in relation to 3G spectrum costs is to explain the specific manner in which spectrum costs have been applied in the scenarios that Ofcom has used to develop efficient unit cost benchmarks. A more detailed discussion of Ofcom's treatment of 3G spectrum costs is contained in Annex 14.

Analysis of 3G spectrum cost scenarios

A13.18 Recognising the uncertainty associated with relevant 3G spectrum costs, Ofcom has chosen to consider a range of plausible scenarios for 3G spectrum costs in setting MCT charge controls.

A13.19 Given that the unit cost benchmarks in question relate only to voice termination, the focus of the cost model is not on estimating the total value of spectrum used by MNOs for all services. Rather, its goal is to derive appropriate values for the portion of spectrum costs that should be recovered from voice termination. This is a significant factor in interpreting the scenarios considered for a range of different voice and data demand levels.

A13.20 BT made a related point in its response to the September 2006 Consultation. It argued that:

...there is a systematic link between the value of 3G spectrum and the split of this value between new services and existing voice services. More optimistic valuations of 3G spectrum are based on higher expected revenues from new services and so should be associated with a smaller share of the value of 3G spectrum being associated with existing services. Therefore, any scenario in which

the 3G spectrum value is higher should also have a smaller share of this associated with voice services.

- A13.21 Ofcom has incorporated spectrum valuations into its overall benchmark scenarios that are broadly consistent with the volume of voice and data traffic within each scenario. For example, high levels of demand for network services would imply that a greater value (opportunity cost) should be attributed to 3G spectrum than would be the case for low levels of demand. Therefore, where a high voice and data traffic volume is assumed for a particular scenario, Ofcom believes that the value assigned to spectrum for that scenario should be towards the higher end of its range of plausible valuations, and vice versa.
- A13.22 This approach also affects the “medium voice-only” scenario that is used by Ofcom. This scenario recovers the entire costs of all network assets from voice services alone, and therefore leads to higher unit costs than the medium voice and data scenario (which has equivalent levels of voice demand but achieves greater economies of scope through the inclusion of data traffic). The purpose of this voice-only scenario is to explore the extent of economies of scale and scope in network costs due to carrying both voice and data traffic. As such, Ofcom believes that it is appropriate to consider levels of 3G spectrum cost recovery from voice termination under this scenario that are equivalent to those under the medium voice and data demand scenario, so that comparisons with corresponding voice and data traffic scenarios quantify the network economies of scope. Ofcom has established its efficient cost benchmarks for “medium voice-only” scenarios on this basis.
- A13.23 Annex 14 describes seven scenarios that Ofcom has considered in terms of the overall magnitude of 3G spectrum costs and their allocation to voice termination. While all of these scenarios are useful benchmarks of spectrum costs, Ofcom has considered further which of these are most useful in terms of representing reasonable MCT unit cost benchmarks.
- A13.24 The final five of the scenarios in Annex 14 differ only in terms of the overall valuations for 3G spectrum (i.e. the allocation of this value is identical for a given demand scenario). In contrast, the first two scenarios differ in structure as well as levels. The first two scenarios place greater weight on the available market-based evidence and the different 3G spectrum holdings of the MNOs, in particular the prices paid in 2000/01 for a third carrier¹⁷⁸ by Vodafone and H3G. This analysis is especially important for the 3G-only operator, given that the only example of a 3G-only operator in the UK (H3G) has a 3-carrier licence.
- A13.25 In Scenario 1, Ofcom uses the actual licence fee payments, along with the associated spectrum allocations, as a proxy for the marginal forward-looking opportunity cost¹⁷⁹ and forecasts equal market shares for all operators in the long run. The key difference in this case is that the MNOs that secured 3 carriers (Vodafone and H3G) have both their additional payments and their additional carrier taken into consideration in the cost modelling. For a given level of demand, the inclusion of the third carrier results in reduced network investment and operating costs (when compared to a network with only two carriers) in situations where the network becomes capacity-constrained.
- A13.26 As noted in paragraph A14.90 of Annex 14, in principle the costs and benefits associated with the additional carrier could be expected to cancel out. In its

¹⁷⁸ A “carrier” for 3G means a paired allocation of spectrum: 2 x 5MHz of spectrum.

¹⁷⁹ See Annex 14 for further details

response to the September 2006 Consultation, H3G accepted that a two carrier scenario may be relevant since a new entrant could bid for one of the two carrier licences. In the case of the 3G-only operator, Ofcom has compared the results of Scenario 1 (3 carriers, 3G spectrum value of £4.4bn¹⁸⁰) with Scenario 3 (2 carriers, 3G spectrum value of £4.0bn). The results are very similar¹⁸¹, supporting the argument presented in paragraph A14.90 that the marginal forward-looking opportunity cost of a third carrier ought to reflect the network cost savings associated with that carrier. This analysis lends support to considering an average efficient operator benchmark for voice termination based on a network with two carriers.

- A13.27 However, Vodafone's payment of £6bn for a three carrier licence in 2000/01 does not reconcile well with the network cost saving analysis described above. In paragraph A14.90 it was also noted that it may be appropriate to ignore the third carrier in determining efficient voice termination benchmarks if it is not required for offering voice call termination and the additional cost should therefore be recovered from other mobile services (as argued by BT). Effectively, this argument implies that a third carrier might be relevant where greater overall traffic demand is anticipated. Scenario 2 considers estimates of the average payment per carrier and the average demand per carrier, and in particular for a 900/1800MHz operator with a 3G spectrum holding of 3 carriers valued at £6.0bn and 25% ultimate market share (corresponding to 3 carriers out of a total of 12 in the overall market). In the case of a 900/1800MHz operator, Ofcom has compared the results of Scenario 2 (3 carriers, 3G spectrum value of £6.0bn, 25% market share) with Scenario 3 (2 carriers, 3G spectrum value of £4.0bn, 20% market share) which are similar. One interpretation of this analysis is that the premium paid for the additional carrier is offset by the cost savings resulting from economies of scale which are derived from an increased market share. Furthermore, Vodafone itself stated that "Ofcom is correct in accounting for the purchase price of 2 carriers (2x10MHz) of spectrum within the cost model" in its response to the September 2006 Consultation.
- A13.28 Both of these sets of analysis suggest that, for the purposes of establishing efficient unit cost benchmarks for voice call termination, it is reasonable to consider scenarios for an average efficient operator based on a network with two carriers. Therefore the following overall benchmarks are derived on the basis of Scenarios 3-7 described in Annex 14.
- A13.29 In the September 2006 Consultation, Ofcom considered the results of modelling scenarios in which 3G spectrum valuations were set to zero in order to explore the lower bound with respect to spectrum costs. However, as set out in paragraphs A14.26-A14.29 Ofcom's proposals did not place any weight on these scenarios. Ofcom agrees with H3G's response that it would be unreasonable for an estimate of the efficient termination charge control levels not to reflect *any* opportunity cost or recovery of 3G spectrum costs.
- A13.30 Furthermore, following responses to the consultation, Ofcom accepts that the use of the "radio traffic" cost driver is a more consistent approach with the treatment of

¹⁸⁰ Mobile operators purchased their 3G licences in the 2000/01 financial year, and for ease of reference to the auction payments in this year, this document expresses 3G spectrum costs in 2000/01 terms. However, while some scenarios for spectrum cost inputs are based on the MNOs auction payments in 2000/01, Ofcom's views on the value of spectrum are not based on these payments – see Annex 14 for more detail.

¹⁸¹ The results of the cost model suggest a slightly lower result for the 3G-only operator under Scenario 1 when compared to Scenario 3, implying that it was advantageous to pay the premium for the additional carrier to access the associated network cost savings.

other assets than the “all traffic” cost driver (this is described in paragraph A14.66 of Annex 14). As a result, while in the September 2006 Consultation Ofcom considered scenarios that allocated spectrum costs on the basis of both the all traffic and radio traffic cost drivers, the efficient unit cost benchmarks described in this annex are derived using only the radio traffic cost driver.

Final 3G Spectrum Cost Scenarios

A13.31 Taking the above factors into account, Ofcom has used five alternative spectrum valuations as inputs into the cost model for the purposes of establishing efficient unit cost benchmarks for voice termination. All of these scenarios assume a network using two carriers, and that 3G spectrum costs are allocated to services on the basis of the radio traffic driver. These scenarios correspond with scenarios 3 to 7 in Annex 14, namely:

- £4.0bn, chosen to align with the auction payments made by MNOs in 2000/01 for a two carrier licence;
- £4.4bn, which adds the present value of a £4.0bn real “renewal payment” in 2021, in addition to the initial £4.0bn payment in 2000/01 for a two carrier licence – though Ofcom has no view at this stage on policy options post 2021 and considers this to be an extreme upper bound;
- £3.3bn, which represents a weighted average, as considered in the September 2006 Consultation document, across the existing two carrier licences¹⁸²;
- £1.9bn, corresponding to the full application of O2’s £2.1bn write-down; and
- £1.4bn, which is the value at which, for a 2G/3G operator in 2010/11 under a medium voice and data scenario, the 2G component unit cost equals the 3G component unit cost at current 2G AIP – Ofcom considers this to be a lower bound.

Path of cost recovery

A13.32 The objective of the cost model is to derive regulated charges for voice termination which allow the MNOs to recover the lifetime costs of the network over the full period that the network is operational. Having determined the total network costs to be recovered from all services over the lifetime of the network, it is necessary to select an appropriate path of cost recovery over time. The cost model is capable of generating unit costs for services on the basis of three alternative paths of cost recovery:

- Economic Depreciation used in the previous market review (“Original ED”)¹⁸³;
- A historical cost accounting approach (“HCA”); and
- A current cost accounting approach (“CCA”).

¹⁸² There are three existing two carrier licences, which can be used to provide a benchmark. This benchmark is adjusted to allow for O2’s write-down by taking the average of two £4.0bn, two carrier licences and one £1.9bn, two carrier licence. The resulting figure is £3.3bn.

¹⁸³ In September 2006 Ofcom also consulted on a simplified form of Economic Depreciation (“Simplified ED”), however this is not included in the final cost model for reasons discussed in Annex 5

A13.33 Annex 5 discusses the relative merits of these approaches in more detail, including stakeholder responses to the September 2006 Consultation.

A13.34 Overall, Ofcom considers economic depreciation to be the most appropriate methodology, since it explicitly attempts to mimic the outcomes of a competitive market and therefore generate the best signals for consumption and investment.

A13.35 In the previous market review, Ofcom used the Original ED approach to determine the charge controls levels for voice termination and did not place significant weight on other methodologies. This approach was accepted by the Competition Commission in the its 2003 Report:

“We chose economic depreciation because it most accurately matches the costs incurred in order to carry traffic to the periods in which the traffic is carried”¹⁸⁴.

A13.36 Consistency with the cost recovery path of previous charge controls has advantages, so as to avoid undesirable windfall gains and losses. It would be undesirable to adopt a different path of cost recovery unless new evidence suggested that the previous approach was no longer appropriate.

A13.37 In summary, Ofcom believes that the Original ED approach continues to be the appropriate methodology for determining the levels for the proposed charge controls. The unit cost benchmarks discussed in the remainder of this section (for network investment and operating expenditure and spectrum costs) are derived using Original ED.

Movement in key indicators over time

A13.38 While Ofcom is primarily interested in the level of the charge control for 2010/11, it is important to understand the movements in key indicators of efficient costs over time. Ofcom has also analysed a number of key parameters over the long run to assist in determining the appropriate charge controls to be put in place until 2010/11.

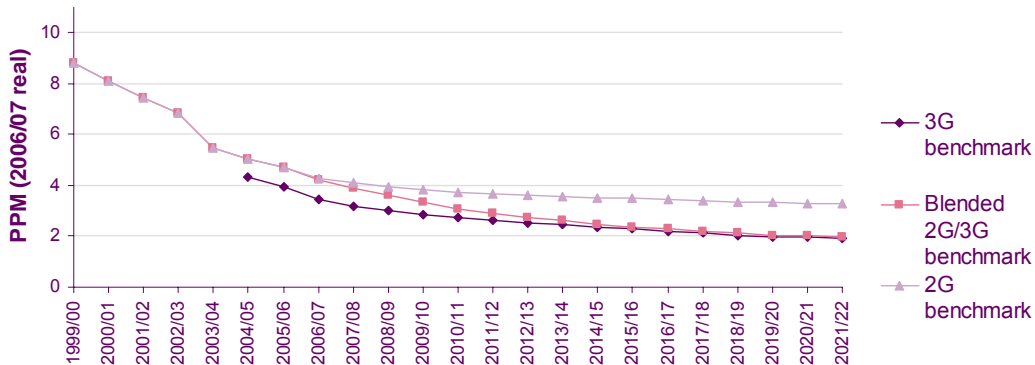
A13.39 Figure A13.1 below show cost modelling results for recovery of network investment and operating expenditure (excluding 3G spectrum costs) for an 1800MHz 2G/3G combined operator in a medium voice and data demand scenario. The 2G and 3G component efficient charge benchmarks are depicted separately and can be seen to be decreasing over time. This is due to declining input costs, which determine the path of cost recovery under economic depreciation.

A13.40 Figure A13.1 also illustrates the relationship between the blended 2G/3G benchmark to its component benchmarks as customers migrate from 2G to 3G.

¹⁸⁴ See paragraph 2.305 of the Competition Commission's 2003 Report

Figure A13.1: 2G, 3G and blended unit cost benchmarks under medium voice and data traffic scenario

2G/3G operator (1800MHz), Zero 3G spectrum costs

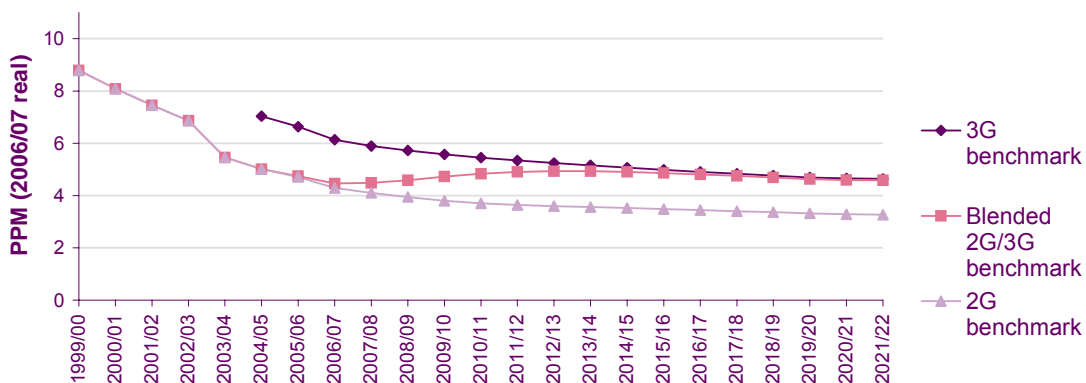


A13.41 Figure A13.1 above shows that, in the absence of 3G spectrum costs, the 3G benchmark continues to fall relative to the 2G benchmark over time. However, the 3G spectrum costs can have an impact on these results. The inclusion of 3G spectrum costs in the cost model is a complex issue, and is discussed in significant detail in Annex 14. In some scenarios, these costs can result in a 3G benchmark which is higher than the 2G benchmark. One example is Figure A13.2 below, which assumes total 3G spectrum costs of £4.0bn in a medium voice and data demand scenario.

A13.42 In this case, the impact of traffic migration from 2G to 3G results in a 2G/3G blended unit cost benchmark which increases in real terms over the period of the proposed charge controls. This occurs despite both the 2G and 3G component efficient charge benchmarks decreasing over time, due to a shift in the blended unit cost from the level of the 2G component to the (higher) 3G component unit cost benchmark during the control period.

Figure A13.2 2G/3G operator: 2G, 3G and blended unit cost benchmarks under medium voice and data traffic scenario

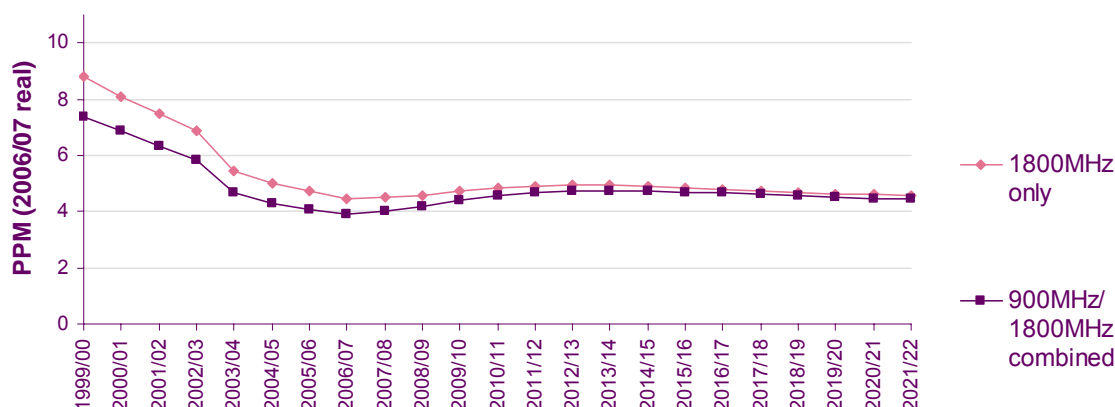
2G/3G operator (1800MHz) £4.0B Spectrum Costs



A13.43 A key issue is to determine whether the same efficient charge level in 2010/11 should be set for all 2G/3G combined operators, or to differentiate between the 900/1800MHz operators and 1800MHz-only operators. This issue is discussed in detail in Section 9 of this document. The behaviour of the modelled cost differential between the two types of operator over time is shown in Figure A13.3 below, in which the differential between 900/1800MHz operators and 1800MHz-only operators is closing over time, and is less than 0.3ppm by 2010/11.

Figure A13.3 2G/3G operators: comparison of blended efficient charge benchmarks under the medium voice and data traffic scenario

2G/3G operator blended benchmarks

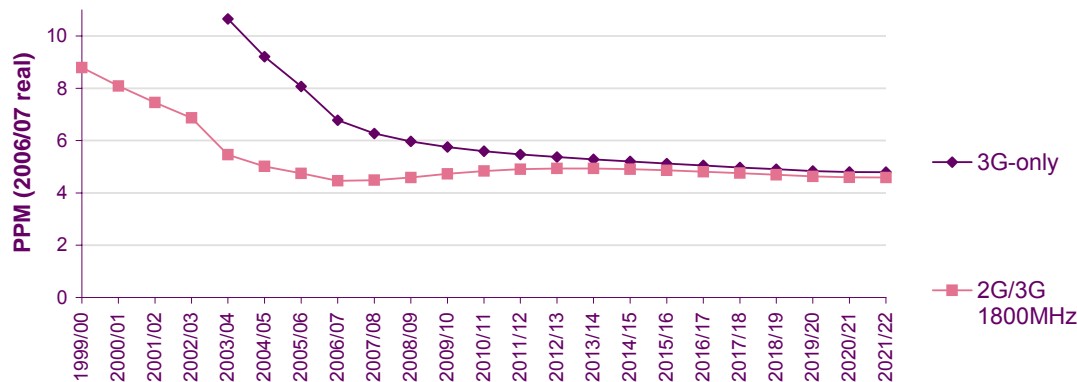


A13.44 Similar convergence is evident between the blended charge for the 2G/3G combined operator and the 3G-only operator, however a significant gap between the two benchmarks remains in 2010/11. Figure A13.4 below demonstrates this result in an indicative scenario that includes £4.0bn of 3G spectrum costs. The convergence occurs as customers of the 2G/3G combined operators migrate from 2G to 3G services, ultimately resulting in a benchmark which is a reflection of the 3G component efficient charge.

A13.45 Over time, the results of the cost modelling suggest that a single termination charge benchmark may be appropriate for all operators. This is discussed in more detail in Section 9 of this document.

Figure A13.4 Comparison of 2G/3G 1800MHz and 3G-only blended efficient charge benchmarks under the medium voice and data traffic scenario

Comparison of benchmarks - 3G-only and 2G/3G 1800 MHz



A13.46 In its response to the September 2006 Consultation, O2 argued that a national roaming agreement should be taken into account for the 3G-only operator, and proposed a simple methodology to achieve this. This methodology would blend the efficient charge generated by the cost model for calls terminated on the 3G-only operator's own network and the price paid by the 3G-only operator to its roaming partner for termination of calls on the partner's 2G network. The blend would be a volume-weighted average of the two charge levels, and in practice would be lower than the 3G-only operator's efficient charge derived from the model on the basis of its own network costs.

A13.47 Ofcom has considered the effect of taking into account the 3G-only operator's national roaming agreement in its cost modelling. By 2010/11 the volume of traffic that is terminated on the 2G roaming partner's network is forecast to be very small, therefore the effect of O2's suggested adjustment to the 3G-only efficient termination charge is minimal. Ofcom estimates that the volume of traffic terminated on the roaming partner's network would need to be at least four times higher in 2010/11 than assumed in the cost model to make a difference of more than 0.1ppm in the 3G-only operator's terminated charge. For this reason, Ofcom does not believe that there is sufficient benefit in altering the model in the manner suggested by O2 to account for national roaming. Ofcom is also mindful that any adjustment would need to take account of offsetting costs that the 3G-only operator may incur in establishing and maintaining a roaming agreement.

Components of efficient charge benchmarks in 2010/11

A13.48 As mentioned earlier, the purpose of this annex is to set out the relevant unit cost benchmarks used to determine the efficient target level in 2010/11. This section looks at the key components of network unit costs, namely demand and 3G spectrum costs, and then discusses the impact of non-network costs and the network externality on efficient unit cost benchmarks.

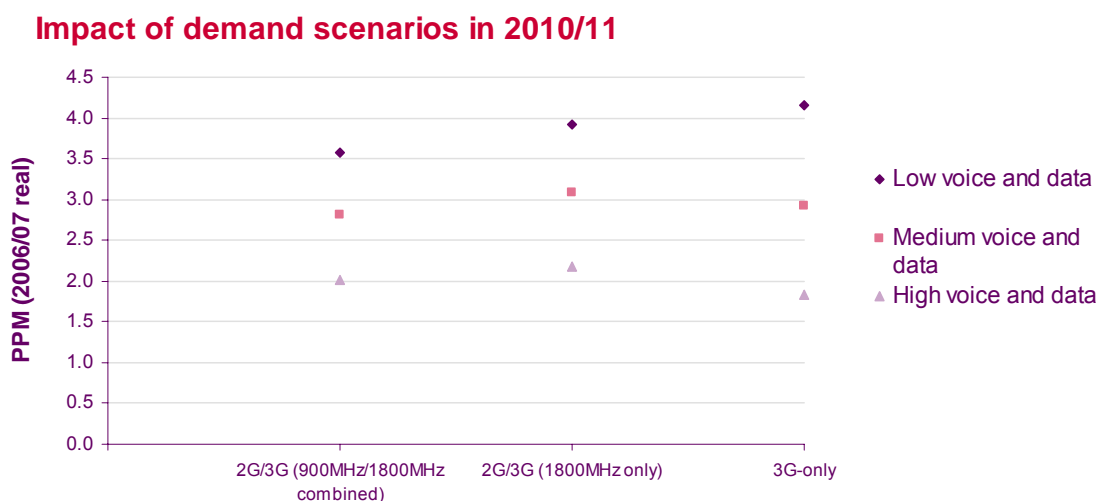
Demand Scenarios

A13.49 As discussed earlier in this annex, efficient MCT unit cost estimates are sensitive to the level of demand assumed, and future demand is very uncertain. In order to deal

with this uncertainty, Ofcom has considered several demand scenarios as part of its approach to determining charge control levels.

A13.50 Figure A13.5 below shows the sensitivity of unit cost recovery on network investment and operating costs (excluding 3G spectrum costs) to the high, medium and low voice and data scenarios. The relatively lower variance of the 2G/3G operator benchmarks is caused by the blending in of the 2G component, the level of which is 2010/11 is significantly less sensitive with respect to traffic forecasts because there is a long period of historic volumes that are fixed with respect to different traffic forecasts. However, in isolation, the 3G benchmark that contributes to the 2G/3G blended charge is sensitive to traffic to a similar extent as the 3G-only operator's efficient unit costs.

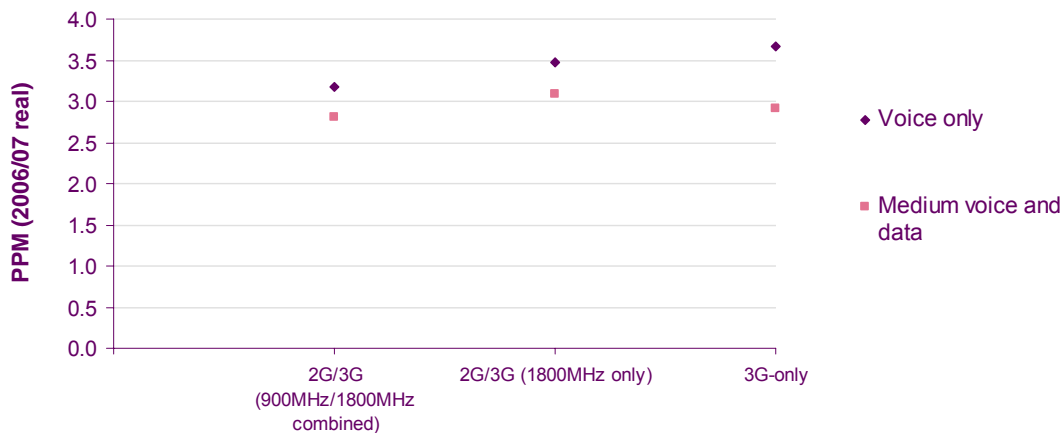
Figure A13.5 Impact of demand scenarios in 2010/11 for different operator types



A13.51 Figure A13.6 below shows the impact on unit cost components for network investment and operating expenditure of allocating these costs to voice services only, rather than voice and data services. Again, the effect is less pronounced for 2G/3G operator benchmarks due to the blending in of the 2G component.

Figure A13.6 Comparison of impact of voice-only and medium voice and data traffic scenarios in 2010/11 for different operator types

Impact of demand scenarios in 2010/11



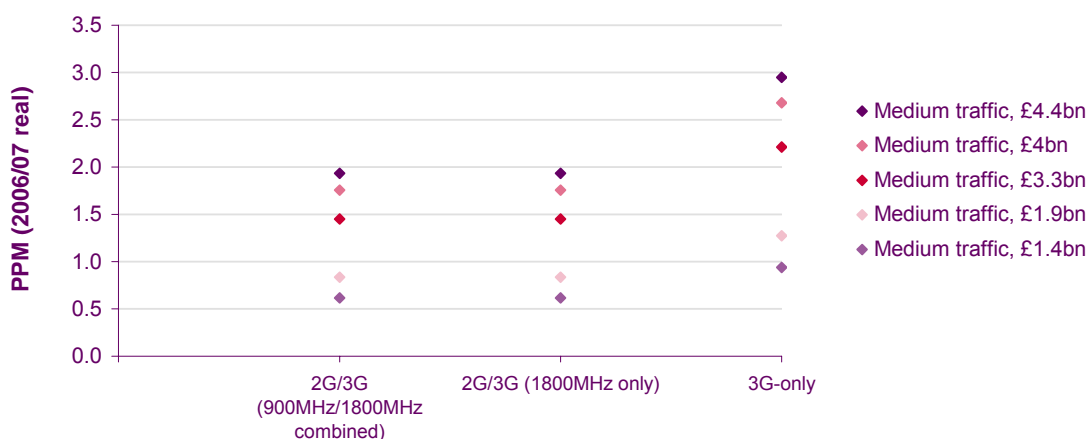
Spectrum Costs

A13.52 The other major uncertainty in determining efficient MCT unit cost benchmarks is the impact of 3G spectrum costs. Ofcom believes that 3G spectrum costs should not be treated as an independent variable from the demand forecasts, but rather that the 3G spectrum costs recovered from voice services should be broadly consistent with the voice and data traffic forecast chosen.

A13.53 Within this context, it is important to understand how the uncertainty in the marginal forward-looking opportunity cost of the 3G spectrum may impact the efficient unit costs of termination. For example, Figure A13.7 below shows the impact of the different spectrum valuations mentioned earlier in this annex for the medium voice and data demand scenario:

Figure A13.7 Impact of spectrum cost treatments in 2010/11 for different operator types under medium voice and data traffic scenario

Impact of spectrum cost treatments in 2010/11



Non-network cost and network externality mark-ups

- A13.54 As discussed previously, in addition to the network costs calculated from the model, two additional mark-ups also contribute to the level of the 2010/11 efficient charge benchmarks. These recover a reasonable share of non-network costs (administration costs) as well as a network externality mark-up to account for the external benefits associated with marginal subscribers and are discussed in detail in Annexes 15 and 16 respectively.
- A13.55 In the September 2006 Consultation Ofcom estimated that £112m in 2006/07 prices should be allocated to network services for administration costs. Ofcom has revised this estimate given updated information and comments from stakeholders. Ofcom estimates that £148m in 2006/07 prices should be allocated to network activities.
- A13.56 The revised allowance for administration costs results in an overall ppm mark-up in 2010/11 (in real 2006/07 prices) on MCT for administration costs, after taking into account Ofcom's revised demand scenarios (set out in Annex 5) of 0.3ppm for 2G/3G operators and 0.4ppm for the 3G-only operator. Ofcom considers that this is a reasonable allowance for the recovery of administration costs from MCT.
- A13.57 A value of 0.3ppm has been estimated by Ofcom for the network externality mark-up. As discussed in Annex 16, a range of potential approaches to the determination of this value have been explored and this value represents Ofcom's view of a reasonable estimate.

Final benchmarks

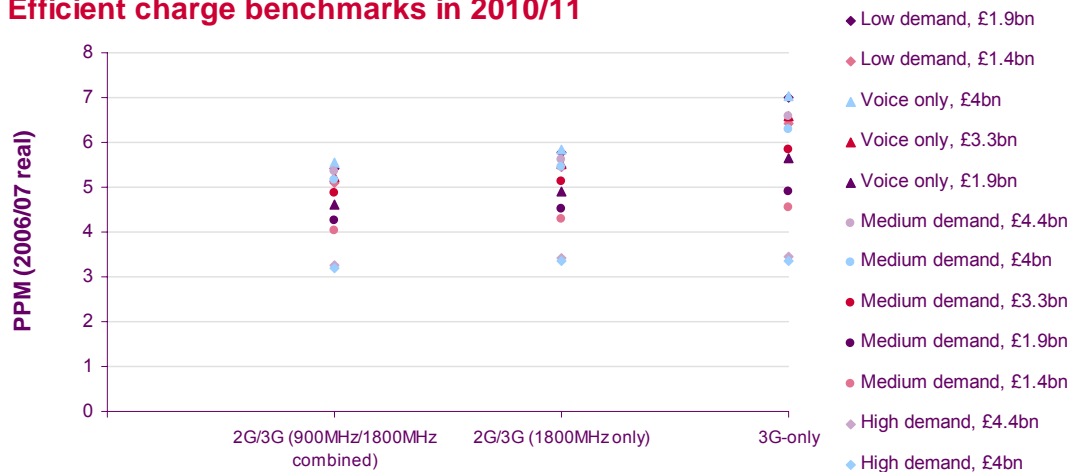
- A13.58 There is a significant degree of uncertainty in forecasting critical variables which influence the level of efficient charges for MCT. Ofcom has modelled a range of scenarios to take account of the uncertainty surrounding future voice and data traffic volumes, and of different valuations of 3G spectrum. In combination, the alternative demand forecasts and 3G spectrum costs that Ofcom has modelled result in a wide range of efficient unit charge benchmarks for each type of operator.
- A13.59 Ofcom has been very careful to select a range of benchmarks that most accurately represent the results of its analysis. The scenarios noted in Figure A13.8 below are not the only ones that Ofcom has modelled, and many more scenarios could be developed in addition to those presented in this document. However, Ofcom believes that its final benchmarks represent a reasonable set of efficient unit cost estimates (plus network externality surcharge) for determining a final level for the charge controls. In comparison to the results presented in September 2006, the final set of benchmarks has also been refined in two further ways. Firstly, all scenarios assume that the MNOs use only 2 carriers for voice services for the reasons stated in paragraph A13.28. Secondly, in response to the arguments presented by MNOs, Ofcom has allocated spectrum costs in all scenarios by using the radio traffic cost driver for the reasons stated in paragraph A13.30.
- A13.60 Ofcom has selected the following 12 final scenarios as the basis for an appropriate set of benchmarks for the level of the charge control:
- Medium voice and data demand, using 3G spectrum values of:
 - i. £4.4bn
 - ii. £4.0bn
 - iii. £3.3bn
 - iv. £1.9bn

- v. £1.4bn
- High voice and data demand, using 3G spectrum values of:
 - vi. £4.4bn
 - vii. £4.0bn
- Low voice and data demand, using 3G spectrum values of:
 - viii. £1.9bn
 - ix. £1.4bn
- Medium voice only demand, using 3G spectrum values of¹⁸⁵:
 - x. £1.9bn
 - xi. £3.3bn
 - xii. £4.0bn

A13.61 Figure A13.8 shows the resulting efficient charge benchmarks for both 2G/3G operators and the 3G-only operator. The efficient charge benchmarks below include the network unit cost as determined under Original ED, and include the non-network cost and network externality mark-ups.

Figure A13.8 Full range of efficient charge benchmarks in 2010/11

Efficient charge benchmarks in 2010/11



A13.62 For information, the following table contains the values that are represented in Figure A13.8.

Figure A13.9 Table of efficient charge benchmarks in 2010/11

| Benchmark | 2G/3G (900MHz/1800MHz combined) | 2G/3G (1800MHz only) | 3G-only |
|---------------------------|---------------------------------|----------------------|---------|
| Low demand, £1.9bn | 5.4 | 5.8 | 7.0 |
| Low demand, £1.4bn | 5.1 | 5.5 | 6.4 |
| Voice only, £4bn | 5.5 | 5.8 | 7.0 |

¹⁸⁵ The ppm contributions to unit cost benchmarks from the voice-only scenarios have been set to equal the contribution from the corresponding medium voice and data scenario (see paragraph A13.22).

| | | | |
|------------------------------|-----|-----|-----|
| Voice only, £3.3bn | 5.2 | 5.5 | 6.6 |
| Voice only, £1.9bn | 4.6 | 4.9 | 5.6 |
| Medium demand, £4.4bn | 5.3 | 5.6 | 6.6 |
| Medium demand, £4bn | 5.2 | 5.4 | 6.3 |
| Medium demand, £3.3bn | 4.9 | 5.1 | 5.8 |
| Medium demand, £1.9bn | 4.2 | 4.5 | 4.9 |
| Medium demand, £1.4bn | 4.0 | 4.3 | 4.6 |
| High demand, £4.4bn | 3.3 | 3.4 | 3.4 |
| High demand, £4bn | 3.2 | 3.3 | 3.4 |

A13.63 Section 9 discusses the steps that Ofcom has taken to determine appropriate charge control levels on the basis of these benchmarks. More specifically, in paragraphs 9.151-9.155, Ofcom outlines a four-step approach that it has used to determine efficient levels for the charge controls, which involves identifying bounds on key areas of uncertainty in order to inform its judgement within a clearly defined structure. The third step in this process is to identify efficient charge levels by applying reasonable judgement, taking into account several relevant considerations.

A13.64 Having completed this third step, the final step in the approach is to cross-check the appropriateness of the judgement exercised in Step 3, by identifying specific scenarios consistent with the identified efficient charge levels. The following five examples are some of the specific scenarios that Ofcom has identified that are consistent with efficient charge levels in 2010/11 of 5.1ppm for the 2G/3G operators and 5.9ppm for the 3G-only operator. Ofcom considers that these examples reflect reasonable assumptions for these scenarios:

- Medium demand, £3.34bn spectrum costs
- Voice-only¹⁸⁶ demand, £2.30bn spectrum cost
- Low demand, £0.90bn spectrum costs
- Weighted average of Medium demand (50%) and Voice-only demand (50%), £2.80bn spectrum costs
- Weighted average of Medium demand (67%) and Voice-only demand (33%), £3.00bn spectrum costs.

¹⁸⁶ As with overall charge benchmarks noted in Figure A13.8, the voice-only scenarios noted below include levels of 3G spectrum cost recovery from voice termination that are equivalent to those under a medium voice and data demand scenario.

A13.65 Furthermore, for the reasons outlined in paragraph 9.154, Ofcom does not believe it would be appropriate to adopt a probabilistic approach to determining efficient charge levels as a substitute for steps 2 and 3 of its approach. Nonetheless, as a further cross-check on the final efficient charge levels identified above, Ofcom notes that it is possible to develop weighted averages of the benchmarks set out in Figure A13.9 which correspond to the final efficient charge levels of 5.1ppm and 5.9ppm. For example, this is achieved with the following aggregate weights¹⁸⁷ on each group of scenarios:

- Low demand cases – 10%
- Medium demand cases – 55%
- High demand cases – 5%
- Voice-only demand cases – 30%

A13.66 These results provide further confirmation that the efficient charge levels determined by Ofcom are appropriate.

¹⁸⁷ These aggregate weights are allocated evenly across the individual scenarios within each group.

Annex 14

3G spectrum costs

Introduction

A14.1 The treatment of the cost of the spectrum used by MNOs for supplying MCT on their 3G networks has a material impact on estimates of the costs of supplying mobile termination. This annex discusses the treatment of the 3G spectrum costs and is structured as follows:

- A general summary of the responses to the September 2006 Consultation;
- A discussion of potential objectives when assessing 3G spectrum costs;
- The theoretical approach Ofcom has adopted (namely the marginal forward looking opportunity cost ("MFLOC"));
- Issues with estimating the MFLOC in practice;
- A discussion of the allocation of 3G spectrum costs to MCT;
- A discussion of an alternative approach advocated by fixed operators;
- Scenarios exploring different potential treatments of 3G spectrum costs;
- A summary of the output of modelling different scenarios.

General summary of the responses to the September 2006 Consultation

A14.2 The 2G/3G MNOs were broadly comfortable with the approach set out in the September 2006 Consultation for estimating the cost of 3G spectrum; instead their comments focused on the appropriate cost allocation approach. The 2G/3G MNOs considered that particular emphasis should be placed on scenarios where all, or close to, the full amount paid for licences in 2000 is recovered from across all mobile services. H3G proposed that the only way to ensure efficient cost recovery is to take the full amount of the licence fee actually paid by H3G into account. H3G argued that the majority of the scenarios explored by Ofcom in the September 2006 Consultation were not reasonable and were inconsistent with Ofcom's treatment of other costs. H3G considered that excluding such scenarios leads to a conclusion that a higher ppm termination charge is appropriate.

A14.3 BT argued that Ofcom's approach to 3G spectrum costs is not appropriate because it results in 3G termination costs being above 2G termination costs. BT argued that this is not reasonable because 3G is a "superior" technology; BT considered that callers to mobiles should not pay a higher regulated price for the same service simply because it is provided using a different technology. BT considered that the conclusion in the September 2006 Consultation that 3G termination costs are higher than 2G termination costs was because the economic value of 3G spectrum was overstated and/or because too large a share of the 3G spectrum value was allocated to MCT services. BT thus proposed that 3G termination charge controls be set on the basis of 2G costs. C&W's position was similar, although it argued that

3G termination charges should be lower than 2G termination charges, reflecting the “efficiency gains” resulting from 3G technology.

A14.4 The European Commission invited Ofcom to reconsider the cost of 3G spectrum.

A14.5 The arguments made in responses to the September 2006 Consultation are set out in more detail in the relevant parts of this annex below.

Objectives

A14.6 Ofcom has identified three potential objectives in assessing the costs of 3G spectrum to be included in the cost base and charges for mobile termination. These are:

- Providing appropriate price signals to consumers for efficient consumption of services using mobile termination;
- The impact on MNOs’ cost recovery; and
- The impact on MNOs’ incentives to use spectrum efficiently.

A14.7 There are a number of different concepts that might be referred to as the ‘value’ or ‘cost’ of spectrum. Which is most relevant depends on the context and the issue being addressed. The implications of each of these three potential objectives are set out below.

Providing appropriate price signals to consumers

A14.8 The implication of this objective is that the marginal forward looking opportunity cost of spectrum is the relevant concept. Opportunity cost is the measure of the resource cost to society, in this case, of scarce spectrum. Prices ideally reflect opportunity costs so that consumers are exposed to efficient signals about the resource costs of different services. If the MFLOC of spectrum were not taken into account in the price of mobile services, these would be priced inefficiently low. The decision of consumers to call a mobile would be distorted and they would tend to over-consume this service relative to others.

Cost recovery

A14.9 In relation to this potential objective, it is not usually appropriate for regulation to underwrite cost recovery, as this may induce cost inefficiency. But, in general, Ofcom considers that regulation should not deny regulated firms the opportunity to recover their efficiently incurred costs. In particular, Ofcom notes the discussion in Annex 5 in relation to its aim of assessing an average efficient operator’s costs in setting regulated charges.

A14.10 However, there is a further consideration, which relates to the potential to distort future spectrum awards, and supports a conservative approach to cost recovery. The 3G licences were acquired in the auction held in 2000. Ofcom has a programme of spectrum auctions in the 2007 and beyond. If it were expected at the time of such auctions that, were any charges to subsequently be regulated (such as mobile termination), Ofcom would include the full licence fee, then there is a risk that bidding at these auctions would be distorted. Bidders might be encouraged to overbid, because they might not expect to face the full cost of such overbidding since it would be passed on to consumers through regulation.

A14.11 This issue was envisaged at the time of the 3G auction. In particular, guidance given at the time sought to address the problem:

“Question: Won’t licence costs be passed on to consumers?”

Answer: Bidders will be paying a cost determined by the auction based on their valuations instead of a licence fee fixed by the Government. This allows the market to determine the commercial value of scarce radio spectrum. The amount that operators will bid is determined by their overall business plans and the expected prices for 3G services and not the other way round.”¹⁸⁸

A14.12 Accordingly, it would be incorrect to assume that market prices would be determined by the sum paid for the licence. This is a further reason for not including the costs incurred in acquiring spectrum in the cost base for regulated charges, except to the extent that they are also justified by their relationship with the MFLOC of the spectrum.

A14.13 The scale of the concern about distorting future auctions is related to (amongst other factors) the proportion of the cost of the spectrum awarded in those future auctions that is expected to be recovered from regulated services. However, even if future regulation of mobile termination is anticipated, it may only be expected to contribute a relatively small proportion of total cost recovery and therefore concerns over distorting future auctions may not be significant.

A14.14 Similarly, in considering the extent to which cost recovery may be affected by regulation of mobile call termination it is important to note how the cost of spectrum may be allocated across mobile services including mobile voice termination. A number of possible approaches are discussed in paragraphs A14.61-A14.70 below and Ofcom has modelled a number of scenarios using radio traffic as the cost driver. In all these approaches, the majority of the recovery of 3G spectrum costs would be expected to come from unregulated mobile services (services other than mobile voice call termination). Therefore, although the opportunity for recovery of efficiently incurred costs is a relevant consideration, in the context of mobile voice call termination it should not be given disproportionate weight compared to other objectives, and in particular the first objective of providing efficient price signals for consumers.

Incentives for operators to use spectrum efficiently

A14.15 Lastly, with respect to the third potential objective, it is important to note that the primary objective of regulation of mobile termination is not to ensure that incentives exist for MNOs to use spectrum efficiently. This is because there are other policy instruments that Ofcom is using to facilitate and incentivise efficient use of spectrum, such as Administered Incentive Pricing (“AIP”), or which are under active consideration, such as the introduction of trading and liberalisation. However, this objective is a relevant consideration to the extent that regulatory actions in relation to mobile termination charges might undermine or weaken incentives for efficient spectrum use.

A14.16 In this regard, a key consideration is whether spectrum is a fixed or marginal cost with respect to the production of mobile call services. In general, from a consumer pricing perspective, Ofcom recognises the desirable long term benefits (e.g. in

¹⁸⁸ See FAQ 4 at <http://www.ofcom.org.uk/static/archive/spectrumbauctions/3gindex.htm>

maintaining incentives for investment and innovation) of taking into account all of a firm's relevant and efficiently incurred costs, including fixed costs when setting regulated prices. However, if (i) spectrum is a fixed cost; and (ii) MNOs are able to sustain prices that allow excessive profits to be achieved (i.e. if the waterbed effect is not complete) then a mark-up over the marginal cost of termination to allow for the recovery of a fixed cost of spectrum may simply serve to provide rents to MNOs. However, in Ofcom's view spectrum is not a fixed cost of production in the context of the time horizon being modelled in Ofcom's cost model. From a long run perspective MNOs can vary the quantity of spectrum they use in line with demand for its capacity. Therefore this last potential objective is not a primary consideration.

Responses on the appropriate objectives

A14.17 O2's response to the September 2006 Consultation discussed the potential objectives set out above:

- Efficient price signals and incentives to use spectrum efficiently – O2 noted that “economic theory” suggests that prices should be based on the MFLOC. However, O2 questioned whether 3G spectrum would in fact be tradable for two reasons. First, O2 considered that it was unclear how to ensure compliance with current 3G licence obligations to build *and maintain* (O2's emphasis) coverage after any trade. Second, O2 claimed that 3G licences would rapidly lose any tradable value towards the end of the control period, due to their fixed term. Accordingly, O2 regarded 3G spectrum as a fixed asset and considered therefore that its cost should (i) be reflected in regulated charges; and (ii) be allocated to services that it supports according to relative elasticities of demand (i.e. Ramsey pricing).
- Cost recovery – O2 disagreed that Ofcom should be concerned about potential distortion in future spectrum awards in considering how to allocate 3G spectrum costs. O2 suggested that, if Ofcom continued with its proposal to introduce a common charge for termination in the medium term, bidders in future auctions will know they can expect to charge this common charge for the long run.

A14.18 Ofcom has considered O2's arguments:

- In terms of O2's first point:
 - Ofcom's views on Ramsey pricing are discussed in Annex 17. For the reasons given in that annex, Ofcom considers that it is inappropriate to undertake to estimate Ramsey prices. Rather, Ofcom has allocated 3G spectrum costs to voice termination as described below.
 - Ofcom notes that, were 3G spectrum costs indeed fixed and sunk (which appears to be O2's position) then this might support the argument of some commentators that operators should not be allowed to recover this cost through regulated charges (this argument is discussed in paragraphs A14.26-A14.31 below).
 - In any event, Ofcom does not accept O2's implicit assumption that trading within the existing 3G spectrum band is simply not feasible. At this stage, Ofcom does not consider that it is reasonable to assume that any issues are sufficiently large and insoluble as to preclude *any* trading of this spectrum. As Ofcom stated on page 47 of the June 2005 *Spectrum Framework Review*, its preference for managing this spectrum is for the use of trading (and

auctions).¹⁸⁹ The *Spectrum Framework Review: Implementation Plan*, in relation to the existing 3G licences, stated that “the extension of trading is likely in due course to bring benefits to citizens and consumers” (paragraph 9.68).¹⁹⁰ More recently, Ofcom has stated that it expects to issue a further consultation document relating to the application of trading and liberalisation to the mobile sector in the early part of 2007.¹⁹¹ Accordingly, Ofcom does not agree with O2’s view that spectrum is a fixed cost (given the time horizon modelled in Ofcom’s cost model).

- In its second point, O2 argued that setting a common regulated termination charge reduces any incentive to overbid (because overbidding would not subsequently raise the regulated charge). It is not clear how easily Ofcom would be able to make a credible commitment that a common regulated termination charge would necessarily remain unchanged in the future, even if circumstances were different, because discretion to reflect the relevant applicable circumstances cannot be fettered. But, if such a credible commitment were possible, Ofcom agrees with O2. However, as explained in paragraph A14.14 above, Ofcom’s main reason for not putting undue weight on the objective of cost recovery is that the majority of the recovery of 3G spectrum costs would be expected to come from mobile services other than mobile voice call termination (which are not charge controlled).

A14.19 In principle, it might be argued that there are other reasons why cost recovery should be Ofcom’s key objective when assessing the cost of 3G spectrum for the purposes of calculating MCT charges:

- MNOs did not have discretion about the time at which they purchased a 3G licence (a point noted in Vodafone’s response to the September 2006 Consultation).
- In competitive markets, some investments will prove unexpectedly successful (and thus earn returns higher than the cost of capital) whereas other investments will prove unexpectedly unsuccessful (and thus earn little or no return). In regulated network industries, firms may be prevented from earning high returns on assets that turn out to be unexpectedly successful. To prevent investment from being discouraged, arguably this implies that the stranded assets of regulated firms should be retained in the asset base that is used to set charges (rather than being written off). For example, the stranded asset could be included in the regulatory asset base. Alternatively, as advocated in Vodafone’s response to the September 2006 Consultation (which submitted that [X]), any “depletion” of value could be reflected through a holding loss.

A14.20 However Ofcom does not consider that either of these arguments justifies Ofcom adopting cost recovery as its primary objective in this context:

- In terms of the first point, Ofcom does not consider that this is a strong reason for adopting cost recovery as its primary objective. Indeed, in principle at least, potential entrants could have chosen not to purchase a 3G licence in 2000 and could instead have entered the market at a later date by roaming on another MNOs’ 3G network or obtaining spectrum that might subsequently have become

¹⁸⁹ http://www.ofcom.org.uk/consult/condocs/sfr/sfr/sfr_statement

¹⁹⁰ <http://www.ofcom.org.uk/consult/condocs/sfrip/sfip/sfr-plan.pdf>

¹⁹¹ See paragraph 6.72 of Ofcom’s consultation on the award of 2.6GHz spectrum, available at: <http://www.ofcom.org.uk/consult/condocs/2ghzawards/2ghzawards.pdf>

available via either primary or secondary spectrum markets. Moreover, for the reason discussed above, Ofcom considers that the primary objective in this context should be providing appropriate price signals to consumers.

- In terms of the second point, Ofcom accepts that an asymmetric ex post regulation of successful and unsuccessful investments might distort investment choices. However, Ofcom's approach to the assessment of 3G spectrum costs (namely use of the MFLOC) does not involve any such asymmetry. Assets that turn out to be highly successful would have a correspondingly high MFLOC (potentially higher than the value of the assets at the time they were purchased), enabling relatively high regulated revenue to be earned from those assets; the converse applies for unsuccessful investments. This reflects the position in a competitive market, where unexpected falls in asset values cannot be recovered (in contrast to expected declines in asset values which will be factored into economic depreciation profiles). Moreover, as discussed above, the majority of the recovery of 3G spectrum costs would be expected to come from unregulated mobile services (services other than mobile voice call termination). This suggests that any impact from MCT charge controls on MNOs' investment incentives is likely to be muted.

Ofcom's view of the appropriate concept when assessing the cost of spectrum for the purposes of regulating MCT charges

- A14.21 The previous discussion around Ofcom's objectives shows how there could be a number of different approaches to the treatment of 3G spectrum costs in the estimation of efficient mobile call termination charges. From an efficiency perspective Ofcom is interested in the MFLOC of the spectrum – that is its earning power¹⁹² in a competitive market. A focus on this approach would be consistent with Ofcom's general approach to costs using economic depreciation.
- A14.22 The European Commission considered that the "value of 3G licences should be calculated at current value on a forward looking basis ..." Ofcom thus considers that its use of the MFLOC accords with the Commission's view as to the appropriate theoretical concept.

Issues in assessing the MFLOC of 3G spectrum

- A14.23 In principle, there are several approaches for estimating, or calculating a proxy for, the MFLOC. The issues associated with a number of different approaches are discussed in this section.

Analogous approach to the calculation of AIP

- A14.24 MNOs pay annual AIP fees for 2G spectrum. These fees are derived from estimates of the marginal opportunity cost of MNOs gaining an additional carrier of 2G spectrum: 2 x 200KHz. This small addition to their existing holdings (up to 2 x 30MHz) produces a cost saving but is assumed not to affect demand and pricing.
- A14.25 In theory an analogous approach could be taken in order to estimate the MFLOC of 3G spectrum. However, due to technical constraints, the relevant increment of spectrum is significantly larger in quantum. A single carrier for 3G use is 2 x 5MHz and would represent an increase in MNOs' holdings of 3G spectrum of up to 50%.

¹⁹² The discounted present value of expected future revenues from the output produced by the asset, less the present value of associated future operating costs.

Therefore the value of a carrier of 3G spectrum may be related to its impact on output as well as costs. Ofcom has not attempted to estimate explicitly the MFLOC of the 3G spectrum in a manner analogous to the calculation of the AIP since it considers the complexity involved would be significant. In its response to the September 2006 Consultation, O2 appeared to support this position (O2 stated that any attempt to estimate the marginal opportunity cost of 3G spectrum today would be complex and not necessarily conclusive). Nonetheless, Ofcom considers that such an approach has some theoretical appeal.

Setting a MFLOC of zero

A14.26 It has been argued that the 3G licence costs, in themselves, could be considered a sunk cost investment. Economic theory suggests that efficient prices are based on MFLOC. From this perspective the one-off auction payments would not be expected to have any impact on prices and therefore should not be taken into account in a regulated price. This view has, for example, been expressed by Ken Binmore and Paul Klemperer who helped design the UMTS auction:¹⁹³

"...Much more worrying is that companies' specious arguments may fool politicians and regulators into agreeing that the auction is a reason for allowing artificially high prices. If we do see higher prices in countries that ran auctions, it will probably be because of these political effects." [Page 78]

"There are some signs that this might happen in the UK and Germany. For example, Oftel will be doing just this if it accepts operators' arguments that it should permit firms to set higher call-termination fees to 'reflect' firms' sunk auction costs." [Page 78, Footnote 17]

A14.27 In the September 2006 Consultation, Ofcom set out the results of modelling scenarios in which the MFLOC of 3G spectrum was set to zero. This was to explore the lower bound with respect to spectrum costs. In the September 2006 Consultation, Ofcom based its proposals on what was characterised as a "medium" range of potential charge levels; the "medium" range did not include benchmarks in which no allowance was made for 3G spectrum costs.

A14.28 H3G argued that scenarios in which zero contribution is made towards spectrum costs are not relevant since these are based on viewing spectrum as a sunk cost. H3G argued that Ofcom does not consider spectrum to be a sunk cost and furthermore, even if it did, denying MNOs the ability to recover this cost from termination is not consistent with Ofcom's objective of providing MNOs with the opportunity to recover their efficiently incurred costs.

A14.29 With the introduction of spectrum trading, MNOs will be able to sell spectrum to other interested parties. MNOs' spectrum holdings will have a realisable value on a forward looking basis and therefore it is not appropriate in the context of a forward looking cost model to treat 3G spectrum as a sunk cost.

A14.30 Moreover, whilst Ofcom's primary objective when assessing the cost of 3G spectrum is the provision of appropriate price signals to consumers, as discussed above this is not the sole objective. As highlighted by H3G, even in the case where

¹⁹³ See "The biggest auction ever: The sale of the British 3G telecom licences", *The Economic Journal* 112 (March) C74-C96, March 2002.

spectrum is considered a sunk cost, Ofcom's view is that it is appropriate to consider whether MNOs are denied the opportunity to recover their efficiently incurred costs. Otherwise, incentives to make future investments might be adversely affected. Therefore, although termination is but one service through which MNOs can recover 3G spectrum costs, Ofcom considers it would be unreasonable for an estimate of the efficient termination charge control levels not to reflect *any* recovery of 3G spectrum costs.

A14.31 Thus, in summary, Ofcom does not consider that it is appropriate to treat 3G spectrum as having a zero cost. However, whether the MFLOC is the same as the amounts paid in 2000 is a separate issue (discussed below).

Proxies for the MFLOC drawing upon the 2000 auction payments

A14.32 A different method by which to proxy the MFLOC of 3G spectrum is to draw upon information from the 2000 auction of 3G licences, at least as a starting point.¹⁹⁴ The table below summarises the 3G licence fees that MNOs paid in 2000 (although, as discussed below, it has been argued that these fees need to be adjusted downwards to reflect the current MFLOC).

Figure A14.1 3G spectrum allocations and 2000 licence fees

| Operator | Spectrum allocations | | Payment in 2000 |
|----------|----------------------|-----------------------------|-----------------|
| | FDD (paired) | TDD (unpaired) [*] | |
| H3G | 2 x 15MHz | 5MHz | £4.3847bn |
| Vodafone | 2 x 15MHz | - | £5.9640bn |
| O2 | 2 x 10Mhz | 5MHz | £4.0301bn |
| T-Mobile | 2 x 10Mhz | 5MHz | £4.0036bn |
| Orange | 2 x 10Mhz | 5MHz | £4.0950bn |

* TDD spectrum is not currently used by the MNOs to provide commercial services.

A14.33 The sums paid in the 2000 auction reflect an estimate of the present value of the spectrum to an MNO at the time of the auction.¹⁹⁵ Whilst these fees may help inform an estimate of the spectrum's MFLOC, it is important to consider a number of issues (which are discussed further below):¹⁹⁶

- Do the sums paid in 2000 represent the MFLOC today?
 - On a forward looking basis spectrum may not be worth the same as the amount originally paid.
 - The 2000 licence fees may not solely reflect the opportunity cost of the 3G spectrum.
 - The 2000 licence fees will reflect the average rather than the marginal opportunity cost of spectrum.

¹⁹⁴ For further background see <http://www.ofcom.org.uk/static/archive/spectrumbauctions/3gindex.htm>

¹⁹⁵ The winning bids reflect the present value in 2000 of having a UMTS licence from the perspective of the marginal bidder i.e. the bidder with the second highest valuation of each licence.

¹⁹⁶ It might be argued that Ofcom should put particular emphasis on the actual 2000 auction payments as estimates of the MFLOC because they are known and stable. However such an approach discounts important reasons why the 2000 auction payments may not reflect the current MFLOC and is tantamount to treating cost recovery as the primary objective when assessing the costs of 3G spectrum (which – for the reasons explained above – Ofcom does not consider is appropriate).

- Do the bids reflect the earning power of the spectrum in a competitive market? The bids may include an element reflecting imperfect competition rather than pure scarcity rents.

Falls in the current value (relative to 2000 auction payments)

- A14.34 On a forward looking basis, the opportunity cost of 3G spectrum may not be equal to the licence fees. First, conditional on the prevailing market conditions at the time of the auction, MNOs may have paid more than the opportunity cost of the spectrum. Second, market conditions may have changed since 2000 meaning that the spectrum is no longer worth what was expected at the time of the auction.
- A14.35 At the time of the 2000 auction it was suggested by some commentators that MNOs had overpaid for their licences. The UK auction raised more per head than most other countries that subsequently held 3G auctions. This issue was investigated as part of the National Audit Office's ("NAO") report on the UK 3G auction (the "NAO Report").¹⁹⁷ The NAO reached the view that the auction design was sound in comparison to other 3G auctions and therefore did not in its own right lead to MNOs potentially overpaying for their licences. However, the NAO considered that the positive market conditions at the time were likely to have increased the level of the bids.¹⁹⁸ Under different market conditions MNOs may not have paid so much for their licences. Therefore, the forward looking value of the licences may be lower now in comparison to what was paid in 2000.
- A14.36 In its response to the September 2006 Consultation, the European Commission stated that the use of "historic costs ... risks overestimating the appropriate costs considerably." The European Commission implied that Ofcom based its approach in the September 2006 Consultation on historic costs and invited Ofcom to reconsider the cost of 3G spectrum.
- A14.37 In its response to the September 2006 Consultation, C&W noted that it is not clear that the amount the MNOs paid for 3G licences represents an accurate valuation of the spectrum today and claimed that evidence suggests that the MNOs paid too much for their licences.
- A14.38 In its response to the September 2006 Consultation, BT argued that Ofcom should be concerned with the current economic value of 3G spectrum, rather than its book value. BT proposed that there are reasons why the 3G auction prices are a poor indicator of the current economic value of the 3G spectrum including:
- The bubble in telecommunications asset prices was at its peak at the time of the auction; and
 - The design of the auction might well have led to more revenue being raised than was necessary to secure efficient allocation, so may not reflect opportunity cost.
- A14.39 BT therefore argued that the auction fees significantly overstate the true value of the spectrum and that it is inappropriate and unfair to customers of fixed networks to use these fees as indicators of the current MFLOC of 3G spectrum. Moreover, BT argued that Ofcom's approach in the September 2006 Consultation document

¹⁹⁷ "The Auction of Radio Spectrum for the Third Generation of Mobile Telephones", National Audit Office, 19 October 2001. Available at http://www.nao.org.uk/publications/nao_reports/01-02/0102233.pdf

¹⁹⁸ NAO Report, paragraph 2.21.

suggests that the value of 3G spectrum varies dramatically across the EU. BT proposed the use of an average of EU auction prices. BT also noted that Ofcom will be auctioning the 2.6GHz band in the near future and that this could give a direct measure of the MFLOC of 3G spectrum.

A14.40 In addition, to support of its view that the 2000 auction fees overstate the MFLOC of 3G spectrum, BT cited the following evidence:

- BT explored analysts' valuations of the UK MNOs. In the case of the four 2G/3G MNOs, (gross) 3G licence fees (before amortisation) represented between 40 and 65% of the average estimated total enterprise value of the UK business. In the case of H3G, the (gross) 3G licence fee represented 210% of an average of analysts' estimates of the total enterprise value of H3G's UK business. BT noted that "[with] the exception of H3G, UK MNOs currently derive only a few percent of their revenue from 3G services" and inferred that market valuations of the MNOs thus indicate that investors no longer consider 3G licences to be worth the amounts paid for them.
- BT carried out its own specific "Greenfield" valuation of a 3G licence based on assumptions consistent with expectations in 2000 and expectations today. It estimated that a 3G licence today is worth £1bn against a value in 2000 of £4bn. BT suggested Ofcom could carry out its own valuation exercise.
- BT highlighted evidence from Denmark and Norway in which 3G licences have been re-awarded following earlier auctions at significantly lower prices. The price of a (re-awarded) Danish licence in 2005 was 56% of its 2001 price (the remaining duration was 20% shorter in 2005). The price of a (re-awarded) Norwegian licence in 2003 was 31% of its 2000 price.

A14.41 Any material decline in the value of the licence may be reflected in the MNOs' statutory accounts. The licence is treated as an intangible fixed asset and under current reporting standards¹⁹⁹ MNOs have a requirement to undertake an impairment review of the asset to test for a reduction in the recoverable amount of the asset below its carrying value. The MNOs have undertaken impairment reviews in relation to their 3G licences. These impairment reviews compare the value of the entire UK business against the value of the UK assets. To date only O2 has impaired their UK 3G licence: by £2.1bn in 2003 against a net book value (after amortisation) in the beginning of 2003 of £4.0bn.²⁰⁰ The other MNOs continue to reflect the cost (after amortisation) of the 3G licence in 2000 as the forward looking value of their licences. Therefore, whilst market conditions may have changed since the time of the auction, they have not changed to the extent that, from an accounting perspective, necessitates an impairment of their licences.

A14.42 In its response to the September 2006 Consultation, BT argued that MNOs' impairment reviews, whilst potentially providing positive evidence that a licence is worth less than the auction price, do not provide evidence to support the value of the licences. This is because MNOs have carried out the impairment reviews on the basis of valuing their entire UK businesses and comparing this to the value of the UK assets i.e. they have not compared a specific valuation of the 3G licence

¹⁹⁹ See FRS 10 and 11.

²⁰⁰ For further information see http://www.o2.com/media/company_presentations_762.asp and Note 12 of http://www.o2.com/media_files/2003_pg65-92.pdf In February 2007 France Telecom announced that it had written down goodwill associated with its UK business unit. Ofcom has no indication that the value attributed to Orange's 3G licence in its accounts has been impaired.

against its book value. The problem with this aggregated approach is that it is possible that some assets could have a recoverable amount less than their carrying amount and some a recoverable amount that is more than their carrying amount. BT suggested that it is possible that the value of the 3G licences could indeed have fallen below 2000 values (less amortisation) but this cannot be discovered from the impairment reviews. Furthermore since goodwill is written down before other assets a write-down would not affect, for example, the 3G licence until all goodwill has been written off.

- A14.43 In its response to the September 2006 Consultation, C&W argued that it is not appropriate to treat MNO impairment reviews as evidence supporting the value of 3G licences. This is because the valuations will be influenced by the regulatory treatment of spectrum costs and therefore MNOs have an incentive to wait until regulation is set before re-valuing their licences.
- A14.44 In its response to the September 2006 Consultation, O2 argued that Ofcom should put greater weight on the impairment reviews of the other MNOs rather than its own review (in which O2 impaired its 3G licence) in deciding whether the licence fees paid by operators are a good proxy for the MFLOC of 3G spectrum. O2 considered its own impairment review to be affected by the significant uncertainty in forecasting demand for data services.
- A14.45 In its response to the September 2006 Consultation, H3G argued that scenarios that are based on O2's write-down of its 3G licence are not relevant when assessing the MFLOC of H3G's licence. H3G considered that O2's circumstances and business strategy are different to H3G's. Moreover, H3G noted that its impairment review supports the valuation of its licence being equal to the 2000 licence payment. Unlike the other MNOs, it only has a 3G business and therefore there is no ambiguity as to whether the impairment review valuation relates to an old 2G or new 3G business.
- A14.46 Ofcom has considered carefully all the arguments raised by the parties.
- A14.47 Ofcom does not consider O2's argument that its impairment review is not relevant to have merit. Ofcom has not been presented with or is aware of any arguments as to why O2's impairment review is less relevant or reliable than the reviews of the other MNOs. To place no reliance on this review would be to treat the different evidence available to Ofcom with undue selectivity.
- A14.48 Ofcom has considered the points raised by BT in relation to the inappropriateness of using the licence fees paid in 2000 as an indication of the value of 3G spectrum today:
- Ofcom notes that BT's argument that the licence fees paid in 2000 were increased by a "bubble" in telecommunications stocks appears to be supported by the NAO Report.²⁰¹
 - BT argued that the amounts paid in 2000 for 3G licences relative to the 2G/3G MNOs' value (as estimated by equity analysts) are unrealistically high, given the low proportion of 2G/3G MNOs' revenues currently derived from 3G services. Ofcom questions whether the comparison with current 3G revenues is appropriate. Rather the key comparator would appear to be estimated future revenues from 3G services; these are highly uncertain.

²⁰¹ NAO Report, paragraph 2.21.

- BT's "Greenfield" valuation is dependent upon the assumptions made (for example, on the path of CARS). However, since the MNOs have undertaken a similar exercise in their impairment reviews (namely estimating future revenue/profitability) and reached differing conclusions, Ofcom considers that BT's analysis provides further evidence of the uncertainties associated with accurately estimating the MFLOC of 3G spectrum.
- A14.49 Ofcom considers that the points raised by BT are further indicators of the uncertain value of the MFLOC of 3G spectrum (given the uncertainties about future costs and revenues). This supports Ofcom's position that it is reasonable to consider scenarios in which the MFLOC of 3G spectrum is lower than the amounts paid in 2000.
- A14.50 Ofcom also considers that the issues raised by fixed operators in relation to the ambiguity of the MNOs impairment reviews in supporting the use of the 2000 auction fees as a proxy for the MFLOC of the 3G spectrum are important. In the case of the 2G/3G MNOs, the impairment reviews do not separate out the value of the 3G business as opposed to the 2G existing business and it is possible that the value of existing 2G services serves to underpin (or cross subsidise) the book value of their 3G licences.
- A14.51 In the case of H3G, there is no analogous problem arising out of its impairment review because H3G has only a 3G business. However, BT presented valuations for H3G UK estimated by equity analysts. BT stated that the gross book value of H3G's licence was 210% of the average of these analysts' estimates; Ofcom also notes that the equivalent figure for the net book value of H3G's licence (as of 31 December 2005) is approximately 180%.²⁰² If accurate, these figures would suggest that, contrary to the conclusions of H3G's impairment review, H3G's 3G licence is not worth what was paid in 2000.
- A14.52 H3G argued that O2's impairment is not relevant from its perspective. However, whilst O2's business plan may be different from H3G's, as H3G suggests, O2 and H3G are competing in the same retail market. Ofcom is concerned with estimating the MFLOC of 3G spectrum in order to estimate the costs of a benchmark average efficient operator. Since the MFLOC of 3G spectrum would be expected to reflect market conditions, it should be applied consistently across all operators for the purposes of deriving regulated charges for termination (rather than deriving different and inconsistent estimates for different operators). Therefore, O2's write-down provides information to Ofcom on one perspective of what might constitute the MFLOC of 3G spectrum and Ofcom considers that it is reasonable to use this information as one relevant benchmark, including for a 3G-only operator.
- A14.53 Moreover Ofcom is concerned by the disparate view of the value of H3G as between analysts and the company's impairment review. Whilst analysts' views change, the difference is very stark in this case. Therefore, Ofcom continues to take the view that it is reasonable to explore scenarios for H3G in which the MFLOC of 3G spectrum are less than the fee paid for H3G's 3G licence in 2000.
- A14.54 In addition, another consequence of spectrum liberalisation and trading (as discussed above) is on the value of the 3G spectrum. In principle there could be effects in both directions. On the one hand, increased availability for 3G use of 2G

²⁰² Ofcom notes that there is evidence that a recent analyst's report is also consistent with BT's response (in which BT concluded that earlier analysts' estimates point to a forward looking value for H3G's 3G licence which is less than its book value).

spectrum and other substitute spectrum, e.g. 2.6GHz band, would be expected to reduce barriers to entry, increase the supply of spectrum for mobile use and therefore reduce its scarcity and opportunity cost. On the other hand, liberalisation of 3G spectrum increases the range of services for which that spectrum can be used and so may increase its value. Whether the overall value will increase or decrease depends on the net effect of these two considerations. But it is plausible that the first effect is larger than the second (e.g. 3G may be the highest value use and there is some empirical evidence to suggest that in general the first effect is larger²⁰³). This supports the use of lower values for the MFLOC of 3G spectrum.

The 2000 licence fees may not solely reflect the opportunity cost of the 3G spectrum

A14.55 The 2000 licence fees may not solely reflect the opportunity cost of 3G spectrum. First, the MNOs' actual licence payments in 2000 may have reflected a payment relating to the expected impact of a 3G licence on 2G profits. If this is the case the sums paid in 2000 may be considered an overstatement of the opportunity cost of the 3G spectrum. Second, in its response to the September 2006 Consultation, BT noted that the UK auction was the first of a sequence of EU 3G auctions. BT argued that the acquiring a UK licence provided a "toe-hold" advantage in later EU auctions. Ofcom notes that the NAO Report provides some support for this view, stating that MNOs (in 2000) considered that "the UK was the foot in the door to Europe and potentially the world" (page 51; Vodafone and other bidders corroborated this view – see paragraph 2.20). This suggests that the 2000 licence fees overstate the MFLOC of 3G spectrum.

The 2000 licence fees will reflect the average rather than the marginal opportunity cost of spectrum

A14.56 The 2000 licence fees may reflect the average opportunity cost of the spectrum rather than the marginal opportunity cost. From the perspective of efficient pricing it is the latter that is the relevant cost to include in regulated prices. It is possible that the average opportunity cost is higher than the marginal opportunity cost and therefore the licence fees may represent an overstatement of the MFLOC.

Did the 2000 bids reflect the earning power of the spectrum in a competitive market?

A14.57 To the extent that the auction fees may reflect profits associated with imperfect competition (even in the absence of individual SMP) they are over-estimates of MFLOC in a competitive market. This would imply that profit above the normal rate of profit would be incorporated into prices through regulation. However, it is difficult to establish whether or not the bids implicitly reflected only scarcity rents.

A14.58 In its response to the September 2006 Consultation, O2 claimed that the waterbed effect is complete i.e. MNOs do not earn excess profits. Therefore, in O2's view, licence fees do not reflect profits associated with imperfect competition. Note that the current extent of the waterbed effect is not directly relevant to the issue at hand, since the 2000 auction fees reflect expectations at the time of the auction was held (including any expectations about potential excess profits). Even if the waterbed effect were relevant, as explained in Section 7 above Ofcom considers that the waterbed effect is unlikely to be complete.

²⁰³ See, for example, Hazlett (2004), Property rights and wireless license values, <http://www.aei-brookings.org/admin/authorpdfs/page.php?id=771>

Conclusion on assessing the MFLOC of 3G spectrum

- A14.59 The European Commission implied that Ofcom based its approach in the September 2006 Consultation on the use of historic 3G spectrum costs. As required by the Framework Directive, Ofcom has taken the utmost account of the comments of the European Commission. Ofcom agrees with the Commission that it would not be appropriate simply to use the price paid at auction as the only estimate of the MFLOC of 3G spectrum. Ofcom does not, and did not in the September 2006 Consultation, assume that the auction payments in 2000 necessarily represent the MFLOC of 3G spectrum. In the September 2006 consultation, Ofcom used a range of figures as a proxy for the MFLOC, including amounts less than the historic cost.
- A14.60 The discussion above illustrates the difficulty in deriving a precise estimate of the MFLOC of 3G spectrum for inclusion in regulated termination charges. In assessing the MFLOC of 3G spectrum Ofcom has carefully considered the impairment reviews conducted by the MNOs, alongside the other evidence before it. The above discussion also indicates that it is reasonable to consider the possibility that the MFLOC of 3G spectrum is lower than the 2000 licence fees. In such circumstances, Ofcom has chosen to consider a range of plausible scenarios for 3G spectrum costs in setting MCT charge controls. These include scenarios in which the level of 3G costs included in its model are lower than the 2000 auction payments. These scenarios are set out in detail later in this annex.

Allocation of 3G spectrum costs

September 2006 Consultation

- A14.61 Ofcom considers that 3G spectrum costs should appropriately be allocated according to drivers reflecting the opportunity cost, such as 3G network cost drivers. As noted in the September 2006 Consultation, this does not result in any explicit allocation of 3G spectrum costs to 2G services. Ofcom's overall policy in this review is to set a single charge for termination based on the average cost of an MNO (with two networks) using its 2G and 3G networks to terminate calls. In light of this policy Ofcom does not consider it a critical point whether any of the 3G spectrum costs are allocated to 2G services.
- A14.62 In the September 2006 Consultation, Ofcom discussed three potential approaches to the allocation of 3G spectrum costs, namely allocation in proportion to:
- Total traffic across different services carried on an MNO's 3G network (This relates to the Total Traffic cost driver in Ofcom's cost model i.e. each MB of traffic attracts the same cost);
 - Demand on spectral capacity by different services carried on an MNO's 3G network. (This relates to the Radio Traffic²⁰⁴ cost driver in Ofcom's cost model i.e. different services attract different costs per MB); and
 - Revenue derived from different mobile services.
- A14.63 In the September 2006 Consultation, Ofcom reported the results of modelling various scenarios using both radio and total traffic cost drivers. Data is more

²⁰⁴ A measure of the use of spectrum as different traffic types (voice and data) are carried on the radio network.

spectrally efficient than voice traffic and thus the percentage of lifetime total traffic arising from voice termination is lower than the percentage of lifetime radio traffic.

Mobile operators' responses to the September 2006 Consultation

A14.64 In its response to the September 2006 Consultation, Vodafone argued that radio traffic is the appropriate cost driver by which to allocate spectrum costs. This is because radio traffic is the capacity constraint on spectrum given how spectrum is used. Vodafone argued that allocation on the basis of total traffic would result in prices for services that do not reflect the opportunity cost of the spectrum required to produce each service. For example, if the total traffic cost driver were used, the estimated cost of data services would be too high. This is because it would not take into account the relative spectral efficiency of data and voice services. Vodafone argued that a MCT price set on this basis would be below the economically efficient level. Similarly, in their responses to the September 2006 Consultation, Orange, T-Mobile and O2 proposed that Ofcom should only use the radio traffic cost driver to allocate spectrum costs. They noted that the costs of all other relevant assets related to the radio network were allocated according to radio traffic in the September 2006 Consultation and therefore it would be inconsistent for Ofcom to do otherwise in the case of the 3G spectrum costs. H3G argued along similar lines i.e. that radio traffic cost allocation is directly related to the opportunity cost of spectrum and is consistent with Ofcom's treatment of other network costs (where costs are allocated by the cost driver that is relevant to the use of the asset in question).

Fixed operators' responses to the September 2006 Consultation

A14.65 In its response to the September 2006 Consultation, BT argued that the prices paid for licences in 2000 were based on expectations about the future opportunities to provide advanced data services, rather than cost savings on producing existing services. BT therefore suggested that it is not appropriate for the majority of spectrum costs to be recovered from voice services (as proposed in the September 2006 Consultation).

A14.66 In its response to the September 2006 Consultation, C&W noted that whilst radio and total traffic cost drivers may be reasonable cost allocation approaches, in this case value may not be proportionate to bandwidth. For example, SMS uses relatively little bandwidth but is a very valuable service to MNOs. Further, C&W argued that allowing MNOs to recover the majority of 3G spectrum costs from voice services does not encourage (and may discourage) MNOs from innovating in new mobile services. C&W considered that such innovation was the main intended use for the 3G spectrum in 2000.

Ofcom's approach to the allocation of 3G spectrum costs

A14.67 The costs of assets can be allocated to services according to their use of the assets' capacity. In the case of spectrum, mobile traffic services require the use of spectrum as traffic is carried across the 3G radio network. Therefore the cost of spectrum can be allocated to mobile traffic services according to their use of the radio resource. Ofcom accepts that use of the radio traffic cost driver would be a consistent approach to the allocation of spectrum costs – given this is how the costs of other assets like sites, TRXs and Node-Bs are allocated.

A14.68 Alternatively spectrum costs can be allocated in proportion to consumers' demand for different traffic services. It has been asserted that the main source of value from

the spectrum is from the sale of advanced 3G data services and that data services should therefore attract a relatively higher share of spectrum costs compared to voice. However, Ofcom does not necessarily accept the premise that the marginal opportunity cost of spectrum is very different depending on the service which it is used to supply. If a resource can be used at the margin to supply one service (e.g. data) or another (e.g. voice termination) then the marginal cost is the same for both uses. Furthermore, a drawback with using revenue or profitability measures for cost allocation is that the resulting cost allocation may be biased by disproportionate mark-ups on one service compared to another. This can lead to a circular conclusion, as those biased cost estimates would apparently justify the disproportionate mark-up (by allocating an unduly high proportion of costs to heavily marked-up services). In principle, one potential way of avoiding this problem might be the use of alternative measures, such as the total traffic allocation approach, as a useful cross check to understand the range of possible cost allocations (as was done in the September 2006 Consultation). However, Ofcom is mindful of the points raised in the MNOs' responses to the September 2006 Consultation. Accordingly, in the scenarios modelled and reported below, the costs of 3G spectrum are allocated using the radio traffic cost driver only.

A14.69 The table below sets out the radio traffic demand for 3G spectrum by different 3G network traffic services under Ofcom's medium case traffic forecasts. Ofcom's cost model allocates costs according to routing factors. These routing factors can be set to provide consistency of allocation with the shares of traffic set out in the table below.

Figure A14.2 Share of lifetime radio traffic by service

| Service | % of lifetime Radio traffic²⁰⁵ |
|---------------------------------|--|
| Total voice | 74% |
| <i>Voice termination</i> | 25% |
| <i>Outbound voice</i> | 48% |
| Total Data | 26% |

A14.70 Ofcom has also considered C&W's argument that allowing MNOs to recover the majority of 3G spectrum costs from voice services may discourage MNOs from innovating in new mobile services "to recover 3G licence fees". Since termination only accounts for a relatively low proportion of MNOs' income, Ofcom considers that even an inefficiently high contribution to the recovery of 3G spectrum costs – which, for the avoidance of doubt, it does not consider is the case as a result of the regulation set out in this statement – is unlikely to have a very material impact on MNOs incentives to innovate. In any case, if there are economic returns from innovation then it is in the interests of MNOs to pursue such innovation. It is unclear why they would only do so if it enables them to recover 3G licence payments and not – as implied by C&W – if those payments are recovered from other services.

²⁰⁵ The "Total voice" figure does not equal the sum of "Voice termination" and "Outbound voice" due to rounding.

Fixed operators' suggested alternative approach – equalising 2G and 3G charges

BT's response to September 2006 Consultation

- A14.71 In its response to the September 2006 Consultation, BT argued that scenarios where the total cost of voice termination over a 3G network are greater than the total cost over 2G networks fail a “sanity test”. In BT's view all of the scenarios that Ofcom put weight on in the September 2006 Consultation (i.e. Ofcom's medium range) fall into this category. BT argued that a “superior” new technology (such as 3G) should reduce costs, rather than increase them. BT considered that, if the value of 3G spectrum is primarily related to voice termination, then this should be because 3G technology *reduces* the cost of voice services. BT argued that, from callers' perspective, call termination on 2G and 3G networks are homogenous. BT set out an analogy in support of its argument that, in a competitive market, it would not be possible to increase the price of termination on a 3G network above the price of (homogenous) termination on a 2G network.²⁰⁶
- A14.72 Accordingly, BT in its response suggested an alternative approach, namely setting call termination charges solely on the basis of 2G unit costs for the entire volume of terminating traffic. This approach would imply that the recoverable 3G spectrum costs would therefore reflect administratively-set 2G spectrum fees (i.e. AIP) plus the efficiency gains of 3G technology (relative to 2G) in the provision of termination. BT considered that this approach would mean that, to the extent that the 3G spectrum was acquired to reduce network costs, the efficiently incurred cost of that spectrum would be reimbursed.

C&W response to September 2006 Consultation

- A14.73 In its response to the September 2006 Consultation, C&W advanced a similar argument to BT. C&W suggested that from the perspective of voice termination, in a competitive market MNOs would not displace 2G technology unless 3G technology offered extra functionality or was lower cost. C&W stated that voice call termination provided using 3G technology has no added functionality over the provision of such termination using 2G technology (i.e. these products are homogenous). Accordingly, C&W considered that the maximum efficient price for 3G voice call termination is the 2G price.
- A14.74 C&W considered that the price of 3G spectrum might reflect some or all of the efficiency gains generated by the provision of voice call termination using 3G (rather than 2G) technology. C&W argued that efficiency gains are often shared between consumers and firms in setting regulated prices (with operators receiving the gains during a control and, with the start of a new price control, consumers realising the full benefit of efficiencies). C&W suggested that the efficiency gains should be split 50/50 between MNOs and consumers. C&W is thus suggesting a variant of the BT approach, namely that the price of voice termination on 3G networks should actually be less than the price of such termination on 2G networks.

²⁰⁶ BT also linked these arguments to its view that the September 2006 Consultation overstated the cost of 3G spectrum and allocated too much of that cost to voice termination. These BT arguments are discussed elsewhere in this annex.

Ofcom's response

Potential theoretical objections

- A14.75 In its response to the March 2006 Consultation, H3G argued that it was “flawed” to claim that a competitive MCT market would lead to a single price because call termination is a homogenous service (see paragraph 9.115 above). However, as discussed in paragraph 9.121, Ofcom does not accept that BT’s reasoning is undermined by H3G’s arguments.
- A14.76 It might be argued that BT’s approach rests upon the assumption that a 2G-only network is viable (and, in this context, Ofcom is unaware of any MNOs in major European markets that are pursuing a 2G only strategy). However Ofcom does not consider that this line of argumentation undermines BT’s approach. Whilst 3G technology offers additional services and functionality (which presumably form an attractive business proposition for MNOs, given their adoption of 3G technology) the essence of BT’s argument is that – in a hypothetical competitive market – the cost of providing these extra services could not be met from higher MCT charges.
- A14.77 An MNO that acquired a 3G licence has to migrate traffic from its 2G network to its 3G network. It might be argued that this results in underutilisation of both networks, driving up unit network costs. In contrast a hypothetical 2G-only network would not suffer this network cost increase. However it is not clear that this potential counterargument undermines the reasoning behind BT’s approach. Whilst, in the long run, 3G network costs may be lower than 2G network costs it is conceivable that, in the short run, 3G network costs are higher (e.g. due to underutilisation or because the price of 3G equipment has not yet fallen to its long run level etc). However, BT’s logic implies that any short run efficiency losses from utilising 3G technology would be reflected in the MFLOC of 3G spectrum (in the same way that the long run efficiency gains would be reflected).
- A14.78 It has been put to Ofcom that, if a Ramsey pricing approach were adopted, it could be desirable to set different prices for termination on 2G and 3G networks (because, for example, it is desirable to allocate any costs common to the provision of 3G services across those services differently to the allocation of common 2G costs across 2G services). Clearly such an argument presupposes that there are such common costs. In any event, Ofcom does not consider that this objection is appropriate – as explained in Annex 17, Ofcom considers that it is inappropriate to attempt to estimate Ramsey prices for the purposes of determining regulated MCT charges.

Practical problems

- A14.79 Ofcom has carefully considered whether BT’s approach, or the variant of that approach proposed by C&W, should be applied in practice, for example in order to cross-check the estimates generated by Ofcom’s modelling. BT’s response to the September 2006 Consultation stated that “BT appreciates that, if the logic of our “sanity test” is used to value 3G spectrum, then it is important that 2G costs are accurate. One part of these costs is for 2G spectrum ...” Ofcom agrees with BT that BT’s approach crucially relies on the ability to accurately compare 2G and 3G costs (of which spectrum costs are a component).
- A14.80 Whilst BT argued in its response to the September 2006 Consultation that it is unlikely that 2G spectrum has been undervalued historically, Ofcom considers that

there are a number of important reasons for why the 2G spectrum AIP and the historic price paid for 3G spectrum may not be comparable.

- A14.81 First, the existing 2G AIP fees are estimated on the basis of the cost savings to a 2G MNO, given existing capacity requirements, of an additional GSM carrier (2 x 200kHz). However, on a forward looking basis this may not be an accurate reflection of the spectrum's full opportunity cost because it does not take into account the potential impact of liberalisation of the 2G spectrum which might make it available for alternative uses (potentially including uses other than mobile voice services, such as mobile TV). For example, liberalised 2G spectrum, and in particular 900MHz spectrum, could reduce the number of sites required to provide 3G coverage thereby reducing network costs (and post-liberalisation substitution from 2100MHz spectrum to 900MHz spectrum in this way might – in the absence of any other factors – tend to narrow any differential between 2100MHz spectrum costs and 900MHz spectrum costs). Thus the post-liberalisation opportunity cost of what is currently 2G spectrum could be greater than its opportunity cost when considered only in its current use. The current AIP may not reflect the value of that spectrum following liberalisation.
- A14.82 Second, for technical reasons the addition of a GSM carrier to an MNOs' existing spectrum holdings represents a small increment and, while it is assumed to produce a cost saving, it is assumed not to affect demand and pricing. In contrast, as noted above, adding a single carrier of spectrum for 3G use is significantly larger in quantum (2 x 5MHz) and would represent an increase in MNOs holdings of 3G spectrum of up to 50%. This creates comparison difficulties for two reasons. First, the value of 3G spectrum may be related to its impact on output as well as costs. Second, if there are economies of scale, the network cost saving resulting from a small change in spectrum holdings may be disproportionately small in comparison to the network cost saving from a large change in spectrum holdings (i.e. if the 2G spectrum increment were, say, 25 times larger the network cost savings may be more than 25 times larger).
- A14.83 For these two reasons there are therefore difficulties in benchmarking 3G costs to current 2G costs (and these difficulties are in addition to the uncertainty in accurately estimating the MFLOC of 3G spectrum, as discussed above).
- A14.84 In the light of these difficulties, Ofcom has not implemented BT or C&W's proposed approaches directly. However, in its modelling, Ofcom has explored a scenario in which the value of 3G spectrum has been lowered to a level that would equate the estimated costs of termination on 2G and 3G networks (and where the 2G termination cost is assumed to be based upon the current AIP).²⁰⁷ Ofcom has also carefully noted the implications of BT and C&W's alternative approaches (namely that they might tend to suggest that a lower ppm charge was appropriate).
- A14.85 As a result of the considerations explored above, in determining the appropriate level of charge controls, Ofcom has placed greater weight upon scenarios implying a lower MFLOC of 3G spectrum than it did in the September 2006 Consultation.

²⁰⁷ In scenario 7 below, Ofcom has equated the costs of termination on 2G and 3G networks by lowering 3G spectrum costs. It is also possible to align the cost of termination on both types of network by assuming a combination of increased 2G spectrum costs (i.e. higher than the current 2G AIP) and reduced 3G spectrum costs (i.e. lower than the 2000 auction payments). Ofcom has considered scenarios where 2G and 3G spectrum costs are assumed to change in this way and where overall 2G and 3G termination costs are aligned at the level of the 2G/3G blended charge controls that this statement puts in place.

Scenarios exploring different potential treatments of 3G spectrum costs

A14.86 Recognising the uncertainty associated with accurately estimating the MFLOC, Ofcom has chosen to consider a range of plausible scenarios for 3G spectrum costs. These scenarios are set out below in relation to Ofcom's cost benchmarks i.e. the costs of a 2G/3G MNO with 900/1800MHz spectrum, a 2G/3G MNO with 1800MHz spectrum and a 3G-only operator. The total cost of all of the 3G spectrum used by a MNO to provide voice call termination reflects the MFLOC of a carrier of 3G spectrum and the number of carriers that that MNO holds (i.e. that MNO's spectrum allocation). In addition, as discussed in Annexes 5 and 13, the level of demand for termination provided by a MNO is a key factor when deriving unit cost benchmarks. Accordingly, three factors relevant to each of the scenarios are:

- Total spectrum cost – the level of total spectrum cost included in the model. In the tables below, this is expressed in terms of 2000 prices (thereby facilitating comparison with the amounts paid in the 2000 auction),²⁰⁸
- Spectrum holding – the number of carriers of 3G spectrum assumed to be held by the MNO; and
- Terminal market share– the ultimate market share of the MNO generally taken to be market share parity of 20% (see paragraphs A5.27-A5.41).

A14.87 By varying the total cost factor, the scenarios outlined in the tables below incorporate different estimates of the MFLOC of 3G spectrum. The appropriate cost of spectrum is expected to lie within the bounds of these scenarios. The uncertainty of where within this range 3G spectrum costs may lie is a factor that Ofcom has taken into account in the broader context of deriving the charge controls (as discussed in section 9).

Scenario 1: Using auction payments and spectrum allocations in 2000 as a proxy for the MFLOC

A14.88 In this scenario Ofcom uses the actual licence fee payments, along with the associated spectrum allocations, as a proxy for the MFLOC and forecasts competitively neutral market shares.

| Cost benchmark | Spectrum | Cost (2000 prices) | Terminal market share |
|-------------------------------------|-----------|--------------------|-----------------------|
| 2G/3G MNO with 1800MHz spectrum | 2 x 10MHz | £4.0bn | 20% |
| 2G/3G MNO with 900/1800MHz spectrum | 2 x 10MHz | £4.0bn | 20% |
| 2G/3G MNO with 900/1800MHz spectrum | 2 x 15MHz | £6.0bn | 20% |
| 3G-only MNO | 2 x 15MHz | £4.4bn | 20% |

²⁰⁸ For the avoidance of doubt, when inputting the various estimates of the MFLOC into Ofcom's cost model, these figures need to be restated in real 2006/07 terms.

Scenario 2: Estimated features of an average carrier

- A14.89 Ofcom is attempting to estimate the costs of an average efficient operator. The average amount that a 2G/3G MNO paid for a 2 x 5MHz carrier of 3G spectrum was £2bn (in 2000 prices). In the 2000 auction, one licence was reserved for a new entrant. The average amount that a new entrant (i.e. a 3G-only MNO) paid for a 2 x 5MHz carrier of 3G spectrum was £1.47bn (in 2000 prices). MNOs hold a total of twelve 2 x 5MHz carriers of 3G spectrum and thus average customer demand per carrier equates to one-twelfth of total demand (i.e. an 8.3% share of the market).
- A14.90 Combing these average estimates of the cost per 2 x 5MHz carrier of 3G spectrum and the level of average demand associated with that carrier implies that the position of a hypothetical average MNO would be as follows:

| Cost benchmark | Spectrum | Cost (2000 prices) | Terminal market share |
|-------------------------------------|-----------|--------------------|-----------------------|
| 2G/3G MNO with 1800MHz spectrum | 2 x 10MHz | £4.0bn | 17% |
| 2G/3G MNO with 900/1800MHz spectrum | 2 x 10MHz | £4.0bn | 17% |
| 2G/3G MNO with 900/1800MHz spectrum | 2 x 15MHz | £6.0bn | 25% |
| 3G-only MNO | 2 x 15MHz | £4.4bn | 25% |

- A14.91 In its response to the September 2006 Consultation, H3G argued that this scenario is not relevant because the addition of a third carrier generates cost savings that are taken into account in the cost model (rather than a third carrier generating increased market share). H3G considered that the view that a three carrier 3G-only MNO would attain a 25% market share is unwarranted and inconsistent with Ofcom's view of forecast subscribers that underlies the rest of the cost modelling. H3G stated that no forecasts predict that H3G will reach 25% market share and that such third party forecasts will already have taken into account the competitive advantages of three carriers compared to two. Therefore H3G considered that it is not consistent to apply a higher market share than is forecast.
- A14.92 However, as explained in paragraph A14.88 above, Ofcom is seeking to explore the costs of an *average* efficient operator and has hence used estimates of the average cost/carrier and average demand/carrier. Accordingly, Ofcom considers that scenario 2 provides some useful benchmarks and that it is thus reasonable for Ofcom to consider this scenario alongside the other scenarios that it has modelled.

Scenarios 3-7: Spectrum allocations of a two carrier licence and various estimates of the MFLOC of spectrum

- A14.93 Scenario 3 differs from scenarios 1 and 2 in that the ownership of a third carrier by Vodafone and H3G is ignored from the perspective of estimating the costs of mobile voice call termination. This could be justified for a couple of reasons. First, arguably the MFLOC of a third carrier reflects the network cost savings associated with utilising that carrier. Accordingly, it may be appropriate to consider scenarios that

exclude the impact of the third carrier (because in principle the costs and benefits associated with that additional carrier cancel each other out).²⁰⁹ Second, the additional capacity provided by a third carrier may not be required to offer voice call termination and its additional cost is therefore recovered from other mobile services (as argued by BT).²¹⁰

- A14.94 Comments made in H3G's response to the September 2006 Consultation promoted consideration of whether estimates of the MFLOC based upon the 2000 auction payments capture the opportunity cost of 3G spectrum in 2021 and beyond (since the current 3G licences expire in that year). In the context of Ofcom's cost model, it is appropriate to consider costs over the lifetime of the network. Ofcom agrees with H3G that it is appropriate to consider whether estimates of the MFLOC based on the 2000 auction payments should be adjusted upwards to reflect the opportunity cost of 3G spectrum in 2021 and beyond. In the absence of any reasonable estimates of the potential opportunity cost of the spectrum in 2021 and beyond, scenario 4 is an extreme upper bound in which scenario 3 is modified to reflect the assumption that MNOs incur a "renewal payment" in 2021 equal in real terms to the payments made in 2000. The other scenarios under consideration reflect the alternative possibility that no further adjustment is needed in order to reflect the opportunity cost of 3G spectrum in 2021 and beyond.
- A14.95 As discussed above, it could be argued that the 2000 auction payments overestimate the current MFLOC of 3G spectrum and thus the cost estimates in scenario 3 need to be adjusted downwards. Scenarios 5 and 6 proxy for an overestimate by using O2's £2.1bn write-down in 2003 (although Ofcom recognises that the use of write downs based on impairment reviews may not be capable of capturing some of the factors discussed above, such as any difference between the average and marginal cost of spectrum, any impact on the earning power resulting from imperfectly competitive markets etc). In scenario 5, the write down has been averaged across the existing two carrier licences.²¹¹ In scenario 6, the full £2.1bn write-down has been applied to the value of each MNO's spectrum holding.
- A14.96 In scenario 7, the MFLOC of 3G spectrum has been lowered to a level that, for a 2G/3G operator in 2010/11 under a medium voice and data scenario, would equate the 2G and 3G unit costs of termination (subject to the assumption that the appropriate 2G spectrum cost would be the current AIP). This is intended to explore the potential consequences of the alternative approaches advocated by BT and C&W (as discussed above). Ofcom considers this to be a lower bound for the MFLOC of 3G spectrum.
- A14.97 Scenarios 3-7 are summarised in the table below.

²⁰⁹ In its response to the September 2006 Consultation, H3G accepted that a two carrier scenario may be relevant since a new entrant could bid for one of the two carrier licences during the 2000 3G auction. Ofcom notes that submitting such a bid could have been advantageous if the premium for the three carrier new entrant's licence, relative to a two carrier licence, exceeded the expected network cost savings associated with the third carrier.

²¹⁰ In its response to the September 2006 Consultation, BT argued that the value of a third carrier stems from the fact that it acts as "insurance" if there is strong demand for data services. Accordingly, BT considered that the value of this carrier should not be allocated to voice services.

²¹¹ There are three existing two carrier licences, which can be used to provide a benchmark. This benchmark is adjusted to allow for O2's write-down by taking the average of two £4.0bn, two carrier licences and one £1.9bn, two carrier licence. The resulting figure is £3.3bn.

| Cost benchmark | Spectrum | Cost (2000 prices) | | | | | Terminal market share |
|-------------------------------------|-----------|--------------------|------------|------------|------------|------------|-----------------------|
| | | Scenario 3 | Scenario 4 | Scenario 5 | Scenario 6 | Scenario 7 | |
| 2G/3G MNO with 1800MHz spectrum | 2 x 10MHz | £4.0bn | £4.4bn | £3.3bn | £1.9bn | £1.4bn | 20% |
| 2G/3G MNO with 900/1800MHz spectrum | 2 x 10MHz | £4.0bn | £4.4bn | £3.3bn | £1.9bn | £1.4bn | 20% |
| 3G-only MNO | 2 x 10MHz | £4.0bn | £4.4bn | £3.3bn | £1.9bn | £1.4bn | 20% |

Use of 3G spectrum costs in deriving efficient unit cost benchmarks

A14.98 As discussed in this Annex, Ofcom has chosen to consider a range of plausible estimates of the MFLOC of 3G spectrum in developing efficient unit cost benchmarks for the purposes of setting the level of MCT charge controls. The contribution of scenarios 1 to 7 above to the efficient unit cost benchmarks is discussed in detail in Annex 13.

A14.99 From the set of seven scenarios described earlier in this Annex, Ofcom then focuses upon five alternative spectrum valuations in developing efficient unit cost benchmarks (see Annex 13). These alternative valuations correspond to scenarios 3 to 7 (see paragraph A13.31). Annex 13 also discusses Ofcom's position that, in setting these benchmarks, 3G spectrum costs should be broadly consistent with the voice and data traffic forecasts for each scenario (see paragraph A13.52).

Annex 15

Non-network costs

Introduction

A15.1 Ofcom's view, as set out in the September 2006 Consultation, is that in order to estimate the total cost of MCT it is necessary to consider whether any share of non-network costs should be added to the network costs discussed in Annex 5. In general Ofcom has taken a higher level approach to estimating and allocating these costs to MCT compared to Ofcom's more detailed bottom-up cost modelling of MNOs' network costs (see Annex 5). This is consistent with the approach followed by the Competition Commission in their 2002 inquiry and in Ofcom's view is a proportionate approach in relation to the information available. This Annex sets out Ofcom's analysis of MNOs' non-network costs and how these are allocated across different mobile services including MCT.

A15.2 Non-network costs are costs of all activities that are not directly associated with the network operation enabling calls to be made. As discussed in Annex 6 these can be grouped into three categories:

- Customer acquisition, retention and service costs (CARS) – comprising advertising and marketing, handset costs, discounts and incentives, customer care, billing and bad debts;
- Administrative costs – to include general overheads; and
- Other costs – remaining costs (eg payments to other operators such as roaming charges) not relating to the running of the UK network nor either of the above two categories.

A15.3 The figure below summarises the MNOs' non-network costs in the three categories above based on the MNOs' average accounting costs (excluding H3G and for H3G separately) based on the information available to Ofcom at the time of the September 2006 Consultation.

Figure A15.1 Summary of MNOs' non-network costs as per the September 2006 Consultation – based on 2004 accounting information

| | Average costs excluding H3G (£ million) | H3G (£ million) |
|-------------------------|--|--------------------|
| CARS costs ¹ | 1,534 | [X] |
| Administration costs | 275 | [X] |
| Other ² | 948 | [X] |
| Total | 2,757 | [X] |

Source: Ofcom based on information from MNOs

¹ CARS costs are shown in the figure before taking account of offsetting revenue, such as the proceeds of handset sales and any part of periodic subscriptions from contract customers.

² Other costs include items such as interconnect costs and amortisation.

A15.4 As discussed in A6.6, when the September 2006 Consultation was published there were some matters of clarification outstanding regarding accounting information for 2004, and accounting information for 2005 had not been finalised by all the MNOs. Ofcom has now reached a view on the outstanding issues relating to 2004's accounting information and in addition 2005's accounting information has been finalised. The figures below summarise the MNOs' non-network costs in the three categories above based on the MNOs' average accounting costs (excluding H3G and for H3G separately) for the finalised 2004 and 2005 accounting information.

Figure A15.2 Summary of MNOs' non-network costs based on 2004 accounting information - updated from September 2006 Consultation

| | Average costs excluding H3G (£ million) | H3G (£ million) |
|----------------------|---|-----------------|
| CARS costs | 1,536 | [X] |
| Administration costs | 302 | [X] |
| Other ¹ | 875 | [X] |
| Total | 2,713 | [X] |

Source: Ofcom based on information from MNOs

Figure A15.3 Summary of MNOs' non-network costs based on 2005 accounting information

| | Average costs excluding H3G (£ million) | H3G (£ million) |
|----------------------|---|-----------------|
| CARS costs | 1,705 | [X] |
| Administration costs | 285 | [X] |
| Other ¹ | 947 | [X] |
| Total | 2,937 | [X] |

Source: Ofcom based on information from MNOs

¹ Ofcom has modified its approach to the allocation of non-network costs: the amortisation costs of 3G licences have been removed from the "Other" grouping and have been included in network costs. See A6.12 for further explanation.

A15.5 H3G is at a different stage in its business development compared to the other four MNOs. [X] Ofcom's approach is to estimate the costs of an average efficient operator on a forward looking basis and Ofcom expects that H3G's costs are likely to tend towards this average over time. Therefore in the September 2006 Consultation Ofcom proposed to base its analysis of non-network costs, to apply to all five MNOs, on the average non-network costs excluding H3G.

Customer acquisition, retention and service costs

Responses to the September 2006 Consultation

A15.6 H3G made a number of points regarding Ofcom's proposed approach not to allocate any CARS to MCT.

Consistency with previous decisions by Ofcom

A15.7 H3G argues that this approach is inconsistent with previous decisions by Ofcom in which CARS are treated as a common cost between wholesale or retail services. The decisions specifically identified are:

- Charges between Communications Providers: Number Translation Services Retail Uplift charge control and Premium Rate Services bad debt surcharge, Statement September 2005 (paragraphs 3.6 and 3.55)
- Provision of Technical Platform Services, Consultation November 2005 (paragraph 6.38)

Ofcom's definition of subscription

A15.8 H3G disagrees with Ofcom that there are three core mobile services: subscription, origination and termination. H3G makes two key arguments as to why it is not reasonable to define a subscription service and to allocate CARS to its incremental cost.

A15.9 Firstly, subscription is not a service in its own right. H3G argues that there is no subscription service per se and to assume that one exists is to confuse the elements of a "two-part tariff". The presence of an identifiable cost associated with subscription does not imply the existence of a service and Ofcom has not provided evidence of a distinct demand for a subscription service independently from the demand to originate and terminate calls.

A15.10 Secondly and alternatively H3G argue that Ofcom's definition of the three basic services provided by MNOs, i.e. subscription, origination and termination leads to illogical conclusions when trying to estimate the standalone costs of one of these particular services. Therefore H3G argues that the existence of a subscription service is not appropriate. For example:

- In order to provide subscription (i.e. the "option" or ability to make and receive calls) it is necessary to also be able to provide both origination and termination services. Otherwise a subscriber would be acquiring a mobile phone handset which was unconnected to any functioning mobile network and hence no one would demand subscription in the first place. Therefore, the subscription service must include all call services provided by an MNO.
- In order to provide call origination and termination it is necessary to provide subscription. The key element of the subscription service is the provision of a mobile handset. To provide termination and origination at any level of demand requires a given number of subscribers and handsets. Hence both origination and termination include subscription in their definition.

A15.11 H3G argues that Ofcom's definition of subscription therefore leads to an illogical circularity:

- The provision of any service implies the provision of subscription and the provision of subscription implies the provision of all other services. This means there are no incremental costs associated with each service, rather all costs are common.

- Alternatively, H3G argues that it is possible to argue the opposite i.e. if an MNO ceased to provide a given service e.g. termination, then it would by definition be unable to provide other services e.g. subscription, and in turn all other services. Therefore all costs are incremental to every service and there are no common costs.

A15.12 In summary H3G proposes that since there is no subscription service and/or to avoid the illogical conclusion set out above in Ofcom's definition of subscription, CARS should be considered a common cost between origination and termination. CARS are simply the cost of achieving and sustaining given levels of demand for usage services.

MNOs as wholesale and retail businesses

A15.13 H3G argue that if Ofcom were to take the view that it is interested in the costs of a wholesale-only MNO, and that therefore CARS, which are a retail cost are not relevant from this perspective, that whilst this would support Ofcom's view on the treatment of CARS, this is unlikely to be an economically meaningful distinction.

A15.14 H3G sets out that it could be argued that a wholesale only MNO does not need to incur CARS because it does not have a relationship with end customers. Rather it would only need to incur costs negotiating and managing the relevant "wholesale contracts". However, H3G makes a number of points as to why this approach is not meaningful.

A15.15 Firstly, H3G argues that in making a distinction between a wholesale and retail MNO it would be unclear who had the market power in termination and therefore which service (wholesale or retail) should be regulated.

A15.16 Secondly, H3G considers that taking the perspective of a wholesale MNO is inconsistent with Ofcom's treatment of the externality surcharge. The purpose of the externality surcharge is to provide a fund that an MNO can use to subsidise subscription prices to marginal subscribers and therefore increase the number of subscribers to a more efficient level. A wholesale-only MNO would not be the appropriate party to receive this subsidy fund since it would not incur any CARS or have the relationship with the end consumer.

A15.17 Thirdly, H3G argues that it would be inconsistent of Ofcom to take a wholesale only MNO perspective because it has already asserted that an element of CARS may be described as common and potentially recoverable from wholesale termination i.e. customer call centre costs that are incurred to resolve technical problems affecting incoming calls.

A15.18 Fourthly, H3G argues that if Ofcom were to take the perspective of a wholesale only MNO then it should take into account, and it has not done so, wholesale CARS costs. H3G argue that a wholesale-only business would incur CARS in the form of providing incentives to its retailers to provide, for example, handset subsidies to its end customers. The reason it would do this is because it has a significant network cost to recover and it is in the interests of the MNO to ensure that as many end users as possible ultimately are using its network.

New entrant CARS

A15.19 H3G notes that Ofcom acknowledges that traffic levels are related to a given level of spending on CARS and that this means that failure to include any allocation of

these in termination has an impact on ppm. In particular H3G considers that a new entrant into a saturated market is discriminated against by the exclusion of CARS from termination.

- A15.20 Firstly, H3G note their disagreement (as discussed above) with Ofcom's overall view that CARS are not incremental or common to termination.
- A15.21 Secondly, H3G argues that even if it accepted Ofcom's view above there is still a problem with Ofcom's approach from a new entrant's perspective. As a new entrant in a saturated market H3G argues that it will face different CARS compared to its competitors to achieve the levels of traffic Ofcom has forecast in arriving at its overall ppm figures. Ofcom has argued that the key issue is to ensure that forecast traffic applied to H3G is reasonable. However, H3G argue that what is "reasonable" is contingent on their level of CARS spending. Therefore H3G argues that to ignore this spending does not allow them to recover their costs.
- A15.22 Lastly, H3G notes Ofcom's view that spending on CARS should not be taken into account since this may result in an "excessive charge" being set. H3G argues that this is circular because if Ofcom were to include CARS as part of the costs of termination then its benchmark for the appropriate costs of termination would suggest that a price (including CARS) was not excessive.

Ofcom's response and conclusions

- A15.23 As discussed in the September 2006 Consultation Ofcom shares the view of the Competition Commission, Vodafone²¹² and as acknowledged by O2²¹³ that CARS should not be recovered from MCT. The Competition Commission concluded that:

"...we did not consider that customer acquisition and retention expenditure was common to termination and other services in the long run"²¹⁴

"...most customer service costs varied with either traffic or number of subscribers, and so were not common."²¹⁵

"...it would not be appropriate to add any non-network cost to LRIC on the basis that callers either caused or benefited from the expenditure, over and above the non-network cost that we considered common."²¹⁶

- A15.24 Ofcom considers that it is appropriate to reflect cost drivers when allocating costs. The analysis of cost drivers rests on a supply side analysis: the costs that are incurred in order to supply a given service or volume. The Competition Commission defined LRIC as:

²¹² See para 7.169 of the CC's 2003 Report "...Vodafone told us that the costs associated with recruiting and maintaining subscribers were subscription event incremental costs and should (absent externality) be recovered through subscription and monthly charges..."

²¹³ See page 12 of O2's response to the September 2006 Consultation document "O2 notes that Ofcom's proposal not to recover customer acquisition, retention and service costs from voice call termination charges is entirely consistent with the approach taken by Ofcom, Oftel and the Competition Commission in the past."

²¹⁴ See para 2.327 of the CC's 2003 Report

²¹⁵ See para 2.328 of the CC's 2003 Report

²¹⁶ See para 2.332 of the CC's 2003 Report

“...LRIC considers the additional cost that the firm incurs in the long run by providing a service (alternatively, the cost that the firm would avoid in the long run if it decided not to provide a service) ...”²¹⁷

A15.25 On this basis, CARS costs should not be regarded as incremental to call termination, since they are not caused by, or incurred in, the supply of MCT. The Competition Commission noted:

“It was apparent that little, if any, non-network cost was directly caused by callers to mobiles...”²¹⁸

A15.26 These costs are incurred because MNOs provide retail mobile services and vary in relation to the number of subscribers acquired. Ofcom also considers that CARS are not a common cost between wholesale voice call termination and retail services²¹⁹. This section now goes on to discuss the arguments raised in H3G’s response to the September 2006 Consultation document.

Consistency with previous decisions by Ofcom

A15.27 Ofcom considers that its approach to CARS in this review is consistent with the position taken in its other decisions raised by H3G.

A15.28 In the context of Charges between Communications Providers: Number Translation Services Retail Uplift charge control and Premium Rate Services bad debt surcharge, it is important to note that this is a charge for origination rather than termination. The NTS Retail Uplift does not treat retail costs as common between retail and wholesale services.

A15.29 The NTS retail uplift is an origination charge. It is a charge for originating a special type of call that could be considered a “hybrid wholesale-retail” call origination service. This is because the originating operator carries out some retail activities on behalf of the terminating operator such as billing. Therefore the NTS Retail uplift allows for some retail costs incurred by the calling party’s (the originating) operator to be recovered from the charge for originating a call made by that party. In the statement²²⁰ paragraphs 4.38-4.40 and Annex 2 set out Ofcom’s approach to specifically exclude those BT retail costs which are not causally related to retail NTS calls (see paragraph A2.10 for example).

A15.30 The NTS Retail uplift is a very specific type of charge and to draw analogies to call termination is not straightforward. However, Ofcom considers that its approach in setting the NTS Retail uplift is consistent with its approach to the recovery of CARS in mobile termination i.e. that CARS are not incremental or common to wholesale mobile termination and are therefore recoverable from retail services. H3G are concerned with the CARS of an operator being recovered from its wholesale

²¹⁷ See para 2.248 of the CC’s 2003 Report

²¹⁸ See para 2.330 of the CC’s 2003 Report

²¹⁹ An element of customer service costs may be described as common across traffic - in particular, customer call centre costs incurred in helping to resolve technical problems that affect incoming calls. However, this element of customer service costs is likely to be very small, as most customer service costs vary with either retail usage services or the number of subscribers and so are not common costs relevant to termination. Due to the absence of any robust calculation of the size of these costs and their likely immateriality, as noted by the Competition Commission, Ofcom sees no strong case for making any adjustment to the costs of termination to take them into account.

²²⁰ See http://www.ofcom.org.uk/consult/condocs/NTSfin/statement_nts_uplift/statement_nts_uplift.pdf

termination service in addition to its retail services and this is not consistent with Ofcom's decision on NTS retail uplift.

- A15.31 In the context of the Provision of Technical Platform Services (TPS) Ofcom published a statement in September 2006²²¹ to conclude the consultation (and the earlier consultation document referred to by H3G in their response). In that statement the following CARS have been identified in the cost analysis of Sky:
- Customer acquisition marketing costs to promote the Sky platform and to encourage and stimulate retail customers to take up and use the Sky platform (e.g. advertising) – see paragraph 4.15;
 - Customer retention marketing costs to encourage retail customers not to churn away from the Sky platform (e.g. direct marketing) – see paragraph 4.20; and
 - Customer equipment subsidy costs to encourage retail customer take up and use of the Sky platform (e.g. subsidised set-top boxes) – see paragraph 4.21.
- A15.32 All three categories of CARS costs listed above have been classified as platform common costs that are incurred by Sky in developing and operating the Sky platform but that are not directly attributable from a cost causation perspective to a particular TPS but which benefit all TPS customers – see paragraphs 4.13 - 4.14.
- A15.33 Ofcom's approach to recovery of CARS in TPS charges is set out in paragraphs 5.4 - 5.8 and 5.12 - 5.18:
- Ofcom would expect that the total incremental benefits that a TPS customer derives from using its chosen mix of TPS (e.g. an EPG listing only for a free-to-air channel; or an EPG listing and conditional access for a pay-TV channel) should be considered when determining the TPS customer's contribution toward the recovery of platform common costs (of which CARS constitute a proportion).
 - In particular, Ofcom would expect that platform common costs would be recovered from TPS customers in proportion to the incremental benefits they derive from the costs being incurred. In other words, platform common costs would be recovered from TPS customers in equal proportion to the relative incremental benefits each customer receives from these costs being incurred.
- A15.34 Ofcom's approach towards TPS charges is consistent with its approach to setting MCT charges, as explained below.
- A15.35 Although as set out below Ofcom considers this to be a weak analogy, in both CTM and TPS, to the extent that CARS costs are included in wholesale charges, this relates to the same principle of reflecting the benefits to the customers and ultimately consumers of the service, not because the particular wholesale service in question is a cost driver. The contribution by TPS customers to Sky's CARS can be compared to Ofcom's approach to the externality surcharge paid by callers to mobiles. The externality surcharge accounts for the external benefits enjoyed by callers to mobiles as the size of the overall mobile network increases with the addition of marginal mobile subscribers. This can be viewed as contributing to the recovery of CARS. There is no cost causality relationship between the size of the externality surcharge and the production of MCT - it is related to capturing the external benefits arising from increased mobile penetration. Similarly, Ofcom has

²²¹ See <http://www.ofcom.org.uk/consult/condocs/tpsguidelines/statement/>

set out its view that purchasers of TPS services can be expected to contribute towards Sky's CARS because they benefit from increasing the penetration of the platform.

- A15.36 The differences of detail between CTM and TPS, in estimating the contribution by services to recovery of CARS, reflect the application of the same high-level principle to different circumstances.
- A15.37 In particular, in TPS the broadcaster and viewer benefit directly from the CARS costs incurred by the platform. In contrast, in CTM, callers to mobiles do not benefit directly from CARS costs incurred by the MNO. Instead the direct beneficiaries are mobile subscribers. Callers to mobile benefit indirectly and the extent to which they do so is reflected in the calculation of the network externality surcharge.
- A15.38 This difference in how consumers benefit from CARS expenditure reflects the circumstances of TPS being more analogous to the charges of a wholesale MNO to a MVNO rather than to mobile termination.
- A15.39 Another way to explain the analogy between TPS and a wholesale MNO-to-MVNO relationship is to consider the relevant baskets of services and prices in each case. In both cases, subsidised equipment is largely paid for by the customer. For mobile customers handset subsidies lead to a bundle of retail services comprising a cheap (or free) handset along with relatively higher charges for subscription and calls. For Pay TV customers, set top box subsidies lead to cheaper set top boxes and relatively higher subscription charges, which are passed on from wholesale charges made to pay TV broadcasters. In each case, the customer faces broadly the same total charges as they would have without subsidies, but the balance of prices is affected.
- A15.40 Thus, the main effect of the subsidy in each case is to change in the way in which customers pay for the service owing to a commercial strategy designed to encourage customers to take up the service, rather than to subsidise the customer's overall consumption to any great extent. This is a difference from the purpose of the network externality surcharge on mobile termination, which is to contribute to the funding of a subsidy to marginal mobile customers, who would not be subscribers in the absence of the subsidy.

Ofcom's definition of subscription

- A15.41 Ofcom disagrees with H3G's view that there is no logical definition of a subscription service. This is especially so in the sense in which the existence of a subscription service is relevant in this context, either because it is a cost driver or because it is efficient for certain costs to be recovered through subscriber charges. CARS are driven by the number of subscribers and can be efficiently recovered by charging at the point of use for the service that causes them to be incurred. Therefore, since MNOs are able to charge customers for subscription it is efficient for MNOs to seek to recover subscriber costs through a specific charge. MNOs may choose to adopt a different pricing approach e.g. recovering some of the CARS through charges for calls, however, this does not mean that there is no subscription service.
- A15.42 Furthermore, even though it is not necessary for Ofcom's conclusion, it is also the case that a distinct demand exists for subscription. There is an option value associated with purchasing mobile subscription and therefore subscribers have a willingness to pay to be a mobile subscriber. H3G has challenged Ofcom to provide empirical evidence that there is a demand or an option value for subscription. First,

Ofcom notes that the existence of an option value is soundly based - so long as there is uncertainty *ex ante* with regards to the amount of usage (making and receiving calls) that a potential subscriber may consume *ex post*, there will be a positive option value from subscribing²²². As to empirical evidence, Ofcom notes, for example, that there are many mobile subscribers who do not use their phone to make or receive calls on a regular basis. These subscribers keep their phone for emergency use so that they have the option to make a call or be called.

A15.43 Ofcom also disagrees that it is illogical to define separate subscription, origination and termination services. H3G reaches this view by taking a demand side perspective and considering the bundle of services that consumers seek to purchase.²²³ However, the objective of Ofcom's cost analysis is to understand the costs of supplying different services by considering how costs arise. In establishing this, it is a supply side perspective that is relevant and therefore defining separate services is a logical step in order to investigate key cost drivers. For this reason, Ofcom believes that H3G's demand side argument leads it to reach an erroneous conclusion. Ofcom agrees that subscription is the service required as a prerequisite from the consumers' perspective in being able to access all other mobile services. However, this does not then imply for cost allocation that all costs are either common or incremental to every service as H3G argues. H3G's argument rests on the idea that there is no *demand* for traffic services without subscription. But this is not the relevant question when identifying the cost drivers. From a supply side perspective the costs of traffic services generally vary with the volume of traffic provided, not with the volume of subscription, and so are not causally related to subscription. Similarly expenditure on CARS is broadly unaffected from a cost causation perspective by the volume of mobile termination that is supplied.

A15.44 There is a further difficulty of circularity or false inference with the use of a demand-side approach to the analysis of CARS. There is a discretionary element to CARS, which are costs incurred in order to obtain customers that have a demand for subscription and calls (in addition to the option value). When termination charges are set excessively, one of the ways in which the waterbed effect may operate is for this profit to be (partially) dissipated or competed away in the retail market by MNOs spending more on CARS (as well or instead of setting lower retail prices). So the observed level of CARS may be an inappropriate figure to use – if termination charges have been excessive, the observed level of CARS will be inflated. Just because CARS increase if the termination charge is excessive, this is not a valid reason for setting a regulated termination charge including CARS. Hence it is incorrect to argue that CARS costs are truly causally related or incremental to termination.

A15.45 In further response to H3G's argument that to define these separate services is illogical, Ofcom notes that the existence of such standalone providers is not necessary for the standalone cost to be established. It is entirely logical to define separate services for this purpose even though in practice there may not be standalone suppliers of each service. In the presence of economies of scale or scope it is likely that standalone suppliers would be less efficient than a firm

²²² See for example "*Option value, telecommunications demand, and policy*" by Kridel, Lehman and Weisman (1993), *Information Economics and Policy*, pp 125-143, which finds that, drawing on the option value literature, expected consumer surplus from usage does not adequately explain subscription decisions. This paper presents an empirical example in which option value significantly improves demand estimation for a fixed telephony optional calling plan in the US.

²²³ However, even this is insufficient to support H3G's conclusion. Even taking solely a demand-side perspective, subscription, origination and termination can have distinct prices and can be purchased in different proportions, so it would still be appropriate to identify distinct services.

supplying all services and therefore the absence of standalone suppliers may not be surprising in practice. Moreover, defining separate services and estimating their standalone costs does not mean that the complete set of services is unavailable to consumers but rather that they are supplied by different firms. Therefore, by considering standalone suppliers, from a demand side perspective consumers are able to purchase the bundle of services they require, whereas from a supply side it is possible to understand the nature of the costs of supplying each service.

A15.46 In addition, H3G argues that to define these three separate services of subscription, origination and termination results in a logical conclusion that all costs are common. Whilst Ofcom has not sought to estimate the standalone costs to a hypothetical provider of providing a single service, if it were Ofcom's intention to do so, consideration would need to be given to the type of network that would be appropriate as a benchmark for these different standalone service providers. This would have an impact on the overall level of costs that would be efficiently incurred in the delivery of different standalone services. For example, if one traffic service were not provided, network costs would likely fall (with the required capacity of the network, which might be designed in a quite different way) implying that it would be a false inference to conclude that all network costs are common. Furthermore, a supplier of a standalone service might design its network in a quite different way to the networks of the existing MNOs.

MNOs as wholesale and retail businesses

A15.47 As set out earlier Ofcom considers that CARS are neither incremental nor common to MCT. It is possible to reach this same conclusion by considering the perspective of an MNO as being engaged in wholesale and retail activities. In Ofcom's view this perspective provides another way to highlight how CARS expenditure is unrelated to wholesale MCT and is instead incremental to retail subscription services. However, H3G has set out its reasons why this perspective is unlikely to be "economically meaningful".

A15.48 H3G sets out in its response what it considers Ofcom's argument to be:

"In order to provide a wholesale termination business no CARS costs need be incurred because a wholesale MNO would only require relationships with other purely retail MNOs. It would therefore only need to incur the costs of negotiating and managing the relevant wholesale contracts."

A15.49 Ofcom considers that an MNO engages in two broad sets of activities, providing wholesale services which support usage and subscription services, and retail services, that is selling subscription and origination services to end users. MVNOs can provide examples of retail only MNOs - businesses that sell subscription and origination services without being network operators. In Ofcom's view this distinction between retail and wholesale is a useful framework when considering cost allocation.

A15.50 As noted above MVNOs are operators that operate as retailers. Whilst it is the case that there are no examples of MNOs that solely provide wholesale services, they sometimes operate in this capacity (e.g. when supplying MVNOs), and in Ofcom's view this framework has value from the perspective of considering how costs arise and how they should be allocated.

- A15.51 Addressed in turn below are the various arguments that H3G puts forward as to why this framework is not “economically meaningful”:
- A15.52 Firstly, H3G argues that in applying this framework it is unclear who has the market power in termination, the wholesale or retail MNO. Ofcom considers that that the supplier of wholesale termination has the market power. The identity of this operator might vary depending on the billing conventions adopted, but whoever it is in any set of contractual or billing arrangements is supplying a wholesale service. For example, MVNOs – with the current set of arrangements in the UK - do not have market power in the supply of mobile termination because they do not have any control over the terms at which callers to their subscribers are connected, i.e. they are not the suppliers of wholesale mobile termination. Ofcom understands that MVNOs do not set the charge for MCT and although as part of their contracts with MNOs they may take a revenue share of termination receipts, they do not have the power to influence the price at which termination is sold. With a different set of arrangements it is possible that MVNOs might be suppliers of wholesale termination and have market power, but in such a situation they would be performing a wholesale activity (i.e. they would not be retail-only operators).
- A15.53 Secondly, H3G argues that Ofcom’s view of wholesale and retail MNOs is inconsistent with its approach to the externality surcharge. There is, however, no inconsistency. Ofcom allows MNOs to receive an externality surcharge on MCT to subsidise mobile subscription prices to marginal subscribers. This subsidy is funded through charges for a wholesale service because MNOs are in practice vertically integrated. However, if this were not the case, then an alternative means of funding externality subsidies might be appropriate.
- A15.54 Thirdly, H3G argues that since Ofcom has recognised an element of CARS to be a common cost associated with termination it is inconsistent for Ofcom to take a wholesale-retail view. The specific element of CARS that Ofcom does consider could actually be a common cost (and referred to by H3G) is related to customer service centre costs - resolving problems with incoming calls. In Ofcom’s view this particular cost is causally related to a wholesale service - ensuring calls to mobiles can be received could be viewed as a wholesale network cost (because there is no related retail service). In any case Ofcom is of the view that these costs are not material and has therefore not undertaken a detailed review of them, The Competition Commission shared this view:
- “We then examined whether customer service costs could be considered as a common cost in the long run, including the cost of resolving problems, billing, bad debts, and distribution of prepay cards. We decide that a very small element of this cost could be described as common across traffic services (specifically, the customer call centre to the extent that the staff help to resolve technical problems that affect incoming calls). However, most customer service costs varied with either traffic volume or number of subscribers, and so were not common²²⁴.”
- A15.55 Lastly, H3G argues that Ofcom has not taken into account those CARS that a wholesale-only MNO would incur. H3G argues that a wholesale only MNO would still incur CARS in the form of providing retailers with incentives to ensure its network is utilised. Ofcom considers that the efficient part of this cost that should be borne by callers to mobile (as distinct from the mobile subscribers) is provided for

²²⁴ See paragraph 2.328 of the Competition Commission’s 2003 Report

via the externality surcharge. If passed on to subscribers this surcharge can be used to subsidise retail prices and promote socially optimal mobile penetration. Ofcom accepts that both wholesale and retail operators would be incentivised to promote use of the network but much of this relates to the balance of prices to be paid by mobile subscribers for subscription and calls. As set out in Annex 16, the network externality surcharge provides for the cost that is efficiently borne by callers to mobile.

A15.56 In addition to costs related to providing incentives to retailers, a hypothetical wholesale-only MNO may also incur costs associated with managing its relationship with retail providers. However, from the perspective of setting charges this is not a relevant consideration in this review. MNOs are vertically integrated and do not incur these costs. The perspective of considering separately the wholesale and retail activities of an MNO, as explained, is a hypothetical thought experiment that usefully informs the question of cost drivers and cost allocation, i.e. the nature and *structure* of costs. But the relevant *level* of costs for consideration in setting charges is the cost level that a reasonably efficient MNO actually incurs.

New entrant CARS

A15.57 H3G argues that a new entrant has to incur a higher level of expenditure on CARS than its competitors. Moreover, H3G argues that Ofcom's forecasts are contingent on a given level of expenditure on CARS. In the case of a new entrant this is particularly important if the forecasts are contingent on a level of expenditure that is higher than its competitors because it is a new entrant.

A15.58 In Ofcom's view there are number of difficulties with H3G's argument. Most fundamentally, in Ofcom's view the relevant question in this context is whether the traffic forecasts that Ofcom has used in its cost modelling are reasonable.

A15.59 In determining its traffic forecasts Ofcom has reached a conclusion based on a range of views. These include the MNOs' actual forecasts as well as those of third parties. Ofcom's overall forecasts for its 3G-only average efficient operator are different to H3G's actuals. H3G's actual forecasts demonstrate a significant imbalance in outbound and inbound calls: outbound calls exceed inbound calls by a significant degree. H3G's particular commercial strategy may have led to this traffic imbalance, reflecting the types of incentives it has given its customers and the types of customers it has attracted – its CARS spending may be linked to this strategy. Ofcom's forecasts are more neutral in terms of traffic balance than H3G's forecast assumptions. However, the key traffic determinant of unit cost benchmarks is the total lifetime traffic, and under Ofcom's traffic balance assumptions the total lifetime traffic is similar (or indeed slightly lower) than under H3G's forecast assumptions resulting in a ppm benchmark for termination which is no lower than would be derived using H3G's traffic assumptions.

A15.60 Ofcom therefore considers that its traffic forecasts are reasonable. Together with Ofcom's view set out above that CARS costs should not be included in wholesale mobile termination charges (except to the extent that the network externality surcharge is characterised as an allowance for CARS costs), in Ofcom's view, this addresses H3G's argument.

A15.61 Viewed in this way, H3G's argument that its high CARS costs as a new entrant should be included in wholesale termination charges can be characterised as entry assistance. That is, it is an argument that the regulator should deliberately favour

H3G over the other incumbent MNOs in regulating mobile termination charges, in order to offset the higher costs associated with entry that H3G argues it faces.

- A15.62 Ofcom's proposals for charge controls already take into account H3G's specific circumstances, as set out in Section 9. Ofcom does not consider that it would be appropriate to go beyond this, given the importance of competitive neutrality.
- A15.63 Moreover, it is not certain that H3G's CARS are in fact higher than the other MNOs. This is because it can be misleading to consider expenditure on CARS only at a specific point in time, especially when seeking to compare long run costs of an entrant with incumbents, who may have incurred substantial CARS cost in the past in order to build up their customer bases. Whether or not H3G's long run expenditure on CARS is greater than its competitors is very difficult to establish, because consideration should be given to CARS expenditure over the lifetime of MNOs' respective marketing activities. The information required to make this comparison is not readily available and in Ofcom's view it would be disproportionate to conduct a detailed investigation of this issue.
- A15.64 Even if it could be demonstrated that H3G's expenditure were higher in the long run than its competitors it would be important to understand the reasons why, given that Ofcom's objective is to understand the costs of an average efficient 3G-only operator.

Conclusion

- A15.65 Ofcom remains of the view, as discussed above, that it is not appropriate to recover CARS from wholesale mobile termination (except to the extent that the network externality surcharge is characterised as an allowance for CARS costs).

Administrative costs

- A15.66 Ofcom considers that administration costs, consisting of overheads for non-network depreciation (IT, furniture and office equipment), property costs, human resources, finance and legal costs and IT overheads, are a common cost between all of an MNO's activities. These costs should therefore be recovered across all areas of an MNO's business that they help to support.
- A15.67 The figure below sets out Ofcom's approach as per the September 2006 Consultation to estimating the share of total administration costs that are allocated to network activities.

Figure A15.4 Allocation of administration costs to network activities (as per the September 2006 Consultation)

| | Average costs (excluding H3G ¹) in 2004 (£ million) | H3G's costs in 2004 (£ million) |
|---|---|---------------------------------|
| Network depreciation (A) | 377 | [X] |
| Network opex (B) | 340 | [X] |
| Net Book value of Network assets (C) | 1,811 | [X] |
| Cost of capital (pre tax nominal) ² (D) | 14.1% | [X] |
| Cost of capital on Network assets (E = C x D) | 255 | [X] |
| Total annual network costs (F = A+B+E) | 972 | [X] |
| Total cost of retail activities (CARS ³) (G) | 1,534 | [X] |
| Total costs ⁴ (H= F+G) | 2,506 | [X] |
| % network costs (I = F/H) | 39% | [X] |
| Administration costs (J) | 275 | [X] |
| Share of administration costs allocated to network activities (K = I x J) | 107 | [X] |

Source: Ofcom based on information from MNOs

¹. [X]

² Based on 11.3% pre tax real cost of capital and 2.5% inflation

³ CARS costs are shown before taking account of offsetting revenue, such as the proceeds of handset sales and any part of periodic subscriptions from contract customers. This is the appropriate measure of CARS rather than taking the net cost in which revenues are offset. The gross handset cost is a genuine cost in contrast to the lower net 'cost' that is effectively a price since it is a function of the underlying gross costs and the extent to which MNOs seek to recover revenues from customers. The resource cost is the gross handset cost, even if the whole of this cost is not charged directly to customers because MNOs choose to provide a subsidy. It would be inconsistent in estimating the allocation of administration costs to use cost for all other services, but a figure for CARS that is below the cost.

⁴ Other costs such as interconnect and roaming costs and amortisation are excluded from this analysis. This is consistent with Ofcom's and the Competition Commission's approach in previous reviews. However, Ofcom notes that administration costs may support activities related to interconnection and roaming. If administration costs were allocated across these activities (in addition to network and retail) the share of administration costs allocated to network activities would be lower than estimated in the figure above.

A15.68 In the September 2006 Consultation Ofcom estimated that £107m in 2004 terms (estimated to be £112m in 2006/7 terms) should be allocated to network activities as a share of administration costs for the average operator. This calculation was based on accounting information for 2004. Ofcom has performed a revised

calculation of the share of administration costs allocated to network activities using accounting information for 2005, which is the latest accounting information available. The revised calculation takes into account a number of responses received following the September 2006 Consultation, regarding:

- the relative administration costs of 3G-only and 2G/3G average operator;
- the overall level and network share of administrative costs;
- the costs included in different non-network cost categories; and
- the use of economic depreciation to determine the mark-up on MCT for administration costs.

A15.69 In the rest of this section Ofcom sets out the arguments raised by stakeholders with regards to these issues and Ofcom's response and conclusions.

Relative administration costs of 3G-only and 2G/3G operator

A15.70 Vodafone argue in its response that the administrative costs mark-up for the 3G-only operator is inappropriately high compared to the mark-up for the 2G/3G operator. Ofcom's proposed mark-ups assumed that the 3G-only operator has the same absolute level of total administration costs as the 2G/3G operators. The higher ppm in 2010/11 for the 3G-only operator is due to the assumption that it has lower incoming call volumes than the 2G/3G operator in 2010/11.

A15.71 Vodafone argue that since the 3G operator will be a little over half the size of the 2G/3G operators in 2010/11 that it is inefficient for the 3G-only operator to be assumed to incur the same level of total network administrative costs as a 2G/3G operator. Vodafone suggests that the total administrative costs for the 3G operator may fall in the range of 75% to 90% of the 2G/3G operator level under different assumptions concerning the speed with which the 3G operator's market share converges to the 2G/3G operators.

A15.72 Ofcom recognises that its proposal to use the same total administrative costs for all operators is an approximate estimate, at least in the short term, of an efficient 3G-only operator's administration costs. However, in the long run Ofcom expects efficiently incurred administration costs to be the same across all MNOs. However, in Ofcom's view it is difficult to determine when an efficient developing 3G-only operator's administrative costs may equal that of an efficient, established 2G/3G operator. Given the relatively small magnitude of non-network costs compared to the overall costs of termination, Ofcom, like the Competition Commission, has not developed a bottom-up approach to non-network costs and therefore the underlying key cost drivers of administration costs have not been explored in detail. Moreover it is also likely that during the early stages of development of a MNO's business, its administration costs are particularly difficult to forecast.

A15.73 In any case, the impact on the ppm of reducing the total administrative costs of the 3G-only operator is not significant. For example, if a 3G-only operator's total administration costs were 90% of a 2G/3G operator in 2010/11 as Vodafone suggest might be likely given convergence of market shares by 2010/11, then the 3G-only operator's ppm would decrease by only about 0.04ppm. As discussed at the end of this Annex (see paragraph A15.109 in determining the appropriate mark-up for administration costs) Ofcom has taken into account uncertainty around forecasts of demand and based its conclusions on a range of scenarios. Small

differences in the estimates of the ppm mark-up under these different scenarios do not affect the overall conclusions. Ofcom considers that its approach, whilst being an approximation in the short term, is reasonable given the available information.

Overall level and network share of administrative costs

A15.74 In the September 2006 Consultation Ofcom proposed to make the assumption that the absolute level of MNOs' administration costs would remain constant in real terms. In addition Ofcom also assumed that the proportion of total administration costs allocated to network services was also constant over time. Stakeholders made a number of points with regards to these assumptions:

- Vodafone argue that a higher proportion of administration costs should be allocated to the network. Firstly, they consider that using accounting information from 2004 to estimate base line costs for analysis is not appropriate. This is because 2004 was a period when H3G was aggressively pursuing customer growth with substantial handset support payments that forced a matching reaction from the other 2G/3G MNOs. Therefore overall CARS in relation to handsets were unusually high in 2004. Therefore Ofcom's allocation of administration costs to network services would understate the allocation in the future. Secondly, they consider that, over time, the proportion of network costs will grow versus retail costs;
- T-Mobile argue that property and human resources (HR) costs will rise in real terms; and
- BT argue in contrast, that there should be efficiency gains as the volume of terminating minutes increases. As an example, they refer to the 2.5% to 4.5% efficiency gains incorporated within the regulation of BT.

A15.75 In considering Vodafone's argument it is worth noting that Ofcom's revised proposals in this statement are based on 2005 figures since these are the most up-to-date. Given Vodafone's view of the 2004 information it is Ofcom's view that using the 2005 accounting information is a more reliable approach. With regards to Vodafone's second point there has been a steady historical trend over the period 2002 to 2005 of CARS increasing, notably increasing by 11% from 2004 to 2005. In addition the proportion of network costs versus CARS has been steadily decreasing from 2002 to 2005. In Ofcom's view these trends do not lend support to Vodafone's argument.

A15.76 It may not be unreasonable of T-Mobile to suggest that there may be increases in property and HR costs. However, in Ofcom's view an efficient operator may also be expected to investigate cost reduction programmes in these areas. Ofcom has been provided with evidence that demonstrates that MNOs have sought to cut costs in these areas.

A15.77 With regards to BT's argument, Ofcom agrees that MNOs may be expected to make efficiency savings in their administrative costs over time. However, it is difficult to know the extent to which overall net cost savings might be made particularly in light of T-Mobile's view above that costs in some categories may be increasing.

A15.78 In conclusion, Ofcom's approach, consistent with the September 2006 Consultation, is to hold administration costs constant in real terms until the final year of the price control. As volumes increase, administration costs will decrease on a ppm basis.

Ofcom considers that this is a balanced approach given the differing views of the MNOs and BT.

Costs included in different non-network cost categories

Incentive payments to a distributor or dealer

- A15.79 Vodafone argues that incentive payments made by MNOs to a distributor or dealer to obtain a connection should not be included in CARS costs in the allocation of administration costs. In Vodafone's view these payments are analogous to interconnect payments, i.e. sums passing outside the operator's business with minimal administrative intervention. Vodafone therefore considers that these incentive payments should not affect the allocation of administrative overheads since this activity involves very little internal administrative resource.
- A15.80 In general administration costs are the costs of activities that support a wide range of services. Whilst Vodafone suggests, for example, that activities related to interconnection (and roaming) do not require support from administrative functions, at least to some degree these activities will require administrative support. Ofcom considers that this is also likely to be the case for activities related to providing incentive payments to distributors or dealers.
- A15.81 Ofcom has not sought to undertake a detailed analysis of every activity undertaken by an MNO and the extent to which it requires administrative support. Ofcom's approach, which is to take a more aggregated view of activities across the MNOs, is reasonable given the information available. However, if for example a different view were taken on whether interconnection costs do indeed attract administration costs this would reduce the administration costs allocated to network activities. Ofcom considers that it has adopted a reasonable balance between more detailed analysis of every activity an MNO undertakes and a more aggregated approach to allocating administration costs, proportionate to the nature of the task in this context.

Handset costs

- A15.82 Vodafone argue that handset costs should be excluded in total from CARS for the purposes of allocating administration costs between network and retail activities. They argue that the number of handsets sold in a year is an indirect driver of administration costs but the unit price of those handsets (net or gross) is not. Therefore, they consider that the inclusion of total gross (or net) handset costs within CARS overstates the degree to which administration activities support CARS.
- A15.83 As discussed above in paragraph A15.72, Ofcom has taken a higher level approach to non-network costs that may for some activities overstate their requirement on administrative resources whereas in others it may understate. In the case of handset costs Vodafone asserts that taking into account handset costs will overstate the proportion of administration costs that should be allocated to retail activities. However, in Ofcom's view, given its more aggregated approach to non-network costs, it is not appropriate to apply a selective detailed cost driver analysis to some categories of non-network costs but not to others. Ofcom considers that its approach is reasonable given the extent of consistent information available across all categories of non-network costs and MNOs.
- A15.84 Vodafone go on to argue that if Ofcom includes handset costs in CARS it must not include the gross handset cost. Vodafone argue that:

- Net handset costs represent the operator's handset cost after the contribution that the customer is prepared to pay (for any given tariff) to upgrade his handset from the "base" model provided free of charge to a more sophisticated handset.
- The contribution from the customer is influenced by two factors:
 - the cost/specification of the handset, and
 - the tariff to which the customer is connected.
- More specifically the price the customer is asked to pay for a given handset reduces as the monthly bundle/contract revenue rises. Equally, for a given tariff, the required contribution from the customer increases with the cost to the operator of the handset.
- Any premium that the customer wishes to pay for a higher specification handset above the base handset (the handset provided free of charge for a given tariff) should be written off against the total handset cost and therefore only the base handset cost should be included for each customer.
- Vodafone argues that the operator chooses to provide a basic subsidy. However, customers decide whether to pay a premium in order to secure a better specified device than that allowed for by the MNOs basic subsidy. It is therefore Vodafone's view that the contract handset cost should be reduced by the contract handset revenue for the purposes of allocation of administrative costs.

A15.85 Ofcom does not consider that this is a new set of issues to those presented to the Competition Commission and to Ofcom in previous reviews. Therefore Ofcom has not changed its approach from the September 2006 Consultation (See note 3 of figure A15.4 above):

"This is the appropriate measure of CARS rather than taking the net cost in which revenues are offset. The gross handset cost is a genuine cost in contrast to the lower net 'cost' that is effectively a price since it is a function of the underlying gross costs and the extent to which MNOs seek to recover revenues from customers. The resource cost is the gross handset cost, even if the whole of this cost is not charged directly to customers because MNOs choose to provide a subsidy. It would be inconsistent in estimating the allocation of administration costs to use cost for all other services, but a figure for CARS that is below the cost".

A15.86 On the supply side MNOs face the cost of a handset, on the demand side they may recover this cost, as discussed above through charging the customer on acquiring the handset, through monthly tariffs and service charges or through some combination of the two. It is not appropriate to take these demand side considerations into account when investigating cost allocation because the purpose of the exercise is to explore efficient price benchmarks for mobile termination charges.

Brand fees

A15.87 In their response Orange state that Ofcom has included its Brand Fees within CARS and Brand Income within Other. Orange argues that this treatment is not consistent, and in fact both items should be included within "Other".

A15.88 After consideration of Orange's comments, Ofcom has concluded that Brand Fees should be in "Other" costs and has moved these costs into this category. Additionally Ofcom has concluded that because Brand Income represents a revenue item it is not relevant to Ofcom's analysis of MCT. Ofcom has therefore excluded Brand Income from the results.

3G spectrum costs

A15.89 T-mobile argue that 3G spectrum costs should be included as part of network costs in the allocation of administration costs. They argue that there is an element of administration costs that relate to managing an MNO's 3G spectrum holding. T-mobile assert that "Network Amortisation", which was classified in "Other" costs in the September 2006 Consultation, represents 3G licence costs and should be included within the network costs grouping.

A15.90 3G spectrum costs could be treated as part of network costs for the purposes of allocating administration costs. 3G spectrum acquisition and holding may require administrative support. However, this is likely to be relatively small. Nevertheless including these costs would be consistent with Ofcom's approach to 3G spectrum costs in estimating ppm network costs.

A15.91 Ofcom has therefore revised its approach to include the average of MNOs' (excluding H3G) 3G amortisation costs in 2005 (as a proxy for 3G spectrum acquisition and spectrum holding costs) in Total Annual Network Costs. In addition a cost of capital on this network asset has also been included for consistency. Ofcom's revised administration cost allocation is set out at the end of this annex in Figure A15.5. This change increases the share of administration costs allocated to network activities.

A15.92 In Ofcom's view this is a reasonable approach to addressing T-Mobile's concern. However, Ofcom notes that this approach may result in an over estimate of the allocation of administration costs to network activities. This is because the extent to which 3G spectrum acquisition and holding requires administrative support is unlikely to be in proportion to the relative level of 3G spectrum costs compared to other network and retail costs.

Cost of capital on non-network assets

A15.93 Orange argue that Ofcom has not made an allowance for the financing cost of non-network assets within the determination of administration costs and that this is inconsistent with the treatment of network assets within the cost model.

A15.94 Vodafone also argue that Ofcom's assessment of network administration costs is limited to operating costs only and that the scope of the administration costs used for the recovery should be extended to include capital as well as operating costs.

A15.95 It is worth noting that the Competition Commission considered whether any additional allowance was necessary to take account of cost of capital on non-network assets and working capital. However, the Competition Commission did not include this cost of capital in its calculations because it found that the MNOs had negative working capital which was roughly equal to the level of their non-network assets, and hence the net figure was quite small. In theory Ofcom accepts that there is a reasonable argument for including an allowance for the financing cost of non-network assets in allocating administrative costs across network and retail activities and has investigated amending its previous approach.

A15.96 The average NBV (excluding H3G) of the MNOs' non-network assets in 2005 was £424m²²⁵. The cost of capital on these assets is £62m at 14.6% pre tax nominal cost of capital (see Annex 18). This cost of capital needs to be allocated across the relevant non-network activities e.g. administration, CARS and "Other". In the absence of more detailed information, this could be allocated in proportion to the operating costs of these activities. This results in a non-network cost of capital allocation of £6m to administration, £36m to CARS and £20m to "Other".

A15.97 The overall impact of taking into account the cost of capital on non-network assets on the administration costs allocated to network costs is small. This is because:

- The actual cost of capital allocated to administrative costs is only £6m compared to administrative operating costs of £285m; and
- The overall increase in total administrative costs (from £285m to £291m) is offset to a small degree by the increase in total CARS costs (operating and cost of capital on non-network costs from £1,705m to £1,741m).

A15.98 Figure A15.5 sets out Ofcom's revised estimates including the above allowance for cost of capital on non-network costs.

The use of economic depreciation to determine the mark-up on MCT for administration costs

A15.99 In the September 2006 Consultation document Ofcom's proposed approach to estimate the mark-up on termination, for network attributable administration costs, was to:

- Estimate the share of network administration costs attributable to termination in proportion to the annual costs of termination relative to total network costs in the year of interest (i.e. 2010/11); and
- Estimate the ppm mark-up on termination for administration costs by dividing the absolute cost by the number of terminated minutes in the year of interest (i.e. 2010/11).

A15.100 Vodafone argue that economic depreciation should be used to estimate the ppm mark-up for administration costs attributable to termination. They argue that this is a consistent approach with the treatment of other network assets.

A15.101 Ofcom's overall objective is to estimate a simple ppm mark-up in the year of interest (i.e. 2010/11) that allows MNOs to recover their efficiently incurred costs related to administration activities in providing termination services.

A15.102 Ofcom considers that it is appropriate to retain its existing approach of accounting depreciation for administration costs even though it differs from the depreciation methodology used to determine network costs in 2010/11. Firstly, in the case of network costs for which economic depreciation is used, Ofcom has sought to develop a bottom-up cost model cross-checked against MNOs' accounting information. In developing the bottom-up cost model Ofcom has estimated cash flows and modern equivalent asset and operating cost trends over a very long

²²⁵ This does not include working capital which Ofcom has estimated to be positive but relatively small and therefore has a negligible impact on the overall share of administration costs allocated to network services.

period of time that spans the past and the future. These estimates are the key inputs for estimating unit costs in each year based on economic depreciation. However, in the case of non-network costs, following the Competition Commission's approach, Ofcom has adopted a broader methodology which relies solely on MNOs' accounting information. Based on this accounting information, Ofcom has developed estimates for administration costs from the annual non-network operating costs and net book value of non-network assets, for the years 2002 to 2005, and for the year 2001 based on the Competition Commission's analysis. For the purpose of deriving an estimate of administration costs in 2010/11, Ofcom has assumed that the administration costs in 2005 remain constant in real terms, having taken a balanced approach to the likely change in costs in light of differing responses from stakeholders (see paragraphs A15.73 to A15.77 above). If Ofcom were to apply an economic depreciation approach, it would be necessary to work backwards from these accounting estimates to first arrive at annual cash flows, and second to determine estimates of cash flows and cost trends over the whole explicitly modelled period (1990/91 to 2020/21)²²⁶. Given the relative materiality of non-network costs to the overall cost of termination (of the order of 5%) Ofcom does not consider that it is proportionate to undertake such further, more detailed, analysis of these past and future costs.

A15.103 Secondly, if Ofcom were to change its approach there would be the risk of creating windfall gains or losses. Ofcom's proposed approach has been used in the past by the Competition Commission and Ofcom itself to set prior charge controls. Any change in approach to the path of cost recovery must be carefully considered against the effect it may have on the path of prices in the past and future, against the path of prices used to set prior charge controls.

A15.104 Therefore Ofcom has decided to retain its existing approach rather than change to an economic depreciation approach to non-network costs.

Conclusion: share of admin costs allocated to network activities and MCT

A15.105 The figure below sets out Ofcom's revised approach to estimating the share of total administration costs that are allocated to network activities. This uses accounting information for 2005, which is the latest information available.

²²⁶ Vodafone has endeavoured to undertake this exercise in its response to the September 2006 Consultation, incorporating a simple forecast which assumes no change in real terms from 2004/05 to 2020/21. Ofcom has forecast the cost in 2010/11 on the basis that, in the absence of any compelling evidence to the contrary, it is reasonable to assume that total administration costs in 2005 remain unchanged in real terms for the final year of the charge control. However, it is a very different matter to generate a cost forecast over the whole modelled period, on which, under economic depreciation, the whole shape of the unit cost profile over time would depend.

Figure A15.5 Allocation of administration costs to network activities¹

| | Average costs (excluding H3G) in 2005 (£ million) | H3G's costs in 2005 (£ million) |
|---|--|------------------------------------|
| Network depreciation (A) | 377 | [X] |
| 3G licence amortisation (B) | 220 | [X] |
| Network Opex (C) | 334 | [X] |
| NBV of network assets (D) | 1,802 | [X] |
| NBV of 3G licences (E) | 3,477 | [X] |
| Cost of capital (pre tax nominal ²) (F) | 14.6% | [X] |
| Cost of capital on network assets | 263 | [X] |
| Cost of capital on 3G licences | 508 | [X] |
| Cost of capital on network assets and 3G licences (G = (E+D) x F) | 772 | [X] |
| Total annual network costs (H = A+B+C+G) | 1,703 | [X] |
| Annual operating cost of retail activities (CARS) (I) | 1,705 | [X] |
| Annual operating cost of "Other" activities (J) | 947 | [X] |
| Annual operating cost of Admin activities (K) | 285 | [X] |
| NBV of non-network assets (L) | 424 | [X] |
| Cost of capital on non-network assets (M = L x F) | 62 | [X] |
| Cost of capital on non-network assets attributable to CARS (Retail) (N = M x I/(I+J+K)) | 36 | [X] |
| Total CARS (Retail) costs (O= I+N) | 1,741 | [X] |
| Cost of capital on non network assets attributable to Admin (P = M x K/(I+J+K)) | 6 | [X] |
| Total Admin costs (Q = K+P) | 291 | [X] |
| Total Network and Retail costs (R = H+O) | 3,444 | [X] |
| % Network costs (S = H/R) | 49% | [X] |
| Share of administration costs allocated to network activities (2005 terms) (S x Q) | 144 | [X] |

Source: Ofcom based on information from MNOs.

¹ Calculations are based on un-rounded figures.

² Based on 11.5% pre tax real cost of capital and 2.8% inflation. See Annex 18 for further details.

A15.106 Ofcom estimates, based on the average costs across MNOs excluding H3G, that £144m in 2005 terms (estimated to be £148m in 2006/07 terms) should be

allocated to network activities as a share of administration costs for the average operator.

A15.107 As discussed this total administrative cost allocated to network activities e.g. incoming calls, outgoing calls and data, is allocated to network services in proportion to their respective shares of network traffic costs²²⁷. The ppm mark-up for administration costs on termination in 2010/11 is estimated by dividing termination's share of this total cost by the number of minutes terminated in that year.

A15.108 The figure below sets out the ppm mark-up for administration costs on termination under Ofcom's revised assumptions and changes to its approach. The ppm mark-up is estimated under different demand scenarios in order to inform an overall conclusion on the appropriate mark-up to apply. The figures in the first two columns are based on the same level of total administration cost allocated to network services of £148m (2006/07 terms) - the average 2005 costs across the 2G/3G MNOs – divided by the forecast volume of termination minutes in 2010/11. Differences in the ppm mark-up between 2G/3G and 3G-only operators reflect differences in the share allocated to termination and the number of minutes terminated. There is a risk that the second column may overstate the unit cost of an efficient 3G-only operator because it assumes that the 3G-only operator incurs the same level of administrative costs in £m as the efficient 2G/3G operator despite significantly lower volumes (see paragraphs A15.70-73). The final column (redacted) is based on H3G's actual costs in 2005 [redacted] which are lower than the average of the four 2G/3G MNOs. The resulting ppm figures in this final column understate the appropriate mark-up since they make no allowance for any increase in costs towards the average level of the 2G/3G MNOs, despite the forecast increase in size of the business by 2010/11.

Figure A15.6 PPM mark-up on termination for administrative costs under different demand scenarios in 2010/11 (in real 2006/07 prices)

| | 2G/3G operator (Average costs exc H3G in 2005) | 3G-only operator (Average costs exc H3G in 2005) | 3G-only operator (H3G's costs in 2005) |
|----------------|---|---|---|
| High Traffic | 0.11 | 0.15 | [redacted] |
| Medium Traffic | 0.29 | 0.46 | [redacted] |
| Low traffic | 0.46 | 0.80 | [redacted] |

A15.109 In conclusion, based on the figures set out above, Ofcom considers that a reasonable mark-up for administration costs on termination in 2010/11 is 0.3ppm in the case of 2G/3G operators. Ofcom has decided to estimate an overall ppm mark-up that is added to the network costs of termination under different demand scenarios in the same way as the externality surcharge (see Annex 16). In the case of the 3G-only operator benchmark Ofcom considers that a mark-up of 0.4ppm is reasonable given the potential overstatement of using the average of the 2G/3G

²²⁷ For the September 2006 Consultation, the proportion of administrative costs allocated to termination was derived in Release 3 of the cost model on the basis of total network costs rather than network traffic costs (which exclude subscriber related costs). In this statement, in estimating the administrative cost allocated to termination, administration costs have been allocated between network services on the basis of traffic costs. The difference in approach has a negligible impact on the non-network cost mark-up on termination.

MNOs costs to apply to the smaller 3G-only operator (as discussed in paragraphs A15.70-73) and noting that the benchmarks derived on the basis of the relatively lower level of H3G's actual costs in 2005 will be an understatement. Ofcom considers this mark-up provides for a reasonable allowance for recovery of administration costs given the potential for H3G's costs to rise between now and 2010/11 as its business increases in size but balances the uncertainty that H3G's business is not forecast to be the same size as the 2G/3G MNOs in 2010/11.

Annex 16

The network externality surcharge

Introduction

A16.1 As explained in section 9 (from paragraph 9.66 et seq.), in the presence of a network externality, not enough consumers may choose to become mobile subscribers from the perspective of society as a whole. To the extent that not all of the network externality is internalised, social welfare can be increased by providing a subsidy to some of those consumers who are not willing to pay the full price of subscription.

The relationship between surcharge revenues and subsidies

A16.2 The purpose of the externality surcharge is to allow MNOs to obtain revenues in excess of costs from terminating calls on their networks that are used to provide subsidies to marginal subscribers thereby promoting economic efficiency.

A16.3 However, MNOs may not have the ability and the incentives to use all surcharge revenues to subsidise marginal subscribers, in which case there is some degree of “leakage” that must be taken into account when estimating the optimal externality surcharge. The relationship between the revenues obtained from the externality surcharge and the subsidy provided to marginal subscribers, i.e. the degree of leakage, depends on a variety of factors and most notably on:

- The waterbed effect, which depends on the intensity of competition between MNOs in the mobile retail market; and
- The ability and incentives of MNOs to target subsidies to marginal mobile subscribers.

Waterbed effect

A16.4 The intensity of price competition affects the extent to which surcharge revenues are passed through to consumers in the form of lower retail prices rather than being retained by MNOs in the form of excess profits.

A16.5 If competition drives MNOs’ excess profits to zero (i.e. MNOs make a return no greater than their cost of capital), then any excess profit from terminating calls to mobiles would be competed away through lower retail prices or other retail activity, such as marketing expenditure (i.e. a so-called waterbed effect). In this case all revenues in excess of costs obtained by MNOs from termination would be passed through to consumers in the form of lower retail prices for mobile services.

A16.6 If competition between MNOs is imperfect and it does not completely remove excess profits the waterbed effect is likely to be reduced. In this case, some of the revenues obtained by the MNOs from a surcharge on termination may be passed through to consumers in the form of lower retail prices or other retail activity but some may be retained by MNOs as profits.

A16.7 However, even if the retail market(s) were monopolised, one could expect the surcharge on mobile termination to have some impact on retail prices and in particular the price of subscription. This is because even in this extreme scenario

the externality surcharge affects the profits that the marginal subscriber will generate and therefore the conditions that determine the profit maximising price of subscription.

- A16.8 The impact of imperfect competition on the optimal externality surcharge is ambiguous since it affects not only the amount of revenues that need to be raised in order to provide the subsidy to a given number of marginal subscribers but also the welfare trade-off that determines the optimal number of subscribers.²²⁸
- A16.9 When competition is less intense, surcharge revenues are partly “wasted” in the sense that they are not fully used to subsidise marginal subscribers. Therefore more revenues need to be raised to fund a given pot of subsidies - which on its own would suggest raising the optimal termination charge.
- A16.10 Off-setting this effect is the adverse impact of higher termination charges on the welfare of callers to mobiles who pay the surcharge and therefore on the optimal number of subscribers. Raising termination charges above resource cost generates a deadweight loss²²⁹ in the termination market, i.e. it reduces the welfare of callers to mobiles who pay the surcharge. When there is leakage, the welfare cost to subsidise any given number of subscribers increases and therefore it is socially optimal to subsidise fewer subscribers, which would point to a lower optimal externality surcharge (other things equal).

Targeting

- A16.11 Targeting affects the extent to which the reduction in retail prices is directed at marginal subscribers rather than other consumers, who do not require a subsidy in order to become or remain mobile subscribers.
- A16.12 In the presence of effective competition (i.e. when the waterbed effect is strong), it is reasonable to expect that much of the revenues that the MNOs obtain from the externality surcharge may be competed away through lower retail prices for mobile communication services, including lower subscription prices (or increased expenditure on CARS). The weaker the waterbed effect, the less the externality surcharge is likely to be passed onto subscribers.
- A16.13 But in any case, the extent to which the surcharge can improve efficiency by increasing the number of subscribers to a level closer to the socially optimal one depends on the ability and incentives of MNOs to actually use the surcharge revenues to subsidise marginal subscribers.
- A16.14 At one extreme there is the situation in which MNOs use all revenues obtained from the externality surcharge to subsidise marginal subscribers, for instance by providing them with handsets at prices below cost. In this case targeting is “full” and the surcharge is an effective instrument to improve economic efficiency.
- A16.15 At the other extreme there is the situation in which MNOs use none of the revenues obtained from the externality surcharge to subsidise marginal subscribers (“zero targeting”). This would arise, for instance, if MNOs competed away the surcharge revenues by offering better deals to non-marginal subscribers only.

²²⁸ See also the discussion of the impact of imperfect competition on welfare optimal termination charges generally at paragraph 22 of Annex 17.

²²⁹ Deadweight loss refers to the loss in welfare which arises because the higher termination charge results in a level of output such that willingness to pay exceeds marginal resource cost - i.e. there remains output which it would be efficient to supply.

- A16.16 In between these two extremes there is a continuum of scenarios with different levels of targeting. In practice, the actual degree of targeting depends on the ability and on the incentives of MNOs to target subsidies to marginal subscribers²³⁰.
- A16.17 In theory, as is the case for imperfect competition, the effect of imperfect targeting on the optimal externality surcharge is ambiguous. This is because targeting has two contrasting effects on the optimal externality surcharge. On the one hand, when MNOs do not target marginal subscribers, the surcharge required to provide the subsidy to any given level of marginal subscribers increases. On the other hand, however, when targeting is imperfect the optimal number of marginal subscribers to be subsidised (and therefore the optimal surcharge) is lower because the higher surcharge on termination raises the welfare cost of the subsidy.
- A16.18 In the extreme case where no subsidy is provided to marginal subscribers, ‘zero targeting’, given the welfare loss associated with raising termination charges above cost, it is clear that the optimal externality surcharge would be zero: if the externality surcharge is entirely wasted on infra-marginal subscribers, the justification for a surcharge falls away entirely.

Estimation of the optimal externality surcharge

- A16.19 Estimates of the optimal externality surcharge can be derived from a variety of applied modelling approaches.
- A16.20 Ofcom does not consider that any single model is, on its own, sufficiently accurate to provide a point estimate of the correct optimal surcharge due to the uncertainties in some key parameter values and to the inability to capture the complex interactions between all the factors that affect the level of the optimal surcharge. However, by placing different weights on a range of factors, each estimate provides useful information on the level of the optimal externality surcharge.
- A16.21 Ofcom has derived estimates of the optimal externality surcharge by
- replicating the analysis undertaken by the Competition Commission in 2002 using updated data; and
 - developing a new modelling framework that extends the analysis undertaken by the Competition Commission in 2002.
- A16.22 While there was some support among MNOs for the modelling approach adopted by Ofcom (in particular from Orange and Vodafone), O2 suggested that there is merit in using also a Ramsey-type model to derive estimates of the efficient externality surcharge and has invited Ofcom to reconsider its position on this issue.
- A16.23 In theory, a Ramsey model that captures the existence of network externalities can provide an estimate of the optimal externality surcharge on termination alongside estimates of the “efficient” mark-ups for common costs.

²³⁰ The ability to target subsidies depends on MNOs being able to design tariffs which induce marginal subscribers to join or remain mobile subscribers without inducing non-marginal subscribers to take such tariffs. The incentive to attract marginal subscribers depends on the net profitability of attracting such customers against the net profitability of attracting non-marginal customers. That is MNOs would be expected to compete for customers which offer greater net profitability – i.e. cost of acquiring the customer against the profits earned (e.g. from calls made and received, plus profits on subscription charges in the case of non-marginal customers).

- A16.24 The main advantage of a Ramsey-type model is its ability to account, at least in theory, for complex demand inter-relationships, feedback effects and the multitude of mobile communications services.
- A16.25 However, as discussed at length in Annex 17, Ramsey analysis involves substantial uncertainties and difficulties and Ofcom has concluded that it would not be robust enough to provide reliable estimates of the efficient externality surcharge.
- A16.26 Relative to a Ramsey model, the modelling framework that Ofcom has developed has several advantages, and notably it is able to capture a number of complex issues (such as leakage) in a relatively straightforward and transparent way and without having to make tentative assumptions on a large number of parameters as is the case in a Ramsey-type model.
- A16.27 Ofcom has therefore calculated the optimal externality surcharge as the increase in the termination charge necessary to provide MNOs with enough revenues to fund the subsidies required to support the socially optimal number of subscribers, explicitly accounting for leakage.
- A16.28 The following two sub-sections respectively describe the calculation of the externality surcharge necessary to achieve a desired target number of marginal subscribers and the derivation of the optimal number of marginal subscribers.

From the optimal number of subscribers to the optimal externality surcharge

- A16.29 In order to increase subscription over and above the (socially inefficient) level that would be achieved in a competitive market (in which the price of subscription reflected the cost of subscription) it is necessary to provide some marginal consumers with subsidies.
- A16.30 The total subsidy that is necessary to support any given number of subscribers depends on the ability and on the incentives of MNOs to offer different subsidies to different marginal subscribers. Hereafter, the term “price discrimination” is used to describe the level of subsidy provided to each marginal subscriber. This is distinct from the term “targeting”, defined above, which is used to refer to the extent to which reductions in retail prices are directed at marginal subscribers as opposed to non-marginal subscribers (who, by definition, do not require a subsidy to be subscribers).
- A16.31 It is useful to consider two extreme scenarios of price discrimination. In the first scenario price discrimination among marginal subscribers is not possible in the sense that all marginal subscribers receive the same subsidy. In this case, the total subsidy required can be calculated by multiplying the subsidy that must be provided to the last marginal subscriber by the total number of marginal subscribers:

$$\text{Total subsidy required} = \text{Number of marginal subscribers to receive a subsidy} * \text{Subsidy to last marginal subscriber}$$

- A16.32 This is illustrated in Figure A16.1 below by the area of the rectangle comprising the two triangles labelled A and B. In the diagram, the number of subscribers N is the number that would subscribe without subsidies – i.e. non-marginal subscribers. N* denotes the number of optimal subscribers – i.e. those for whom the marginal social benefit of joining the network exceeds the marginal social cost of them subscribing.

A16.33 In the second scenario, price discrimination is perfect in the sense that each marginal subscriber is given a subsidy exactly equal to the amount necessary to induce her to subscribe. In this case, the total subsidy required is lower and, if the demand function is linear, it is half of the subsidy necessary when there is no price discrimination:

$$\text{Total subsidy required} = \frac{1}{2} * \text{Number of marginal subscribers to receive a subsidy} * \text{Subsidy to last marginal subscriber}$$

A16.34 This is illustrated in Figure A16.1 below by the area of the triangle labelled A.

A16.35 In practice, price discrimination is unlikely to be perfect or impossible but the two scenarios above conveniently capture the two extreme cases and therefore contribute to the understanding of plausible upper and the lower bounds to the optimal externality surcharge.

A16.36 Once the total amount of subsidy that must be provided has been calculated, it is possible to determine the revenues that MNOs need to raise from termination in order to fund these subsidies. The relationship between surcharge revenues and subscription subsidies crucially depends on the degree of “leakage”.

A16.37 The degree of leakage will depend on the ability and incentives of MNOs to use surcharge revenues to provide subsidies to marginal subscribers. As explained above, leakage can be interpreted as potentially capturing both imperfect price competition (in retail services) and imperfect targeting (between marginal and non-marginal subscribers).

A16.38 In the model, leakage is captured by a parameter that specifies the proportion of revenues generated by the externality surcharge that are “wasted” in the sense that they are not actually used to provide subsidies to marginal subscribers. By taking leakage into account, the total amount of revenues that must be raised in order to provide the required subsidy is thus specified as

$$\text{Total revenues required} = \text{total subsidy required} / (1 - \alpha)$$

A16.39 Where the parameter α (which takes values between 0 and 1) is the proportion of surcharge revenues that are not used to subsidise marginal subscribers. For instance, if leakage were 0%, total revenues required would be the same size as the required subsidy, whereas if leakage were 75%, α would be equal to 0.75 and total revenues required to provide subsidies to all marginal subscribers would be four times the level of the required subsidy.

A16.40 Finally, given the total revenues required to fund subsidies to achieve the target number of subscribers²³¹, the surcharge can be calculated by dividing the total surcharge revenues required by the total number of minutes terminated by MNOs:

$$\text{Surcharge per termination minute} = \text{total revenues required} / \text{termination minutes}^{232}$$

²³¹ The target number of subscribers will only include marginal subscribers for whom the marginal social benefit is greater than or equal to the marginal social cost of them joining.

²³² The total number of termination minutes is calculated accounting for the fact that the demand for mobile termination decreases when the surcharge per termination minute is increased. It is assumed that pass-through is full, i.e. the retail price of termination increases by the full amount of the surcharge.

- A16.41 This approach is consistent with the one followed by the Competition Commission since it assumes that the required subsidy can be funded from both fixed-to-mobile and off-net calls.²³³
- A16.42 Nevertheless, some MNOs have continued to suggest that the surcharge on off-net calls is self-defeating and would not be entirely passed onto consumers through higher retail prices. T-Mobile has proposed to recover the externality surcharge from fixed-to-mobile calls only because in T-Mobile's view funding the subsidy from off-net calls is likely to be largely self-defeating: on the one hand, mobile users benefit from the subsidy they receive but, on the other hand, they also fund this subsidy by paying a higher price for off-net calls. As a result, the net effect of the scheme might not necessarily be a reduction in the cost of mobile ownership to marginal subscribers.
- A16.43 Ofcom notes that T-Mobile is correct in recognising that consumers of (fixed and mobile) communications services are the ultimate source of any subsidy provided to marginal subscribers. In fact, this is a reasonable and desirable feature of the scheme since the cost of providing the subsidy is paid by the same consumers who benefit from contacting marginal subscribers and from being contacted by them (and/or from the ability to do so).
- A16.44 However, Ofcom reiterates that mobile users (and not only fixed-line users) should contribute to the subsidy provided to marginal mobile subscribers and observes that this is not self-defeating. The subsidy is financed through a surcharge that affects the price of (fixed-to-mobile and off-net) calls. Therefore, the cost of the scheme falls largely on (fixed and mobile) consumers with a high level of usage, i.e. consumers who are unlikely to be marginal. Notwithstanding the potential impact of leakage, i.e. that not all surcharge revenues may be used to subsidise marginal subscribers, which is accounted for in the model, it is thus reasonable to expect that marginal subscribers are net beneficiaries of the scheme.
- A16.45 In fact, not only off-net calls but also other mobile services should contribute to the funding of the subsidy. This is because optimal recovery of the subsidy would reflect Ramsey principles – i.e. based on the relative elasticity of all mobile services, with less elastic services contributing a greater mark-up over cost. However, for the reasons set out in Annex 17 Ofcom does not propose to conduct applied Ramsey analysis for the recovery of common costs and therefore does not consider it proportionate to do so for calculation of the externality surcharge. Nevertheless, it should be noted that the omission of other traffic services from the model implies that the efficient surcharge on termination is likely to be overestimated to some degree.
- A16.46 The surcharge on off-net calls is the source of aggregate revenues for the mobile industry inasmuch as the increase in the wholesale termination charge is passed onto consumers by the originating operator in the form of higher retail prices. Vodafone has submitted to Ofcom that the externality model should be adjusted to reflect the fact that a change in the wholesale termination charge is not expected to be fully reflected in the retail price of mobile off-net calls, i.e. that pass-through is incomplete.
- A16.47 Vodafone observes that, if pass-through is incomplete, then off-net minutes are only partially a source of aggregate revenues to the mobile industry that can be used to subsidise subscription. Vodafone suggests that MNOs might not be willing to pass

²³³ Paragraph 8.217 of the CC's 2002 Report

through the full termination rate onto the retail prices of off-net calls because they expect that each outbound call has a certain probability of generating a return call for which a termination payment will be received and that this should be accounted for in the model through the α parameter.

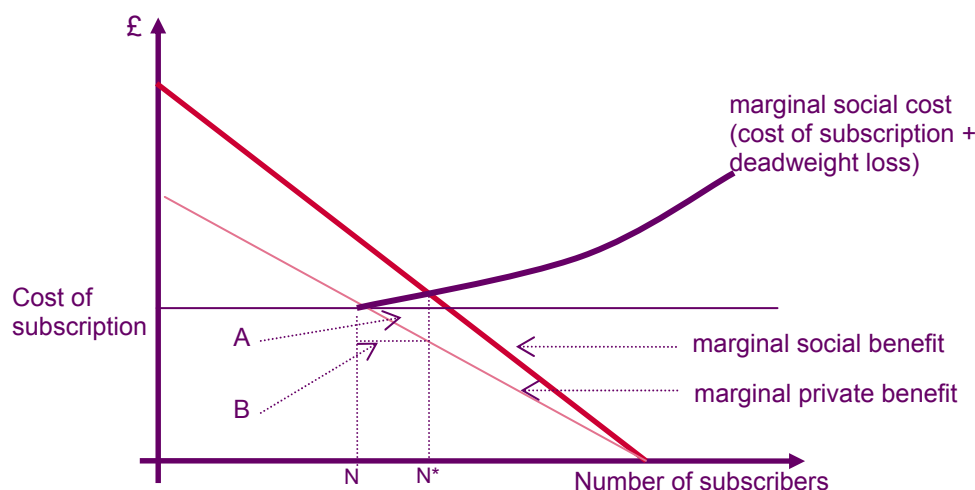
- A16.48 Vodafone considers the relationship between the wholesale termination charge and the retail price of off-net calls. However, the issue of pass-through should not be considered by looking at the retail price of off-net calls in isolation. In fact, the increase in the marginal cost of off-net calls faced by the originating operator can affect the prices of all the retail services it offers and not only the price of off-net calls. Even if a cost increase is passed on to consumers through an increase in the price for other services, the MNO can extract revenues from consumers that offset the increase in its costs.
- A16.49 If MNOs set prices according to Ramsey principles and if competition dissipates any excess profits, pass-through will take place through the entire set of services offered and must be complete in the sense that the additional revenues extracted by MNOs from consumers must offset the cost increase. In fact, firms would otherwise incur losses.
- A16.50 Vodafone suggests that the relationship between the price of off-net calls and the volume of incoming calls is an important element that affects the extent to which an MNO would optimally increase the price of off-net calls when it faces an increase in termination charges. Indeed, when the marginal cost of one service changes, a profit-maximising MNO is expected to modify the prices it charges for all services so as to maximise profits given all the interdependencies that are captured by the demand system it faces. The cross-elasticity of incoming calls with respect to the price of off-net calls is one of the factors that the MNO will take into account. However, this affects the optimal *structure* of pass-through but not the total *amount* of pass-through, which is ultimately determined by the intensity of competition.
- A16.51 In the light of these considerations, Ofcom does not consider it necessary or appropriate to modify its approach to the calculation of the optimal externality surcharge to reflect incomplete pass-through on to the retail price of off-net calls.²³⁴

The optimal number of subscribers

- A16.52 The optimal level of subscription, which in Figure A16.1 is denoted by N^* , is obtained when the marginal social benefit of subscription is equal to the marginal social cost.

²³⁴ Although to the extent that the waterbed effect is partial, not complete, this can be reflected in the leakage parameter.

Figure A16.1 The optimal number of subscribers



A16.53 The marginal social benefit of increasing subscription is the change in social welfare generated when a new subscriber joins the network, i.e. the sum of marginal private benefit and marginal external benefit. The marginal private benefit is the benefit that accrues to the subscriber herself; the marginal external benefit is instead the benefit that accrues to fixed-line and infra-marginal mobile subscribers, i.e. existing subscribers' valuation of contact with the new subscriber.

A16.54 The private benefit of mobile subscribers is measured by the amount they are willing to pay to subscribe, which is captured by the (inverse) demand schedule for subscription.

A16.55 The external benefit generated by subscription is not observed but it can be conveniently expressed as a proportion of the individual benefit. Following established terminology, the size of the marginal social benefit relative to the marginal private benefit is referred to as the "gross externality factor" or the Rohlfs-Griffin factor (the R-G factor)²³⁵. It is reasonable to assume that the value of the R-G factor lies between 1 and 2. A value of 1 implies that there are no external benefits (or that there is no need to correct for externalities because they are fully internalised). A value of 2 would imply that the non-internalised external benefits are as large as the private benefits obtained by the marginal subscriber.

A16.56 The marginal social cost of increasing the number of subscribers by providing subsidies funded by a surcharge on termination of calls to mobiles comprises two elements:

- the cost of the handset necessary to access mobile networks; and
- the reduction in welfare due to the decrease in the volumes of calls to mobiles caused by higher prices for calls to mobiles (i.e. the "deadweight loss" in termination).

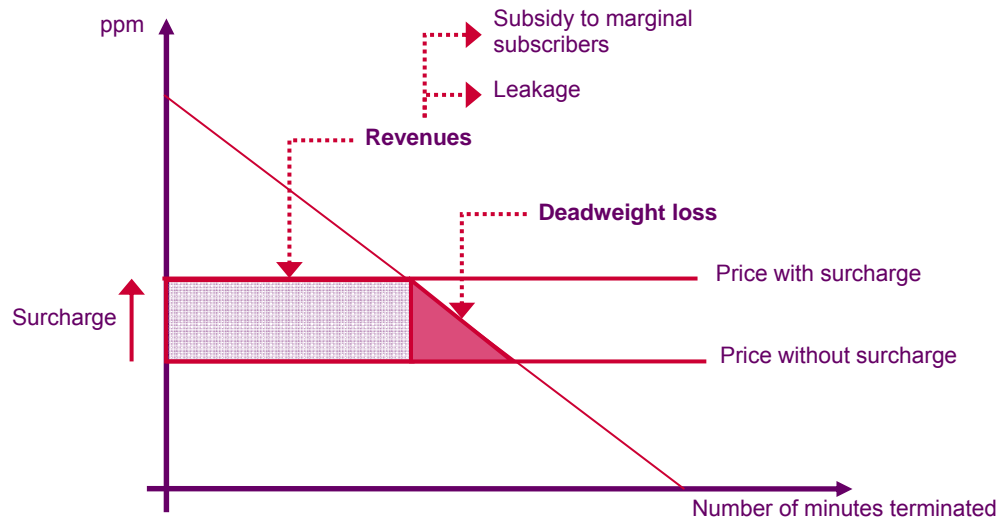
A16.57 The deadweight loss associated with any given level of subscription can be calculated by considering how the demand for calls to mobiles is affected by the surcharge per termination minute required to fund the necessary subsidy. In turn,

²³⁵ See for example para 8.108 of the CC's 2002 Report.

as explained above, the surcharge required depends on both the extent of price discrimination among marginal subscribers and on the degree of leakage.

A16.58 The graph below shows the impact of the externality surcharge on the market for calls to mobiles.

Figure A16.2 The demand for calls to mobiles



A16.59 The surplus of callers to mobiles is equal to the difference between how much callers are willing to pay for a given number of calls (the area below the inverse demand) and the price they pay to make those calls (the area below the price line).

A16.60 When the price of fixed to mobile calls increases, demand for fixed to mobile calls declines and the total number of minutes terminated decreases. The total cost to callers to mobiles from a surcharge on termination to fund subscription subsidies is equal to the area of the shaded trapezoid in Figure A16.2, i.e. the total revenues raised from the surcharge plus the deadweight loss.

A16.61 The total revenues generated from the externality surcharge are transferred to mobile subscribers in the form of subscription subsidies (assuming no leakage) and/or to MNOs. Therefore, even though they represent a cost to callers to mobiles, they do not represent a cost to society as a whole.

A16.62 However, as noted above, in addition to generating revenues, the externality surcharge reduces the total number of minutes terminated. The resulting deadweight loss is a cost to society as a whole that arises when the subsidy to marginal subscribers is funded through the externality surcharge.

Calibration of the model

A16.63 In order to use the Ofcom model to estimate the optimal externality surcharge in 2010/11 (real 2006/07 prices), it is necessary to specify:

- the size of network externalities, i.e. the R-G factor;
- the degree of leakage;
- the subscription cost;

- the number of marginal consumers and the demand for mobile subscription;
- the demand for termination;
- the level of retail termination prices without the externality surcharge; and
- the degree of price discrimination.

Relevant scenarios and the size of network externalities

A16.64 Different combinations of assumptions about the R-G factor, the handset cost, the degree of price discrimination and the degree of leakage are captured by two different scenarios:

- Scenario 1 captures the case in which network externalities are low (R-G factor equal to 1.3), the handset cost is £50, there is perfect price discrimination and no leakage. It provides a lower bound to the optimal externality surcharge.
- Scenario 2 captures the case in which network externalities are large (R-G factor equal to 1.7), the handset cost is £70, there is no price discrimination and leakage is very large (75%). It provides a potential upper bound to the externality surcharge.

A16.65 The specification of the two scenarios reflects the fact that, because of the way the model has been specified, the optimal surcharge is larger when the degree of leakage is larger. However, this is not a general result and different specifications of the model might in principle reverse this result.

A16.66 Some MNOs have invited Ofcom to revise some of the assumptions of the two scenarios and in particular to consider a maximum value of the R-G factor equal to 2²³⁶ and a minimum amount of leakage equal to 25%²³⁷.

A16.67 Even though it is reasonable to expect that the value of the R-G factor lies between 1 and 2, it is likely that some part of the network externality is internalised by consumers and therefore that it does not require corrective pricing. For this reason, Ofcom considers that the highest value of the R-G factor that should be considered for the purpose of estimating the socially optimal externality surcharge is less than 2. This is consistent with the CC's conclusion on the maximum size of the R-G factor²³⁸. The CC's final estimates of the externality surcharge were based on an R-G factor of 1.5²³⁹.

Leakage

A16.68 One of the advantages of the modelling framework developed by Ofcom is that it explicitly captures leakage. However, it is difficult to estimate an appropriate value for the relevant parameter α . Scenario 1 has been designed to provide a lower bound to the plausible range of the optimal externality surcharge and Ofcom

²³⁶ See Orange response

²³⁷ See Vodafone response. O2 also argued that leakage was likely to be "high" but did not suggest revised parameter values, rather selecting a value from the upper end of the Ofcom range.

²³⁸ See paragraphs 2.350 and 2.372 of the CC's 2002 report

²³⁹ Indeed, the CC notes at paragraph 2.374 that in its view 1.5 was likely to be an upper estimate of the R-G factor

therefore considers that it is useful to consider the extreme case in which there is no leakage.

Subscription cost

- A16.69 The cost of subscription is an important input of the model since it affects the subsidy that must be provided to any given marginal subscriber and also the number of marginal subscribers. The following subsection discusses only the marginal private costs of subscription, not the deadweight loss (because this is not a parameter requiring calibration but is solved for by the model).
- A16.70 In 2002, the Competition Commission used “the minimum handset price” as an example of the minimum cost of a marginal subscriber joining the network.²⁴⁰ The CC found that entry level handsets could be bought for £49.99-£59.99 and concluded that £70 would be a reasonable estimate of the minimum handset price allowing for withdrawal of retail commission of up to £20.²⁴¹
- A16.71 The appropriate marginal cost of subscription is likely to include more than the wholesale cost of a handset acquired from handset manufacturers, such as efficient retailing activities necessary to supply marginal subscribers. To the extent that the latter category of costs would be captured in the unsubsidised retail price of a handset, Ofcom considers that the CC’s use of minimum handset prices as a proxy for the minimum cost of joining the network remains a reasonable approach.
- A16.72 On the basis of the CC’s estimates and Ofcom’s subsequent research on the internet, the cost of subscription was set equal to £70 in the September consultation. However, from more recent research, it appears that the retail cost of basic SIM-free 2G handsets available online might now be even less than this.²⁴²
- A16.73 H3G argued that as a 3G only operator it was not appropriate for Ofcom to consider a calculation based on 2G handset prices. Ofcom rejects this view, because the calculation of the externality surcharge is designed to recover only the minimum subsidy necessary to achieve the efficient size of network of subscribers who can be called. Therefore, it is appropriate to consider the cost of a basic 2G handset rather than of a 3G handset because the additional functionalities of 3G handsets are not directly related to making and receiving calls: the externalities in question being related to the size of the network of subscribers that can call and be called (i.e. two-way communication).
- A16.74 H3G has attempted to argue that it is inconsistent for Ofcom to then assume that H3G will achieve market share parity. Again Ofcom rejects this position for the following reasons. First, as a matter of fact, H3G is not assumed to achieve market share parity by the end of the current charge control. Second, the allowance of an externality surcharge will allow H3G to offer subsidies to subscribers. Third, the purpose of the externality surcharge is to ensure an optimal network size overall – not an even distribution of marginal subscribers among operators. Indeed, given that marginal subscribers will tend to be less profitable than non-marginal subscribers, if H3G did not use the externality surcharge to attract marginal

²⁴⁰ See for example paragraph 8.205 of the CC’s 2002 report

²⁴¹ See paragraph 8.222 of the CC’s 2002 Report

²⁴² For example, the Carphone Warehouse website lists a number of sim-free handsets in the range £30 to £60 (see <http://www.carphonewarehouse.com/commerce/servlet/gben-pd-ProductDisplay?S=20&PN=SIMFREEPHONES&display=10&SORTFIELD=MinimumPrice>). Other examples include the Direct Mobile Phones website, where a number of sim-free handsets seem to be available in a similar price range (see http://www.directmobilephones.com/phones_offline1.htm).

subscribers, this would bring into question the appropriateness of allowing any externality surcharge in the first place.

A16.75 BT has submitted that the cost of subscription considered by Ofcom was excessive and has invited Ofcom to consider a lower figure, citing for example Ofcom's market research findings on average handset spend²⁴³. Cable & Wireless argued that the availability of pay-as-you-go and SIM card only services combined with an excess of handsets means that there is no longer a requirement for MNOs to pay for the handsets of marginal users.

A16.76 Ofcom has now considered different costs of subscription in the 2 scenarios that it has specified so that this factor can also contribute to the understanding of plausible lower and upper bounds of the optimal externality surcharge. The range now considered is £50-£70.

Number of marginal subscribers and demand for subscription

A16.77 Marginal consumers include current mobile users and consumers who currently do not own a mobile phone who are interested in (re-)subscribing but are not willing to pay at least the cost of subscription to do so (and those who are not interested in (re-)subscribing because of high handset prices).

A16.78 The number of marginal consumers has been estimated on the basis of standard population statistics sourced from the Office of National Statistics and on the basis of the results of a bespoke market-research survey commissioned by Ofcom to estimate consumers' willingness to pay for subscription ("Mobile call termination Report of market research findings" published by Ofcom simultaneously with the September consultation).²⁴⁴

A16.79 The Office of National Statistics forecasts that the UK population aged 15+ in 2011 will be about 51.4m²⁴⁵. This population has been partitioned between subscribers and non-subscribers and between marginal and non-marginal consumers on the basis of the results of the survey commissioned by Ofcom. The results obtained when the cost of subscription is £70 are compared with those obtained by the CC in 2002 in the figure below.

²⁴³ Ofcom's market research findings on handset spend (published with the September 2006 Consultation were averages, implying that some handsets will have been acquired at lower prices. Paragraph 4.5 of Ofcom's market research findings shows that average handset spend was £44, with pay-as-you-go customer paying on average £57 and contract customer paying £18. However, the figures reported are based on retail prices which may themselves have been subsidised – i.e. are imperfect proxies for retail handset costs.

²⁴⁴ See Mobile Call Termination – Report of market research findings published by Ofcom on 13 September 2006 http://www.ofcom.org.uk/consult/condocs/mobile_call_term/marketresearch

²⁴⁵ See Table 4, p.16 of Population Trends: http://www.statistics.gov.uk/downloads/theme_population/PT123_V1.pdf

Figure A16.3 Marginal vs. non-marginal consumers (%)

| | Ofcom: cost of handset = £70 (2006 survey) | Competition Commission (2002) |
|---|---|--------------------------------------|
| Mobile subscribers as a proportion of population | 81% ²⁴⁶ | 68% |
| Marginal current subscribers as a proportion of total subscribers | 34% | 34% |
| Non subscribers as a proportion of population | 19% | 32% |
| Marginal non subscribers as a proportion of total non-subscribers | 14% | 23% |

A16.80 The figure below shows the estimated number of marginal consumers derived from the combination of UK population forecasts and the results of the survey commissioned by Ofcom when the handset cost is set equal to £70.

Figure A16.4 Marginal vs. non-marginal consumers (millions)

| | Ofcom 2010/11 forecast: cost of handset = £70 (2006 survey) | Competition Commission (2002) |
|------------------------------------|--|--------------------------------------|
| Subscribers | 41.6 ²⁴⁷ | 34.15 ²⁴⁸ |
| Marginal current subscribers | 13.9 | 11.6 |
| Non subscribers | 9.8 | 15.9 |
| Marginal non subscribers | 1.3 | 3.6 |
| Total number of marginal consumers | 15.3 | 15.2 |

A16.81 T-Mobile expressed its concern that Ofcom underestimated the number of marginal customers in the UK and observed that the number of potential mobile subscribers

²⁴⁶ Source: Ofcom tracking survey. Base UK adults aged 15+ July-September 2006, n=2166. Approx error margins at 95% CI: +/-2%

²⁴⁷ Those aged 15+.

²⁴⁸ Those aged 12+.

used in the externality model is lower than the number of mobile subscribers used in the cost model.

- A16.82 The difference in the number of subscribers used in the two models reflects two different metrics. The figure used in the externality model refers to individual subscribers. In modelling externalities it is appropriate to model individual subscribers because the objective is achieving the efficiently sized network of people with mobile communication.
- A16.83 The figure used in the cost model, instead, refers to the number of “active subscribers” defined as SIMs used in the past 90 days. The reason that SIMs are relevant to the cost modelling is because SIMs are the more accurate cost driver than number of subscribers (e.g. handset costs and HLRs will be driven by the number SIMs rather than the number of subscribers per se). Since each individual can have multiple SIMs, it is not surprising that the number of “subscribers” used in the cost model is higher than the number of subscribers used in the externality model.
- A16.84 The analysis of the optimal externality surcharge is based on an annual model and it is thus necessary to derive estimates of the number of marginal consumers on an annual basis. In order to determine the annual number of marginal non-subscribers to subsidise each year, the total number of marginal non-subscribers has been divided by the length of the charge control, i.e. four years. The annual number of marginal existing subscribers has, instead, been estimated as the total number of marginal existing subscribers divided by the estimated average handset life.
- A16.85 In 2002 the CC used average handset lives of 3.5 and 4 years. The average handset life revealed by Ofcom’s survey is 27 months. Since it is reasonable to expect that the handset life for marginal subscribers is longer than the average handset life of all subscribers, the handset life has been set equal to 3 years in scenario 1 and to 2.5 years in scenario 2.
- A16.86 In the absence of better information it is assumed that marginal subscribers are uniformly distributed between £0 and the cost of subscription according to their net private benefit of subscription, which is equivalent to assuming a linear demand for subscription.

Demand for termination

- A16.87 The demand for termination is also modelled as a linear function, which Ofcom considers to be a reasonable approach in the absence of detailed information concerning this demand function. It has been calibrated for three sets of traffic assumptions reflecting the “low”, “medium” and “high” traffic scenarios in Ofcom’s cost model.²⁴⁹ In each case, the calibration price has been set at 10.3ppm (in 2006/07 real terms), which is the current average retail price of off-net and fixed-to-mobile calls. The own-price elasticity of demand at the calibration point has been assumed to be 0.3 (consistent with Ofcom’s approach in the last market review).

²⁴⁹ The aggregate volumes used in this analysis for 2G/3G operators do not correspond with the aggregate volumes in Annex 5. This is because the volumes in Annex 5 reflect the impact of rebalancing of on-net calls that cross both the 2G and 3G networks of a single operator. (See paragraph A5.87 in Annex 5 for further details).

Retail termination prices without the externality surcharge

A16.88 The level of retail termination prices without the externality surcharge is estimated at 9.1 ppm. This is the average level of the charge control in 2010/11 (without the externality surcharge) plus a mark-up set equal to 4.2 ppm²⁵⁰. The mark-up used to derive retail prices is higher than the one used by Ofcom in the September consultation and it now reflects the average mark-up in the market for both off-net and ftm calls.

The degree of price discrimination

A16.89 The two scenarios used by Ofcom capture the two possible extremes for price discrimination among marginal subscribers. The first scenario assumes perfect price discrimination and the second no price discrimination among marginal subscribers. The actual level of price discrimination among marginal subscribers will lie somewhere in between these two extremes.

Results

A16.90 The figure below sets out the results of the model in the two scenarios described above for the volumes of incoming calls to mobiles consistent with Ofcom's cost model assumptions for different traffic scenarios:

Figure A16.5 Results

| | Low traffic: 46.57bn termination minutes | Medium traffic; 58.49 bn termination minutes | High traffic: 80.59 bn termination minutes |
|--|--|--|--|
| Scenario | Estimated optimal externality surcharge (ppm) | Estimated optimal externality surcharge (ppm) | Estimated optimal externality surcharge (ppm) |
| Scenario 1 R-G=1.3 perfect price discrimination no leakage cost of handset = £50 handset life = 3 years | 0.01 | 0.01 | 0.00 |
| Scenario 2 R-G=1.7 no price discrimination 75% leakage cost of handset = £70 handset life = 2.5 years | 0.51 | 0.42 | 0.31 |

²⁵⁰ Estimated based on Ofcom's analysis of fixed and off-net retail prices and regulated MCT charges.

A16.91 Ofcom has also derived estimates of the surcharge by replicating the analysis undertaken by the Competition Commission using updated data. This provides a comparison of Ofcom’s and the Competition Commission’s models. The Competition Commission’s report discusses two different approaches to the estimation of the externality surcharge:

- Approach 1 is the one described in Appendix 8.1 of the Competition Commission’s report. This approach is very similar to the one used by Ofcom, but it considers neither the deadweight loss nor leakage. Further, it assumes imperfect price discrimination (i.e. all marginal subscribers get the same subsidy).
- Approach 2 is the one that the Competition Commission ultimately used to set the externality surcharge as discussed in paragraphs 2.372 – 2.384 of its report. This approach assumes that it is optimal to maintain all current subscribers.

A16.92 The figure below shows the externality surcharge estimated on the basis of these two approaches, assuming that the R-G factor is equal to 1.5, the cost of a handset is £70, the average handset life is 2.5 years and considering the medium traffic scenario.

Figure A16.6 The updated Competition Commission approaches

| Approach | Estimated optimal externality surcharge (ppm) |
|------------|---|
| Approach 1 | 0.08 |
| Approach 2 | 0.38 |

A16.93 In 2002, the estimates of the externality surcharge obtained by the Competition Commission were 0.11ppm (approach 1) and 0.41ppm (approach 2)²⁵¹. The reason why the estimates obtained from the Competition Commission’s model are now lower than those obtained in 2002 is due to the increase in termination minutes outweighing other offsetting effects. While the Competition Commission considered approximately 29.95bn minutes to be terminated in 2005/2006, the Ofcom model considers 58.49bn minutes to be terminated in 2010/2011 in the medium traffic scenario.²⁵²

Conclusion

A16.94 Where there are network externalities that are not fully internalised by consumers, providing subsidies to (some) mobile subscribers can increase economic efficiency. Ofcom believes that it is appropriate for wholesale mobile termination charges to include a contribution towards the recovery of these subsidies (i.e. an “externality surcharge”).

A16.95 The level of the optimal externality surcharge, i.e. the surcharge that maximises social welfare, depends on a variety of economic factors. Because of the modelling

²⁵¹ While the CC used 0.45ppm as the externality surcharge in the final MCT charge, this was the result of taking the mid-point of the 0.41ppm noted above and 0.5ppm (which was obtained using the CC’s approach 2 but with handset cost at £75 and a reduced handset life of 3.5 years).

²⁵² Other differences from the CC’s calculations include different handset life assumptions (2.5 years used here compared with 4 years used by the CC), and a greater number of marginal current subscribers, but a smaller number of marginal non-subscribers.

uncertainties and difficulties in capturing all these relevant factors it is not possible to quantify the optimal externality surcharge without considering a range of estimates.

- A16.96 As discussed above, Ofcom considers that in practice the estimation of the optimal externality surcharge on the basis of Ramsey-type analysis involves significant complexity and ignores some important features of the markets for mobile services (such as leakage and price discrimination among different consumers of the same services). For this reason, Ofcom has considered the range of estimates available from its more flexible yet analytically simpler externality model, although recognising that this model also has limitations and needs careful interpretation.
- A16.97 In light of the results of the analysis undertaken, Ofcom considers that there are sound reasons why the surcharge should be lower for the forthcoming charge control than the current and previous controls. While it is possible to construct scenarios where the externality surcharge is very close to zero, Ofcom considers that some of the parameter values leading to such scenarios are rather extreme. Nevertheless, it seems unlikely that an externality surcharge greater than 0.5ppm (to the nearest 0.1ppm) would be justified.
- A16.98 On balance, Ofcom considers that the 0.3ppm proposed in the September consultation document remains a reasonable allowance for the externality surcharge, but notes that it remains above the mid-point of the plausible range.

Annex 17

Common costs and Ramsey prices

Introduction

- A17.1 There are two potential sources of common costs relevant to MCT: non-network and network common costs. This annex sets out Ofcom's approach to the allocation of these costs to MCT.
- A17.2 In the last market review common costs were estimated explicitly and allocated across all services (traffic and subscription) in proportion to the total costs of those services. This was an EPMU approach and therefore all services, including subscription, contributed to the recovery of common costs.
- A17.3 In the case of network common costs, in Annex 5, paragraph 18, it was highlighted that Ofcom's network cost model does not explicitly identify or estimate the level of network common costs. As discussed in paragraphs A17.43- A17.45 below, identifying and estimating network common costs reliably is difficult. To the extent that common costs exist, in Ofcom's new cost model, these are allocated to service increments according to routing factors.
- A17.4 As a result, no network costs are recovered from the subscription service. The only cost allocated to subscription is the cost of mobile handsets.²⁵³
- A17.5 Ofcom's allocation of network common costs is therefore different from the EPMU approach that was taken in the last market review. Ofcom's methodology in this review will, for a given level of network common costs, lead to a higher mark-up on mobile termination than EPMU. In the absence of a robust quantification of the size of network common costs, Ofcom considers that this is a reasonable approach.
- A17.6 Annex 15 set out Ofcom's approach to estimating and allocating relevant non-network common costs to MCT. Ofcom has allocated non-network common costs (administration overheads) according to the network cost share of total costs (network costs plus the total cost of retail activities). The resulting share of administration costs allocated to network services is further allocated to termination in proportion to the termination share of network traffic costs.²⁵⁴

Ramsey pricing

- A17.7 In the responses to the consultation document Ofcom's methodology to allocating network common costs has been criticised on the grounds that it is not designed to maximise welfare. In particular, T-Mobile has invited Ofcom to adopt at least a partial Ramsey approach to the allocation of common costs in order to derive MCT charges that in its view maximise (expected) welfare.

²⁵³ In terms of cost drivers, there are some network costs which are driven by the number of subscribers (for example, location updates and HLR costs). However, consistent with the Competition Commission's approach, such costs are then explicitly allocated to traffic services.

²⁵⁴ As a consequence termination also receives a greater share of administration costs than if administration costs were allocated on the basis of individual service LRICs rather than the LRIC+ network costings produced by the cost model. However, given the small proportion of administration costs relative to network costs, this effect is negligible.

- A17.8 Economic theory suggests that, in general, static efficiency is maximised when prices are set equal to marginal costs. However, in the presence of fixed and common costs of production, firms can break even only by setting prices that are higher than marginal costs. Ramsey prices are defined as those prices that maximise static efficiency under the constraint that firms recover all costs of production.
- A17.9 Ramsey prices are “efficient” because they account for the impact that increasing prices above marginal costs has on demand. This matters because the demand for some services may be more responsive to changes in prices (i.e. more “elastic”) than the demand for other services. When demand is elastic, increasing the price causes a larger reduction of the quantity consumed and therefore a larger deadweight loss. Therefore, in order to recover the common costs efficiently, it is optimal to increase the prices of those services with a relatively elastic demand less than the prices of those services that are not very sensitive to price changes. However, when non-linear pricing is possible, there are more efficient ways to recover fixed and common costs, which reduce the welfare distortion to usage prices. That is, smaller mark-ups over marginal costs are required when non-linear pricing is possible than when only uniform Ramsey prices can be set (i.e. linear tariffs).
- A17.10 These considerations are reflected by the Ramsey (linear) pricing rule whereby (if demand inter-relationships are ignored) efficient mark-ups over marginal costs are inversely proportional to the own-price elasticities of demand.
- A17.11 When cross-price effects are considered, it is necessary to account for the impact that increasing the price of one good has on the demand for other goods/services (in addition to the impact that it has on own demand). This is captured by the concept of “super-elasticity”, which measures the effect on the demand for a good/service of small changes in the prices of all goods/services in the market. Formally, a super-elasticity is a function of the service’s own and cross-price elasticities, including a weighting for relative revenue shares²⁵⁵.
- A17.12 The Ramsey pricing rule in the presence of cross-price effects is similar to the one obtained when there are no cross-price effects: the ratio between the Ramsey prices of two goods/services is equal to the ratio between the inverse super-elasticities of the two goods/services. The intuition behind this result is also similar: it is efficient to have larger mark-ups on goods/services the consumption of which is less sensitive to price changes.
- A17.13 Because of the difficulties in estimating demand price elasticities, especially for innovative services, the derivation of Ramsey prices in practice is fraught with difficulties and uncertainties. In the light of these difficulties, T-Mobile has proposed a partial Ramsey approach to the allocation of common costs that entails two steps. First, fixed common costs are allocated on the basis of EPMU to all services. Then, the pool of common costs allocated to services for which evidence on demand elasticities is available, is reallocated on the basis of their relative elasticities. T-Mobile suggests that this approach is welfare superior to the approach of using EPMUs across all services.
- A17.14 Even if T-Mobile were correct, the approach that Ofcom has adopted does not allocate common costs onto all services according to EPMU, therefore it is not

²⁵⁵ See for instance Brown and Sibley (1986), *The theory of public utility pricing*, Cambridge University Press, p.42.

possible to conclude that any approach that might be welfare superior to EPMU would also be welfare superior to Ofcom's approach.

A17.15 In addition, Ofcom considers that the use of Ramsey pricing to set regulated charges is not appropriate for the following reasons:

- In order to estimate the level of welfare-optimal termination charges, it is necessary to account not only for the impact that prices have on demand, as in a basic Ramsey model, but also for a variety of other important factors such as externalities, imperfect competition and price discrimination (in particular second-degree price discrimination in the form of non-linear pricing). Developing a reliable applied modelling framework that captures all these relevant features, however, cannot be done robustly, in Ofcom's view, due to the difficulties and uncertainties inherent in dealing with such complex market environments.²⁵⁶
- In addition to the difficulties in developing an appropriate modelling framework, it has not been possible to derive robust estimates of common costs and of demand, which are necessary to derive welfare-optimal MCT charges.
- The Ramsey approach was rejected by the Competition Commission in 2002.

A17.16 These issues are discussed in detail in the following sections.

Using Ramsey prices as a basis for regulated charges

A17.17 Under certain conditions, Ramsey prices maximise static efficiency under the constraint that firms recover all costs of production. However, setting one price, in this case the wholesale termination charge, at the Ramsey level may not be sufficient to achieve efficiency.

A17.18 This is because, even if the price of fixed-to-mobile calls is set at the Ramsey level, the retail prices of the other services may not be set by MNOs at the corresponding Ramsey price levels. A more complicated Ramsey model would be required to reflect more closely price setting in practice. For instance, the model should capture the fact that retail competition between MNOs may be imperfect.

A17.19 Moreover, the model would also need to capture the fact that different users are charged different prices for subscription and for different units of usage (price discrimination) which will affect the optimal mark-ups.

Imperfect competition

A17.20 In a standard Ramsey model, efficient prices are derived under the assumption that firms do not earn any excess profits, which is an outcome equivalent to that resulting from perfect competition.

A17.21 However, if competition is imperfect, MNOs are likely to set retail prices that are higher than Ramsey prices. In addition, the structure of prices set by MNOs may

²⁵⁶ In some cases, this problem is alleviated by the fact that economic theory suggests what impact the factors that cannot be explicitly captured by the applied model have on the level of charges. However, this is not always possible and, in the absence of clear theoretical guidance, relying on "partial" models to set efficient termination charges (i.e. models that capture some of the relevant factors and not others, may be misleading).

not be consistent with a Ramsey termination charge because the relativities between firm-level super-elasticities may be different from the relativities of market-level super-elasticities. It is also unclear that the MNOs have incentives to set prices in a welfare-optimal manner, given the existence of network externalities.

A17.22 In general, theory suggests that the impact of imperfect competition on the level of welfare-optimal charges is unclear, i.e. the welfare-optimal charge may be either higher or lower when competition is imperfect. However, there is theory that finds that this ambiguity depends on the measure of welfare that is used. In the paper by Armstrong (April 2002)²⁵⁷, the larger the welfare weight attributed to consumer surplus as opposed to super-normal profit (producer surplus), the more likely it is that the welfare-optimal charge is lower with imperfect competition. If only consumer welfare is considered, then it is unambiguously the case that imperfect competition implies a lower optimal mark-up on termination.

Price discrimination

A17.23 In a standard Ramsey model it is normally assumed that all mobile users pay the same prices for mobile subscription and for each unit of usage. However, the price structures for mobile communications services show a significant degree of price discrimination, i.e. different users pay different prices for subscription and for different units of usage.

A17.24 MNOs achieve price discrimination by offering a variety of price plans from which consumers self-select the one that is expected to minimize their bill given their expected usage. A typical price plan is a multi-part tariff with a monthly access fee and prices per units of usage.²⁵⁸ Such tariffing is known as non-linear pricing since price per unit does not vary in direct proportion to usage.

A17.25 The use of price discrimination is not surprising since MNOs can increase their profits by charging different prices to consumers with different willingness to pay for mobile services. Price discrimination may also increase total welfare since increasing the prices paid by some consumers allows MNOs to charge lower prices at the margin, which can increase subscription and the consumption of mobile communications services.

A17.26 Ramsey prices solve the trade-off between increasing the price of fixed to mobile calls and increasing the price of mobile retail services in order to recover the fixed and common costs of production. Efficiency is maximised when the welfare cost of marginally raising the contribution from one service is equal to the welfare cost of marginally raising the contribution from the other service(s). Compared to the simple case of uniform prices, a nonlinear pricing structure (whenever such pricing is possible) tends to reduce the welfare costs of extracting any amount of revenues from the services in question. This is because discrimination allows MNOs to increase the revenue obtained from its customers on infra-marginal demand and generally allows the marginal prices paid for usage services to be closer to marginal

²⁵⁷ Call Termination on Mobile Networks, 11 April 2002, as submitted by OfTel to the Competition Commission in April 2002 - see http://www.ofcom.org.uk/static/archive/OfTel/publications/mobile/ctm_2002/armstrong110402.pdf. Paragraphs 35-51 of OfTel's Response to the Competition Commission's Letter on externalities of 28 March, dated 15 April 2002, also discusses the effect of imperfect competition on the optimal termination charge drawing on Armstrong's paper – see http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/externalities150402.pdf

²⁵⁸ The monthly charge often includes a certain amount of usage and is equal to zero in the case of pay-as-you-go subscribers.

cost, i.e. it provides a more efficient way for fixed and common costs to be recovered. This implies that the optimal termination charge is likely to be closer to cost when non-linear pricing is possible.

- A17.27 In addition, there may be greater scope for and in the use of price discrimination in retail markets than in the wholesale termination market. Compared to the benchmark case of uniform prices, therefore, when nonlinear mobile retail prices are taken into account, it may be efficient to extract more revenues to recover the common costs from retail services such as calls and messaging rather than from termination (where the scope for price discrimination is relatively limited). Hence, the efficient level of the termination charge may be overestimated by an applied model which does not capture price discrimination.
- A17.28 T-Mobile argues that price discrimination should not affect the estimation of efficient Ramsey prices because the elasticities used in the model would reflect the average elasticities of a group of potentially heterogeneous consumers.
- A17.29 However, given a demand function that reflects the willingness to pay for a good/service by a population of heterogeneous consumers, calculating consumer welfare assuming that all consumers pay the same average price is different to calculating consumer welfare assuming that different consumers pay different prices.
- A17.30 This is likely to have implications on the correct estimation of the welfare function and therefore on the estimates of efficient prices. In particular, if price discrimination is not considered, the risk is that the welfare loss of extracting a given unit of revenues in excess of costs from the retail markets rather than from the termination market is overestimated and therefore that the efficient termination charge is also overestimated.
- A17.31 In order to capture price discrimination, it would be necessary to develop a model in which marginal retail prices of mobile services can be different to average retail prices. This would allow a more correct definition of the welfare function but would also require fundamental changes to the structure of the standard Ramsey model or, at the very least, a significant increase in the information/assumptions required to calibrate the model.

Estimating common costs and demand

- A17.32 The derivation of reliable estimates of welfare-optimal termination charges is also complicated by the difficulties and the significant uncertainties in estimating the parameters of the model, and in particular in estimating demand price elasticities and costs.
- A17.33 Since the conditions of demand are important to determine the level and the structure of efficient prices, estimates of welfare-optimal termination charges may be very sensitive to the particular way in which the demand system is specified and it is estimated/calibrated.
- A17.34 Obtaining reliable estimates of demand elasticities, however, is extremely difficult and it is often infeasible²⁵⁹. For instance, historic data are unlikely to be very useful in estimating the elasticities of the demand for data services in 2010/2011. More

²⁵⁹ For a detailed discussion of the problems in estimating demand elasticities, see Chapter 8 of the 2002 Competition Commission Report.

generally, the estimation of demand elasticities on the basis of historic data and/or cross-sectional variation is very sensitive to the particular econometric specification of the demand system and it is not uncommon that different empirical studies produce very different estimates of the same parameters. This is very problematic since Ramsey models can be very sensitive to small changes in their parameters.

- A17.35 T-Mobile has proposed a two-step approach to the allocation of common costs, a “partial” Ramsey model, that attempts to deal with the difficulties in estimating a full demand system by focusing only on those services for which it is possible to obtain relatively robust estimates of price elasticities. This approach entails (i) following EPMU principles to allocate common costs among different groups of services and (ii) refining the allocation of common costs on the basis of the relative elasticities of those services for which demand is relatively less uncertain. T-Mobile suggests that this approach would improve (expected) welfare relative to an EPMU approach.
- A17.36 The approach suggested by T-Mobile is not necessarily welfare superior to the approach adopted by Ofcom for four reasons. First, as stated above (and in the September 2006 consultation - see A17.5-A17.6) Ofcom has not used an EPMU approach in the new cost model.
- A17.37 Second, in any case when there are significant cross-price effects, e.g. between the price of mobile outgoing calls and subscription, efficient charges depend on the super-elasticities of demand and not on the own-price elasticities only. It would therefore be necessary to have robust evidence on all of the cross-price elasticities among the services considered and this does not appear to be available.
- A17.38 This is illustrated in Figure A17.1, which shows the structure of the matrix of own- and cross-price elasticities for 5 services (as used in Annex 19). The own-price elasticities are the cells on the diagonal from top left to bottom right (i.e. the cells labelled a1, b2, f3, g4 and h5). The other cells in the matrix are cross-price elasticities, i.e. the effect of a change in the price of one service on another service.

Figure A17.1 Elasticity matrix

| | | Prices | | | | |
|------------|--------------|--------------|-------|-----|-----------|------|
| | | subscription | voice | ftm | messaging | data |
| Quantities | subscription | a1 | a2 | a3 | a4 | a5 |
| | voice | b1 | b2 | b3 | b4 | b5 |
| | ftm | f1 | f2 | f3 | f4 | f5 |
| | messaging | g1 | g2 | g3 | g4 | g5 |
| | data | h1 | h2 | h3 | h4 | h5 |

- A17.39 T-Mobile provided Ofcom with averages of some empirical estimates for a limited set of elasticities: the own-price elasticity of subscription, the own-price elasticity of mobile outgoing calls, the own price elasticity of fixed-to-mobile calls and the cross-price elasticity of fixed-to-mobile calls with respect to the price of subscription²⁶⁰ (i.e.

²⁶⁰ Although T-Mobile label this the “subscription fixed-to-mobile cross-price elasticity”, the sources they draw on are estimates of the cross-elasticity of fixed-to-mobile calls with respect to the price of subscription (see Table 8.10 of the 2002 Competition Commission report).

the cells labeled a1, b2, f3 and f1 respectively). Information on the elasticities for all of the other cells in Figure A17.1 was not provided. Elasticities for which information was provided by T-Mobile are indicated by un-shaded cells and elasticities for which information was not provided are indicated by shaded cells. In Ofcom's view, the incomplete set of elasticities is not sufficient to derive reliable estimates of efficient mark-ups.

- A17.40 Third, even if it were possible to reallocate the common costs on the basis of the super-elasticities of demand of a subset of services, the cross price effects between these services and the others would be ignored. If these cross-price effects affect the relativities between the (partial) super-elasticities of the subset of services considered in step two of T-Mobile's approach, it is not clear that the estimated partial Ramsey mark-ups would improve welfare relative to EPMU.
- A17.41 The super-elasticity for any service requires knowledge of its own-price and all cross-price elasticities, i.e. all of the information in the row and column in question (e.g. for subscription the cells labelled a1 to a5 and a1 to h1. Since the super-elasticities are affected by information that is not available, the ratio of the super-elasticities of services reflecting the partial information may well be different from the true super-elasticities reflecting all of the elasticity information. In Ofcom's view, adjusting mark-ups reflecting partial information on elasticities does not ensure that welfare is increased.
- A17.42 Fourth, and aside from the problems noted above, it seems that T-Mobile's approach could take mark-ups in the wrong direction rather than the correct (welfare optimal) direction. For example, suppose that evidence on relative elasticities were available for two services, but suppose that they are also more elastic than average. In moving from an initial EPMU allocation to refined mark-ups based on relative elasticities, the relatively less elastic service (but which is more elastic than average), would be charged a mark-up greater still than EPMU. This refinement would clearly go in the wrong direction for this service, since the welfare optimal mark-up should be less than EPMU for this service (because it is more elastic than average). Fundamentally, the relevant benchmark for assessing optimal mark-ups (with linear prices) is the full set of Ramsey mark-ups. While relative elasticities matter, it is the full set of relative elasticities that is relevant to the set of optimal mark-ups and not a subset of relative elasticities starting from an initial EPMU level.
- A17.43 The derivation of welfare-optimal termination charges requires also the specification of costs. Despite Ofcom's development of a detailed cost model, however, the estimation of the marginal and of the common network costs is also subject to significant uncertainties.
- A17.44 Ofcom's cost model does not explicitly identify and estimate the level of network common costs. Three potential sources of network common cost have been identified in principle: (i) fixed costs (e.g. network management in the core of the network); (ii) marginal cost economies (e.g. arising in backhaul due to statistical multiplexing); and (iii) modularities in capacity. However, estimating the level of network common costs robustly is not straightforward and the third potential source, modularities in capacity, raises particular difficulties, both conceptually and empirically. The analysis of common costs depends on whether modularities in network deployment give rise to excess capacity and from a long run perspective whether the opportunity cost of traffic in some parts of the network is zero.

A17.45 The initial deployment of assets will often exhibit periods where full capacity is not exploited. If the same assets (with the same capacity) are deployed across all geo-types this may be particularly the case in rural areas where traffic demand is less. Over time as demand increases, assets whose capacity was not fully exploited may become fully utilised and it will become necessary to deploy further assets. However, it may remain the case that in some areas and for some assets the initial deployment is never added to. This is due to the modularity of the initial deployment. In Ofcom's view, whether or not this excess capacity caused by the modularity of initial deployment should be considered a real common cost or the result of short to medium term equipment build constraints and/or modelling simplification is not clear. If MNOs were able to efficiently deploy assets with lower capacity or to charge for traffic services on a geographic basis in order to exploit excess capacity the identification of excess capacity in Ofcom's cost model would not be a real network common cost.

The Competition Commission's position on Ramsey charges

A17.46 In 2002, the Competition Commission rejected the Ramsey approach to the allocation of common costs for the following reasons:²⁶¹

- it breaches the cost-causation principle;
- MNOs would, in practice, set neither the correct structure nor the level of retail prices in accordance with Ramsey principles if termination charges were set at Ramsey levels; and
- there are formidable problems associated with computing correct Ramsey prices.

A17.47 Ofcom's approach is therefore consistent with the rejection of a Ramsey approach to set MCT charges by the Competition Commission.

Conclusions

A17.48 Ofcom has not explicitly identified the level of network common costs, because of the difficulties in deriving robust estimates.

A17.49 To the extent that network common costs might exist, in Ofcom's new cost model, these are allocated to service increments according to routing factors. Compared to EPMU, which would entail allocating any network common costs on all services including subscription, this approach leads to a relatively higher mark-up on mobile termination.

A17.50 In any case, because of the difficulties and uncertainties in undertaking robust applied analysis that would capture all the relevant factors that affect the level of welfare-optimal termination charges and in deriving reliable estimates of demand and common costs, Ofcom considers that it is not appropriate to use an applied Ramsey model to derive MCT charges. In the light of these significant obstacles, it is not surprising that there is a lack of use of applied Ramsey pricing in regulatory practice. Indeed, Ofcom is not aware of any instance in which regulated termination charges have actually been set on the basis of a quantitative Ramsey model. Notably, the Competition Commission also rejected the use of Ramsey principles to set MCT charges in 2002.

²⁶¹ See paragraph 1.6 of the 2002 Competition Commission report and paragraphs 2.515-2.523.

Annex 18

Cost of Capital

- A18.1 A firm's cost of capital is the weighted average of its costs of debt and equity finance, and is referred to as a company's weighted average cost of capital ("WACC").
- A18.2 The cost of capital can be expressed in real terms (after adjusting for inflation) or nominal terms. It can also be expressed in post or pre-tax terms. A pre-tax cost of capital should be compared with returns calculated on a pre-tax basis and a post-tax cost of capital with post-tax returns. In the context of this review, Ofcom's cost model estimates real pre tax cash flows and therefore it is appropriate to apply an estimate of the MNOs' pre-tax real cost of capital.
- A18.3 Prior to the September 2006 Consultation document, Ofcom had set out its views in relation to cost of capital estimation, both in terms of the mobile sector and more widely, in the following publications:
- Ofcom's 2005 consultation, "Ofcom's approach to risk in the assessment of the cost of capital" (henceforth collectively referred to as "the risk consultation"):
 - January 2005 – first consultation²⁶²;
 - June 2005 – second consultation²⁶³; and
 - August 2005 – final statement²⁶⁴;
 - Ofcom's previous market review of MCT concluded in 2004 ("the 2004 statement")²⁶⁵; and
 - Ofcom's statement and notification extending the charge controls on wholesale mobile voice call termination in 2005, ("the 2005 statement")²⁶⁶
- A18.4 This annex sets out Ofcom's determination of an appropriate WACC for use in Ofcom's analysis of the costs of mobile termination in this market review. It discusses, in the light of Ofcom's previous estimates of the cost of capital for mobile networks and the risk consultation, the following issues:
- asset pricing models – Ofcom proposes that it is appropriate for it to continue to use the Capital Asset Pricing Model (CAPM) to estimate the cost of capital for mobile operators
 - variations in risk across mobile activities – Ofcom proposes to apply a single WACC estimate to all the companies and activities within the sector;

²⁶² See http://www.ofcom.org.uk/consult/condocs/cost_capital/

²⁶³ See http://www.ofcom.org.uk/consult/condocs/cost_capital2/main/

²⁶⁴ See http://www.ofcom.org.uk/consult/condocs/cost_capital2/statement/

²⁶⁵ See December consultation

http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/mct_consultation/ and June statement http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/wmvct/

²⁶⁶ See June consultation <http://www.ofcom.org.uk/consult/condocs/wholesale/> and December statement http://www.ofcom.org.uk/consult/condocs/wholesale/wmvct_statement/

- CAPM parameters – Ofcom proposes a set of parameters, and hence a WACC estimate, within the CAPM framework; and
- real options – the final part of this Annex addresses the issues raised by respondents regarding real options and the extent to which a real options approach is appropriate in the context of estimating the efficient unit cost benchmarks for mobile voice termination. .

A18.5 In the September 2006 Consultation document, Ofcom set out its view of the appropriate WACC for use in Ofcom's analysis of mobile termination in this market review and invited views.

Summary of Ofcom's September 2006 Consultation

A18.6 In summary, the September 2006 Consultation set out Ofcom's view that:

- The CAPM method is appropriate based on its clear theoretical foundation, simplicity and continued wider use by UK regulators and practitioners;
- Estimating an MNO's WACC, at an aggregate company level was more appropriate than disaggregation;
- A real risk free rate of 2% and a nominal rate of 4.6% was appropriate, based upon longer term averages;
- The equity risk premium was estimated at 4.5%, based upon historical data and future projections;
- The appropriate gearing ratio for calculation of an MNO's WACC was 10%;
- The range for equity beta was 1.0 to 1.6, at an optimal gearing level of 10%;
- The range for the debt premium was 1% to 2%.

Responses to the September 2006 Consultation

A18.7 Four responses to the September 2006 Consultation, in particular, made substantial comments in relation to Ofcom's approach to calculating the Cost of Capital. Ofcom's consideration of these responses is incorporated into the discussion of the appropriate WACC which follows.

Asset pricing models

A18.8 A number of different asset pricing models exist for calculating the cost of capital. The CAPM, which is a single factor model, measures economy-wide influences through the risk of an individual asset relative to a market portfolio. There are also multifactor models which include factors that capture the risk of other economic factors not captured in the single factor model.

A18.9 Ofcom has previously expressed a preference for using the CAPM, on the basis of its clear theoretical foundation, simplicity, and continued wide use by both the UK's economic regulators and practitioners.

A18.10 Some mobile stakeholders have argued in the past that Ofcom should at least partly base its analysis on figures calculated using alternative asset pricing models,

i.e. models other than the CAPM. For example, during the 2002 Competition Commission inquiry, T-Mobile calculated estimates of its own cost of capital based on an Arbitrage Pricing Theory (“APT”) approach.

A18.11 There are many alternative approaches to estimating the cost of capital, for example:

- APT models (e.g. that of Chen, Roll, and Ross);
- The Fama-French three factor model;
- Analysis of the third and higher moments of the distribution of returns; and
- The literature arising out of Merton’s work on the intertemporal capital asset pricing model (“ICAPM”).

A18.12 Ofcom continues to take an interest in the emerging academic literature regarding alternatives to the CAPM but does not think that it would be appropriate for it to depart from reliance on the CAPM in this review. A departure from the CAPM would set a significant precedent for Ofcom and requires a thorough review of the possible successors to the CAPM. In making this assessment there are a number of criteria to consider, for example:

- theoretical underpinning;
- empirical robustness;
- consistency with intuition;
- availability of data;
- track record & regulatory precedent; and
- stability of results over time.

A18.13 Whilst there are a number of candidate alternatives to CAPM, it is not clear to Ofcom which, if any, of these, should be areas of key focus at this time. Ofcom considers that it would not be balanced or appropriate for it to selectively put significant amounts of weights on, for example, one or two of the available alternatives whilst the relative merits of each of the alternatives have yet to be fully established. The approach taken by the other UK regulators and the Competition Commission would be an important factor in determining Ofcom’s approach in this regard.

A18.14 Ofcom considers that a review affecting only the mobile sector would not be the appropriate means by which to start to tackle these issues. Ofcom considers it unlikely that an independent study carried out at this time would be able to reach any firm conclusions as to whether alternative asset pricing models should be explored.

Variations in risk across mobile activities

A18.15 In the risk consultation, Ofcom disaggregated BT’s group equity beta and hence its estimate of BT’s WACC, into two distinct categories, in order to reflect some of the

most important variations in risk across BT's activities. Ofcom disaggregated BT's group equity beta of 1.1 into:

- a "lower risk" category (access related services), with a beta of 0.9; and
- a "higher risk" category (the rest of BT's services), with a beta of about 1.2.

A18.16 It is important to consider whether, given this precedent, it would be appropriate to depart from Ofcom's previous approach of basing its analysis on a single "UK mobile WACC". Such a departure could be appropriate since it might be argued that advanced data services (such as music downloads and web browsing) that are expected to become widely available to mobile subscribers entail more systematic risk than more traditional voice services because, for example, consumption of the former is characterised by a greater level of discretionary spend and therefore subject to greater income elasticity of demand. If this were true then the beta used for regulatory purposes (in the case of call termination) should be lower than group betas obtained via analysis of company level returns, since the latter will partly reflect the higher risk associated with the companies' advanced data services.

A18.17 However, Ofcom continues to consider that it is appropriate to use an aggregate company level estimate of an MNO's WACC. This view has been arrived at by considering the criteria that were set out in the risk consultation with the intention of identifying those cases in which a disaggregated approach to risk assessment would be appropriate. For example, paragraph 5.24 of the final statement stated that:

"...Ofcom's view, based on stakeholder responses and the principles outlined in the first consultation, is that the case for assessing risk on a project-specific basis is likely to be stronger under the following circumstances ...

- there are strong a priori reasons for thinking that the systematic risk faced by the project was significantly different from that faced by the overall company (e.g. different income elasticities of demand and/or stability of cash flows);
- there is evidence which can be used to assess variations in risk, e.g.
 - it is possible to identify benchmark firms that are close to "pure play" comparators in terms of having similar risk characteristics to individual projects within the firm;
 - it is possible to use other quantitative analysis (such as quantified risk assessments or the analysis carried out by PwC on behalf of Ofcom to assess variations in risk);
 - data on the firm are available at a disaggregated level (e.g. via separated accounts); and
- correctly identifying variations in risk, and reflecting this in an adjusted rate of return, is likely to bring about significant gains for consumers."

A18.18 Based on this set of criteria it is possible to compare the BT and mobile cases. Firstly, the strength of a priori reasoning may be considered weaker. In the case of BT, there was a relatively stronger a priori reason for distinguishing between voice and line rental volumes since voice volumes are likely to vary with GDP whereas line volumes tend not to. In the mobile case a different issue is under consideration, there may be some intuitively appealing arguments to suggest that, for example, the demand for advanced data services may be more strongly correlated with aggregate demand, and hence market returns, than that for voice services. However, the exact nature, take-up and importance of these services as sources of return for MNOs are uncertain in many cases.

A18.19 Secondly, the standard of evidence available for mobile is more challenging to assemble. For example published estimates of income elasticities of demand are much less widely available than in the BT case, where the well-established higher elasticity for calls than access was an important indicator. In addition Ofcom is not aware of any countries in which there are examples of separately listed mobile operators that offer obviously different mixes of data and voice services. It might be possible to carry out a cross-sectional regression analysis (such as the one carried out on Ofcom's behalf by PwC in the BT case) investigating whether players with different mixes of, e.g. 2G and 3G subscribers since this may reflect different mixes of voice and data services, have different equity betas. However, this would be a difficult exercise because many of the main European mobile operators operate as part of a bigger parent group, offering services in a number of countries; and one of the key activities of interest, namely 3G data activities, differs significantly from traditional mobile activities in that they currently generate relatively modest revenues (expected to grow at a relatively high rate in the coming years), making it difficult to estimate the proportion of a company's market value accounted for by 3G data services.

A18.20 Lastly, in considering whether it is appropriate to disaggregate the WACC, as discussed in Ofcom's 2005 consultation it is important to consider the risks of making Type I and Type II errors:

- Type I error, i.e. incorrectly using a single beta figure when the difference in risk between for example voice and data is significant:
 - Allowing excessive returns on MCT; and
 - Allowing insufficient returns on the rest of a MNO's activities if these were to be regulated.
- Type II error, i.e. incorrectly using a disaggregated beta when the difference in risk between for example voice and data is not significant:
 - Allowing insufficient returns on MCT; and
 - Allowing excessive returns on the rest of a MNO's activities if these were to be regulated.

A18.21 In assessing the risk of these errors it is relevant to consider firstly, the likelihood of making each type of error i.e. whether it is more likely that the risks associated with voice and data services are different and secondly, the costs associated with each type of error. As discussed above, the strength of a priori reasoning that the risk across a MNO's activities is different is relatively lower than in the case of BT.

Therefore, it would appear that in disaggregating MNO equity betas, there might be a greater likelihood of a Type II error compared with the BT case.

- A18.22 In any case it is difficult to assess which of these outcomes, should they arise, is likely to be most damaging to consumers. A Type I error is likely to be harmful to consumers since this error would lead to excessive prices on MCT and an inefficient structure of prices (as discussed in Section 7). However, a Type II error, whilst also leading to an inefficient structure of prices, may not allow MNOs to earn sufficient returns on MCT and this may affect their incentives to invest in new innovative services that would have brought benefits to consumers in the long term.
- A18.23 On the basis of the available evidence of differences in risk between a MNO's activities, Ofcom has determined that it will not take a disaggregated approach to mobile WACC estimation.

CAPM parameters

Introduction

A18.24 The CAPM methodology was discussed in detail in Ofcom's risk consultation. The cost of equity is built up from three main factors. These are:

- the risk free rate;
- the expected market equity risk premium; and
- the value of beta for the company in question.

A18.25 The risk free rate is simply the expected rate of return on a risk free investment. The expected equity risk premium is the expected return on equities over and above the risk free rate (that is, it is the expected reward for holding equities compared with the reward for holding risk free assets). The value of beta reflects the variability of returns of the equity of the company in question compared with the variability of returns on the equity market.

A18.26 The cost of debt is built up from:

- the risk free rate; and
- the debt premium

A18.27 The debt premium is the company specific risk premium for corporate debt above the risk free rate.

A18.28 The WACC takes account of the cost of equity and the cost of debt by weighting each of these by the proportion of equity and debt respectively in a company's financial structures in the following way (where Gearing = Debt / (Debt + Equity)):

$$\text{WACC} = (\text{Cost of equity} \times (1 - \text{Gearing})) + \text{Cost of debt} \times \text{Gearing}$$

A18.29 There is an element of uncertainty, and hence a need for regulatory judgement, in arriving at an appropriate value for each of the parameters set out above. Ofcom's proposed and determined values for these parameters are discussed below.

Risk free rate

A18.30 In the September 2006 Consultation, Ofcom proposed to use a real risk free rate of 2.0% and a nominal rate of 4.6%²⁶⁷ (based on an explicit assumption for expected inflation of 2.5%). These are the same assumptions that were used by Ofcom in the risk consultation and in the December 2005 Statement.

Summary of Responses Received

- A18.31 Vodafone, T-Mobile and Orange responded with opinions concerning the risk free rate.
- A18.32 Vodafone stated that the risk free rate should be 4.8%, as opposed to the Ofcom proposed rate of 4.6%. Vodafone argued that the rate used should reflect the longevity of the assets and therefore a 4 year rate should be used (based on the assets being half way through their 8 year lives) rather than asset lives of up to 20 years, although in both cases a rate of 4.8% is produced.
- A18.33 Vodafone went on to state that the current risk free rate is the market's best expectation of interest rates over the forthcoming maturity period, and therefore Ofcom should not be unduly concerned with balancing long and short term interest rate movements. The recent interest rate increase is in line with longer term averages.
- A18.34 T-Mobile stated that the risk free rate should be updated to provide the best forward looking estimate, noting specifically that the gilt rates are currently at 4.9%.
- A18.35 Orange stated that the market has changed significantly since Ofcom set the risk free rate, and that the real risk free rate is now at 2.5% (not 2%), and therefore the nominal risk free rate should be set at 5% (not 4.6%). Attention is also drawn to the fact that 5 year gilt rates have been on average at 4.72%, with a high of 4.87%, and since July 2006 have never been as low as 4.6%.

Ofcom's determination of the appropriate risk free rate

- A18.36 Ofcom considers that when estimating a forward looking cost of capital, if capital markets were fully efficient, then current yields would reflect all expectations of future earnings and would therefore be an appropriate measure of the risk free rate. However, volatile rates observed on any given date could be temporarily influenced by short term volatility. Forecasters would be unlikely to consider that today's risk free rate will remain static for long. In any case capital markets may be imperfect to some extent.
- A18.37 In the second risk consultation, Ofcom set out its view that basing parameter estimates only on current market data would give undue weight to short term market fluctuations.²⁶⁸ Ofcom therefore considers that it is appropriate to base its estimate of the risk free rate on the current value together with consideration of recent values.
- A18.38 In the second risk consultation, Ofcom also set out its view that it was appropriate to estimate the risk free rate with regard to a range of different maturities, rather

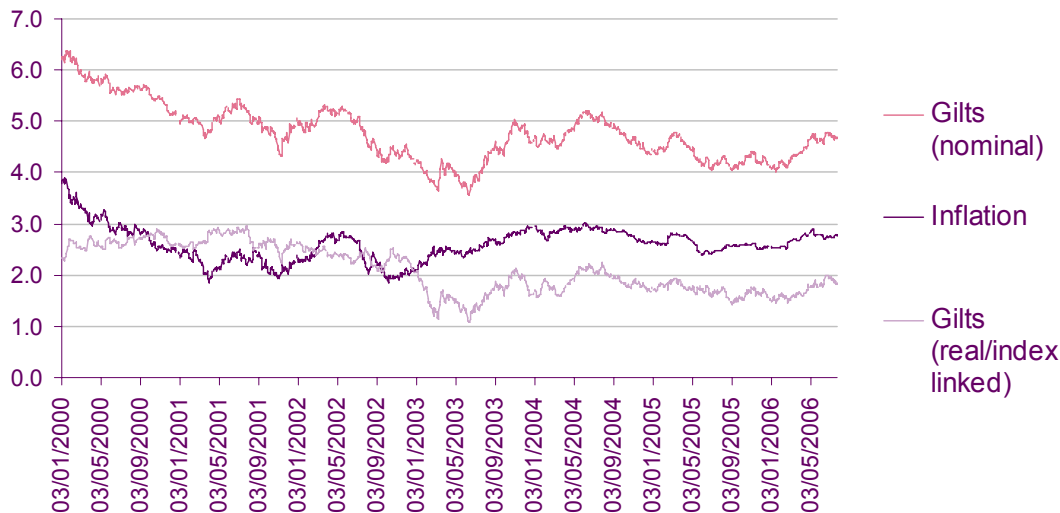
²⁶⁷ Based on the product of real risk free rate and expected inflation i.e. $(1 + \text{real risk free rate}) \times (1 + \text{expected inflation}) - 1$

²⁶⁸ See paragraphs 8.10-8.11 of the final statement of the risk consultation

than relying solely upon rates which are reflective of maturities falling due at the end of the charge control period. This reflects the fact that current investments in the network are likely to retain value beyond the end of the current charge control period. Furthermore, it reflects uncertainty about the average time horizon of investors in an MNO.

A18.39 The figure below sets out the time series of 5 year rates in nominal and real terms, and the implied inflation rate over time, as included in the September 2006 Consultation.

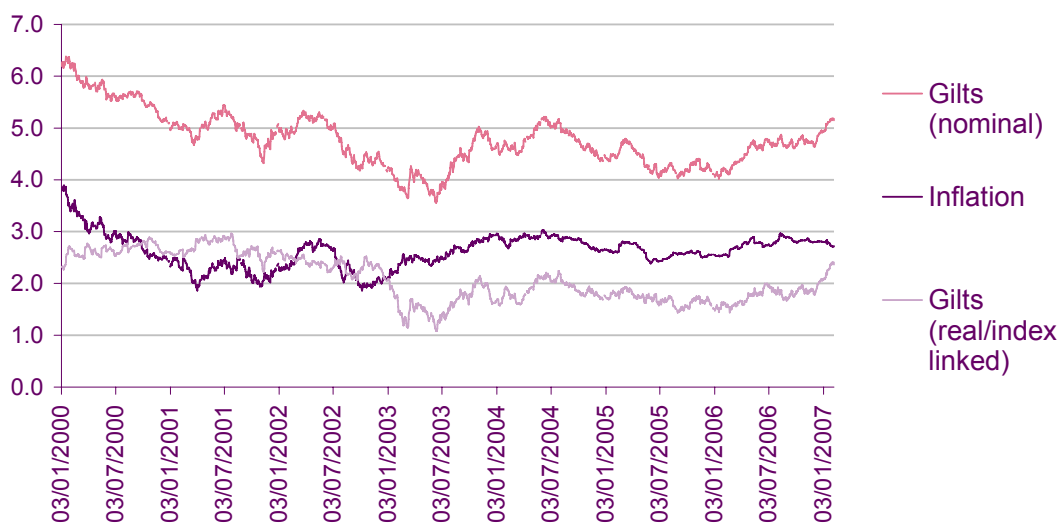
Figure A18.1 Real and nominal (5 year) gilt rates since January 2000 – as at July 2006



Source: Bank of England and Ofcom analysis

A18.40 Ofcom has updated this dataset to take account of further changes since publication of the September 2006 Consultation. This analysis is shown in the chart contained in Figure A18.2 along with averages of nominal and real rates shown in the table at Figure A18.3

Figure A18.2 Real and nominal (5 year) gilt rates since January 2000 – Updated as at February 2007



Source: Bank of England and Ofcom analysis

Figure A18.3 Historic averages of nominal and real gilt rates (averaged across gilts ranging from 1-15 year maturities) – as at February 2007

| Averaging period of observations | Average nominal return over range of 1-15 year maturities | Average real return over range of 1-15 year maturities | Average implied inflation over range of 1-15 year maturities |
|----------------------------------|---|--|--|
| 7 February 2006 | 5.0% | 1.9% | 3.0 |
| 1 week | 5.0% | 1.9% | 3.0 |
| 1 month | 5.0% | 1.9% | 3.1 |
| 3 month | 4.8% | 1.7% | 3.1 |
| 6 month | 4.7% | 1.6% | 3.0 |
| 1 year | 4.6% | 1.6% | 3.0 |
| 2 year | 4.5% | 1.6% | 2.8 |
| 3 year | 4.5% | 1.7% | 2.8 |
| 4 year | 4.5% | 1.7% | 2.7 |
| 5 year | 4.5% | 1.9% | 2.6 |

Source: Bank of England and Ofcom analysis

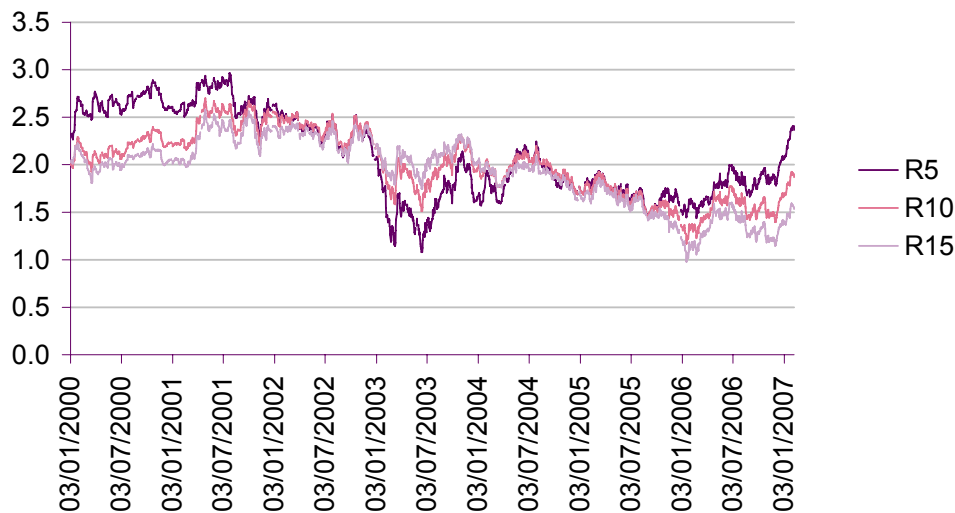
A18.41 This analysis shows that given recent increases in nominal and real gilt rates, the nominal rate of 4.6% proposed by Ofcom in the September 2006 Consultation is below the more recent average rates. While 4.6% remains within the plausible range based on longer averaging horizons, averages over the more recent past suggest that 4.6% is towards the lower end of the plausible range. As noted above, Ofcom considers that it is appropriate to base its estimate of the risk free rate on the current value together with consideration of recent values. Since the publication of the September 2006 Consultation, the nominal risk free rate appears to have been rising. Therefore, based on the balance of evidence Ofcom will use a nominal rate of 5% (see Figure A18.8 below).

A18.42 In making this determination, Ofcom has also considered the causes of the increase in the nominal risk free rate. It appears that the increase in the nominal rate is significantly explained by higher inflation expectations which are higher than the 2.5% previously assumed by Ofcom in its September 2006 Consultation. It is appropriate that the higher nominal risk free rate reflected in Ofcom's calculation of the WACC should also be accompanied by an appropriate estimate of inflation; this means that Ofcom's WACC calculation will reflect an appropriate estimate of the real risk free rate. Ofcom has therefore used an expected inflation assumption of 2.8%²⁶⁹, higher than the 2.5% proposed in the September 2006 Consultation, since this is more in line with current and recent rates implied by the difference between nominal and index-linked gilts.

²⁶⁹ In Section 9, a measure of inflation is used to convert Ofcom's year-one charge control levels from 2006/07 real terms into 2007/08 nominal terms (for the purposes of charge control implementation). In making this conversion, Ofcom notes that the assumption of 2.8% discussed here is a long term measure, and on the basis of shorter-term estimates has reason to believe that a slightly higher inflation assumption might be appropriate for 2007/08. Therefore, in Section 9 Ofcom has used the latest available average of inflation forecasts for 2007/08 compiled by HM Treasury of 3.1% (see www.hm-treasury.gov.uk/forecasts).

A18.43 Use of these parameters implies a real risk free rate of 2.1%, marginally above the 2.0% previously assumed by Ofcom in its September 2006 Consultation. Despite this increase in the inflation expectation, it can be seen that the implied real risk free rate is now 2.1% rather than 2.0%. This small increase is in line with recent increases in index-linked gilt yields, particularly those of a shorter duration, as shown in Figure A18.4, below.

Figure A18.4 Yield on index-linked gilts of up to 5, 10 and 15 year durations as at February 2007



Source: Bank of England

Equity risk premium

A18.44 The equity risk premium is the difference between the overall return on equities and the nominal risk free rate. Its value in the UK reflects the risk of investing in UK equities generally. There is considerable debate about the appropriate method of estimating the value of the equity risk premium, with different methods producing different values.

A18.45 In the final statement of the risk consultation, Ofcom concluded that a figure of 4.5% represented an appropriate value for this parameter.

A18.46 This range of values reflected a variety of evidence, both historical and forward-looking. Based on an assessment of the available evidence, Ofcom proposed that :

- The available evidence suggested that the equity risk premium was likely to fall within a range of 3% and 5%; and
- Based on its assessment of an appropriate balance between encouraging investment and short-run consumer protection (in the form of lower prices) 4% to 5% represented an appropriate range from a regulatory perspective.

A18.47 In the September 2006 Consultation, Ofcom also stated that during the consultation period of the risk consultation Ofcom was supplied with and took into account the views of the main stakeholders that have an interest in mobile termination rates in reaching its view that 4.5% was appropriate. Ofcom also stated that it would be unlikely to change this view unless important new evidence or arguments that had not been considered during the course of that review were submitted.

Summary of responses received

A18.48 Vodafone stated that it continued to believe that Ofcom's estimate of 4.5% was too low. Vodafone suggested that a rate of 6% was more appropriate, and consistent with the rate that it used for internal investment evaluations.

Ofcom determination on the equity risk premium

A18.49 Ofcom's view remains that an estimate of 4.5% is an appropriate value for the equity risk premium and that it strikes an appropriate balance between encouraging investment and securing low prices for consumers. Ofcom does not consider that a rate that happens to be used by Vodafone for internal investment appraisal purposes is necessarily an appropriate measure of the risk premium demanded by equity shareholders of an efficient MNO.

Optimal gearing

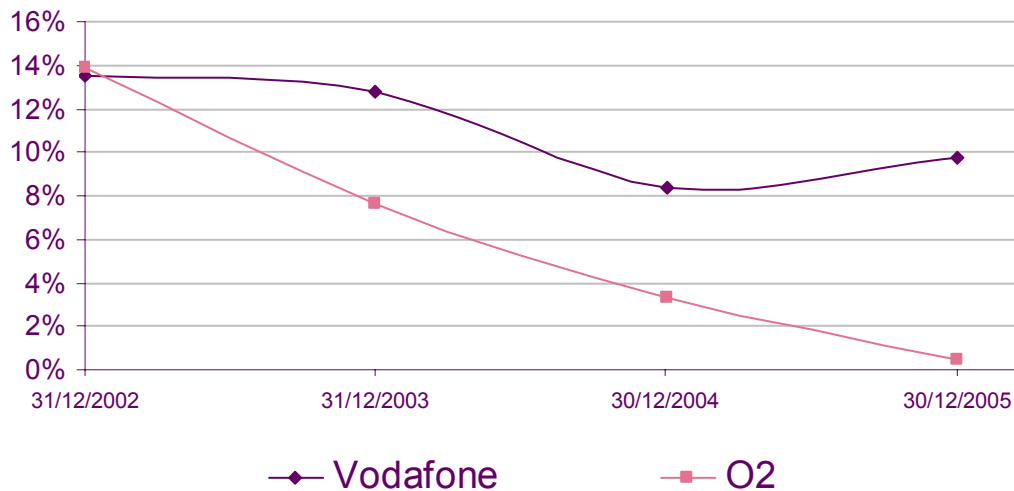
A18.50 The gearing ratio measures the extent to which a company is financially leveraged, and is typically estimated by calculating the ratio of the book value of a company's debt to the sum of this value and the market value of shareholders' equity.

A18.51 Under the standard Capital Asset Pricing Model, a firm can potentially lower its overall cost of capital by increasing its gearing. This is because debt is generally cheaper than equity as a result of tax advantages to debt. This consideration must be weighed against the fact that, other things being equal, highly leveraged companies will be at a greater risk of insolvency if they are unable to make payments on their debt; and may also find it more difficult to find new lenders in the future.

A18.52 Ofcom has previously (e.g. see the 2004 statement) assumed a range of 10% to 30% as its estimate of the optimal gearing ratio of an MNO. This assumption was based primarily on the historic averages of the MNOs.

A18.53 In recent years, the gearing ratios of both Vodafone and O2, calculated as the ratio of the book value of net debt to the combined book value of net debt and market value of equity, have been some way below the top of the range previously identified by Ofcom. This is shown in the figure below.

Figure A18.5 MNOs' gearing over the past four years



Source: Thomson DataStream and Ofcom analysis

A18.54 In the absence of any other reliable means by which to assess the optimal gearing ratio of an average efficient UK MNO, Ofcom is inclined to put a significant amount of weight on the historic gearing of the MNOs to estimate a value for this parameter²⁷⁰. Based on such evidence, Ofcom's view is that it is appropriate to base its estimate of the WACC for an MNO on an assumption of a gearing ratio of 10%.

Equity beta

A18.55 The value of a company's equity beta measures the movements in the return from its shares relative to the movement in the return from the equity market as a whole. It will rise with an operator's debt/equity ratio (gearing), since a higher level of gearing implies higher volatility in the returns to shareholders. A company's asset beta controls for this factor, and measures the systematic riskiness of a firm or project before allowing for gearing.

A18.56 The equity beta captures exposure to systematic risk (risk that cannot be diversified away by investors). Following the approach of the Competition Commission and its previous market reviews Ofcom considers that it is appropriate to estimate an equity beta to represent the systematic risk of an average efficient UK MNO. Previously this represented the systematic risk of the then, four UK MNOs. However, Ofcom considers that the concept of an average efficient UK MNO also applies to H3G and that the same estimate of systematic risk can be appropriately applied to all five MNOs in this review. (Issues of specific risk are discussed at the end of this annex).

A18.57 In the past Ofcom has used a range of 1.0 to 1.6 at 10% gearing as a value for the equity beta of an average efficient MNO, corresponding to an asset beta range of 0.9 to about 1.45. These values were the same as those used by the Competition Commission in its inquiry into mobile termination. These values were based on

²⁷⁰ Gearing levels were not commented upon by respondents to the consultation. The historic figures presented have not been updated to reflect more recent estimates since the September 2006 Consultation. This is because gearing levels have not changed appreciably for Vodafone and for O2 it is not possible to estimate gearing since the acquisition of O2 by Telefonica.

putting weight on a number of different estimates, reflecting the many uncertainties inherent in arriving at beta estimates.

A18.58 Equity beta estimation is usually carried out in order to estimate what the relationship between a firm's returns and those of the market will be on a forward-looking basis. Expectations of this sort are very difficult to measure so equity beta values for a company are typically calculated by regressing data on past returns against the past returns associated with an appropriate market index.

A18.59 In using historical data to estimate a company's beta on a forward-looking basis, there are a number of potentially contentious issues to consider in appraising the usefulness of beta estimates (aside from the issue of estimating the disaggregated risk of different services within a company, discussed earlier). These issues must sometimes be traded off against each other, since no single estimate will typically score highly against all relevant criteria. Contentious issues include the following:

- the statistical properties of estimates, for example:
 - reliability of estimates (for example, lower standard errors can be obtained by using a sample containing more data points via higher frequency data or longer data windows, and estimates calculated using monthly data can be susceptible to significant variations depending on which day of the month is used for beta estimation);
 - parameter stability – if beta estimates change over time, then it may not be appropriate to use estimation methods that rely on long run historical data windows. This will be particularly true if, for example, data windows span important events such as major acquisitions and divestments; and
 - other technical statistical issues – for example heteroscedasticity, autocorrelation, and asynchronous trading bias.
- the need to measure risk relative to an appropriate index (e.g. domestic or international);
- isolating relevant activities (e.g. it might be argued that it would not be appropriate to use a group beta estimate as a basis for setting charges for UK termination services, and that adjustments should be made to strip out the contribution to group equity betas of one or both of overseas activities and unregulated activities); and
- other issues that are relevant from a policymaker's point of view, e.g.:
 - issues relating to the stability of estimates e.g. if some estimation methods provide results that are very unstable over time, then putting a relatively large amount of weight on estimation methods that provide more stable results may be desirable in order to provide a stable climate for investment; and
 - the usefulness of relying on well known, published, data sources such as the LBS Risk Measurement Service ("RMS") data or similar.

A18.60 Taken together, these issues mean that a wide range of estimation methods may be used in beta estimation. Ofcom's preferred approach is to give weight to a number of different estimation techniques, which, it believes, strike an appropriate balance amongst the issues outlined above.

A18.61 Some of the key practical estimation issues that arise based on the objectives identified above are:

- choice of data frequency (daily, weekly, or monthly);
- estimation period (how many years' worth of data to use, and over which period); and
- the need to measure risk relative to an appropriate index (i.e. regressing company returns against either a domestic or international market index).

A18.62 Each of these issues is discussed at some length in the risk consultation. The estimates set out in the next subsection draw on the principles established in these earlier reviews.

A18.63 The range used by Ofcom in the past on mobile termination was based on putting most weight on beta estimates that were calculated on Ofcom's behalf by The Brattle Group ("Brattle") using:

- returns data for O2 rather than Vodafone, since doing so limited the difficulties associated with the impact of overseas activities;
- daily data²⁷¹, since doing so maximised the precision of estimates; and
- relatively short data windows (e.g. one year), making use of the most recent available data, because of statistically significant changes to beta estimates over time.

A18.64 Most weight was put on results calculated using the FTSE All-Share index, rather than a global equivalent such as the FTSE All-World index, reflecting the approach most commonly used by most practitioners. Ofcom additionally placed some weight (albeit less than that placed on Brattle's estimations given the greater statistical merit of these) on estimates supplied by the LBS RMS, given their status as a widely-recognised, published, set of estimates.

A18.65 Ofcom's view is that this approach remains appropriate, and has updated its analysis based on new research carried out on its behalf by Brattle during the course of the review in early 2006. These estimates are summarised in the figure below.

²⁷¹ Including any appropriate adjustments for heteroscedasticity and autocorrelation

Figure A18.6 Equity beta estimates for O2 and Vodafone at actual gearing levels

| Company; Estimated by | Details, e.g. data frequency | Index | Period | Estimate (standard error) |
|---------------------------------------|---|-------|--|---------------------------------|
| O ₂ ; The Brattle Group | Daily (1 year) | UK | Year to 31 st October 2005* | 1.26 (0.14) |
| Vodafone; The Brattle Group | Daily (1 year) | UK | Year to 14 th December 2005 | 0.95 (0.13) |
| O ₂ ; The Brattle Group | Daily (1 year) | World | Year to 31 st October 2005* | 0.92 (0.20) |
| Vodafone; The Brattle Group | Daily (1 year) | World | Year to 14 th December 2005 | 0.69 (0.14) |
| O ₂ ; LBS RMS | Monthly (5 years), Bayesian adjusted | UK | 5 years to Q3 2005 | 1.12 (0.23) |
| Vodafone; LBS RMS | Monthly (5 years), Bayesian adjusted | UK | 5 years to Q3 2005 | 1.12 (0.19) |

* O2 daily beta estimates are based on data sets ending 31st October 2005, Ofcom's view, and that of the Brattle Group, is that estimates based on data following this period are unlikely to provide a reliable basis for calculating forward-looking beta estimates. This is due to the announcement on 31st October 2005 of Telefónica's takeover bid for O2 that represented an offer of a 22% premium on the closing O2 share price of the previous Friday. This offer prompted an immediate 25% gain in O2's share price by the close of trading on October 31 2005 and has a material impact on regression estimates of O2's beta.

A18.66 These estimates are broadly lower than the ones used to support the 2004 Statement (see Table 2 and Table 3 of the December 2003 Consultation). Equity betas (and implied asset betas) calculated using one year of daily data for both Vodafone and O2 have fallen fairly significantly. Based on this evidence there may be reason to revise the top end of Ofcom's previous range of 1.0 to 1.6 down to reflect the change in more recent estimates. However, given that beta estimates are subject to volatility and change it may be appropriate to continue to use the same range as the previous market review. It is not possible to judge whether the lower betas measured today reflect a long term trend or a short term market fluctuation.

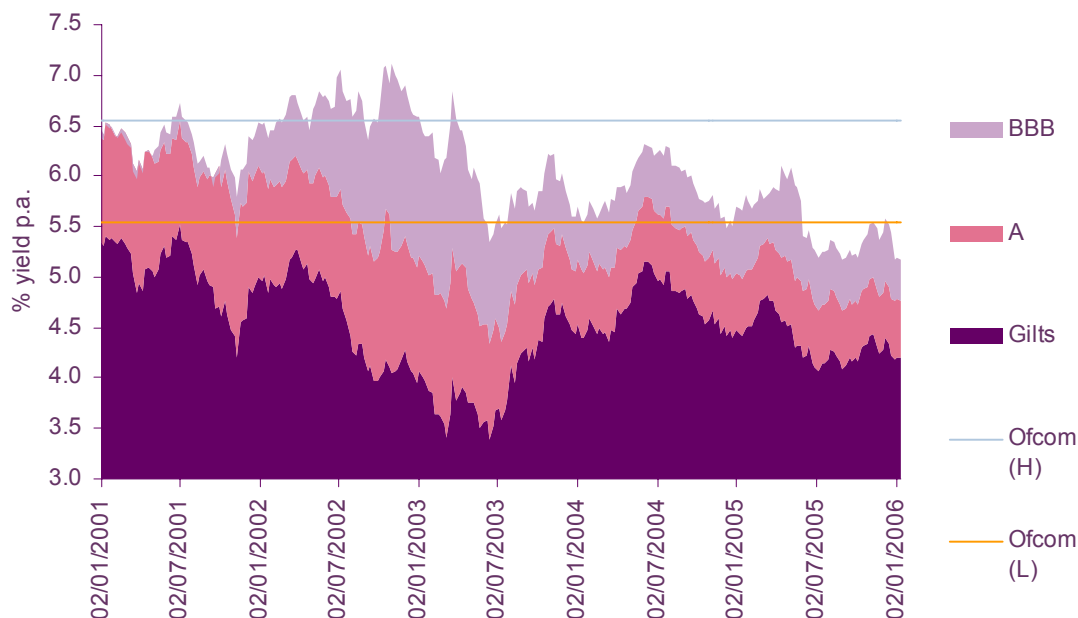
A18.67 Ofcom's view is that the range used in the 2004 and 2005 statements remains appropriate. The low end of Ofcom's range is an equity beta of 1.0, which, at a gearing ratio of 10%, corresponds to an asset beta of 0.9. The high end of Ofcom's range is an equity beta of 1.6, which corresponds to an asset beta of just below 1.5. The midpoint of this range is an equity/asset beta of 1.3/1.2. These estimates are very close to the one-year O2 beta measured against the FTSE All-Share index shown in the top row of the figure above, i.e. an equity beta of 1.26 at a gearing ratio of about 3% and an implied asset beta of about 1.2. Therefore Ofcom will continue use a range of 1.0 to 1.6 at 10% gearing in its estimation of the cost of capital.

Debt premium

A18.68 The cost of corporate debt is made up of a risk free component and a company specific risk premium. Historical evidence suggests that blue chip corporate debt, such as that of mobile operators, commands a small risk premium, although estimates of this premium vary considerably. In the 2004 and 2005 statements, Ofcom used a range of 1% to 3.5% for the debt premium of an MNO.

A18.69 The figure below shows the yields on average A and BBB-rated corporate bonds (and also on 5-year gilts) since the beginning of the year 2000. These correspond to the credit ratings of Vodafone²⁷² and O2²⁷³ respectively. It shows that having peaked at about 3% in late 2002/early 2003, the yield on BBB (medium risk) rated corporate bonds has varied between about 1.0 and 1.5 percentage points above the risk free rate, with the corresponding figure for A rated bonds having been between about 0.5% and 1.0%.

Figure A18.7 Yields on government & corporate debt



Source: Thomson DataStream and Ofcom analysis

A18.70 Based on this evidence, Ofcom considers that it would be appropriate for it to adopt a range of 1.0% to 2.0% for the debt premium for an MNO. Given the low optimal gearing ratio utilised in the WACC calculation (10%), this change has a fairly small impact on Ofcom's final cost of capital estimate²⁷⁴.

²⁷² See

http://www.vodafone.com/article/0,3029,CATEGORY_ID%253D408%2526LANGUAGE_ID%253D0%2526CONTENT_ID%253D230922,00.html

²⁷³ See http://www.o2.com/investor/bond_holder_information.asp

²⁷⁴ The historic debt premia presented have not been updated to reflect more recent estimates since the September 2006 Consultation. Ofcom's adopted range is broadly based on the historic estimates and Ofcom does not consider that more recent estimates would have an impact on its overall conclusions given the small impact the debt premium has on the overall cost of capital due to the low gearing assumption.

Ofcom's determination of the cost of capital estimate

A18.71 The figure below sets out Ofcom's estimates in calculating the WACC. They lead to an average pre-tax real WACC estimate of 11.5%. This is only slightly greater than the 11.3% estimated in the September 2006 Consultation.

Figure A18.8 Proposed WACC estimate

| | Low | High |
|------------------------------|--------------|-------------|
| Nominal Risk-free rate | 5.0% | 5.0% |
| ERP | 4.5% | 4.55 |
| Asset beta | 0.90 | 1.46 |
| Equity beta @ 10% gearing | 1.0 | 1.6 |
| Cost of equity (post tax) | 9.5% | 12.2% |
| Debt premium | 1.0% | 2.0% |
| Cost of debt (pre tax) | 6.0% | 7.0% |
| Corporate tax rate | 30% | 30% |
| Cost of debt (post tax) | 4.2% | 4.9% |
| Gearing | 10% | 10% |
| WACC (post tax nominal) | 9.0% | 11.5% |
| WACC (pre tax nominal) | 12.8% | 16.4% |
| Inflation | 2.8% | 2.8% |
| WACC (pre tax - real) | 9.7% | 13.2% |
| Average | | |
| WACC (pre tax - real) | 11.5% | |

Other risk related issues raised by respondents

A18.72 Vodafone and H3G both made comments relating to the interaction between the WACC and the demand scenarios utilised in the cost model.

A18.73 Vodafone stated that the cost model should adopt a cautious demand forecast in order to capture necessary contingency against project specific risk and take account of the impact of uncertainty on market developments and the optimal allocation of costs between voice termination and other services.

A18.74 H3G made a number of comments relating to the specification of the cost model and the range of scenarios utilised. These comments are discussed further in Annex 5 (see paragraph A5.51 in relation to demand scenarios). Related to these points, H3G suggested that one potential approach to reflecting this risk would be to allow for a premium on the relevant cost of capital. H3G also noted that Ofcom had used the middle of the estimated range for the weighted average cost of capital and had not adopted a probability weighted approach. H3G noted that there were cases where regulators in other industries had considered the issue of specific cost and

revenue risks and used this consideration to justify choosing a value for the cost of capital which is different from the mid point. In particular H3G cited CAA Decision, “Economic Regulation of BAA London Airports (Heathrow, Gatwick, and Stansted)”, February 2003 and Office of Rail Regulation’s 2003 interim review of charges (“Access Charges Review 2003: Final Conclusions”, December 2003).

Ofcom ’s determination on these issues

- A18.75 Ofcom’s approach to dealing with the key areas of uncertainty in its cost modelling more generally is discussed further in Section 9 (see paragraphs 9.77-87). Ofcom considers that use of a single WACC, derived from the mid point of a range, remains the appropriate way of estimating the cost of capital for an efficient MNO. In its 2002 inquiry, the Competition Commission utilised a similar approach, setting out “high” and “low” values for each WACC component and calculating the mid point. The Competition Commission then adjusted the mid point upwards in order to reflect a more cautious approach to the equity risk premium than would have been implied from the mid point of the range alone. The Competition Commission used a range of 2.5-4.5% for the ERP.
- A18.76 In its calculation of the WACC for the purposes of this charge control, however, Ofcom has used only a single value for the ERP of 4.5% for the purposes of determining the “high” and “low” estimates of the WACC. This has been drawn from the upper end of a range of 3-5% as determined following a review of the issues in the final statement on Ofcom’s approach to risk assessment in the cost of capital.
- A18.77 In respect of estimates of other components of the WACC, Ofcom considers that its approach is consistent with that adopted by the Competition Commission’s 2002 inquiry. In turn, in paragraph 7.265 of its report, the Competition Commission noted that the non-company specific aspects of its own cost of capital estimation in its review of mobile call termination were consistent with its report “BAA plc: A report on the economic regulation of the London airports companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stansted Airport Ltd).” The Competition Commission report’s conclusions in respect of cost of capital estimation were incorporated into the CAA decision cited by H3G.
- A18.78 Consistent with the approach taken by the Competition Commission, Ofcom does not consider that the company specific aspects of either the Competition Commission report or the CAA decision on BAA would be appropriate for inclusion in the estimation of a cost of capital for an efficient mobile network operator.
- A18.79 Further, Ofcom considers that the range of parameters from which the mid point was taken is one which already appropriately incorporates a number of cautious estimates. Deviating from the mid range of these already cautious estimates in favour of an even more conservative approach would, in Ofcom’s view, be likely to result in applying a cost of capital which could be materially greater than that which would likely be faced by an efficient MNO.

Other risk related issues in responses received prior to the September 2006 Consultation

- A18.80 T-Mobile suggested that forward costing requires estimates of a number of highly uncertain parameters (e.g. demand and modern equivalent asset trends) and therefore there is a risk of over or underestimating future cost levels. Charges should be set so as to provide a high degree of confidence that they will recover costs. This is the appropriate balance between static efficiency gains to consumers

and long run benefits of further investment. In balancing potentially higher charges for mobile telephony against reduced investment, the consumer is better off incurring higher charges to reduce the risk of setting prices too low and deterring investment.

- A18.81 For example, MNOs are multi product firms and face competition in the retail market from other MNOs and increasingly from new communications providers. If the termination charge is regulated at a price level that is lower than might be achieved in a competitive market there is a risk that this could prevent MNOs from earning a sufficient return on capital. This would be the case if retail prices were constrained by competition from other communications providers e.g. fixed operators or new mobile operators and/or if some MNOs were regulated less stringently enabling them to earn a sufficient return when charging relatively lower retail prices.
- A18.82 Ofcom is mindful of the uncertainty in trying to forecast a number of parameters in its cost model. In order to take account of this uncertainty Ofcom has modelled a range of different scenarios in order to determine efficient unit cost benchmarks for the MNOs, rather than relying on a single estimate of future costs²⁷⁵.
- A18.83 T-Mobile also argued that Ofcom's approach to risk did not properly take into account project-specific risks. The cost of capital only takes into account systematic risk. In general it is Ofcom's view that investors do not expect to be compensated for specific risk because (as discussed in Ofcom's risk consultation):
- “In theory, investors should be indifferent to the level of specific risk involved in a particular project, since this can be diversified away...”
- A18.84 Investors are able to diversify project specific risks by trading off underperforming investments against out-performance on others. However, when prices are regulated it has been argued by T-Mobile that regulation may prevent firms from earning the upside of successful investments whilst exposing them to the downside. This implies that overall firms' rates of return could fall below that required by investors in a competitive market and this may harm incentives to make further investments.
- A18.85 Ofcom does not consider that this is correct. In setting regulated prices Ofcom seeks to estimate price benchmarks on the basis of expected costs and the cost of capital (that is the expected rate of return required by investors). Ofcom considers that this is an appropriate approach and does not limit the opportunity to diversify project specific risk. As discussed below (see paragraph A18.127 et seq.) price caps are set providing a balance between the potential upside and downside risk of actual demand and costs being different from the fixed assumptions made in estimating the regulatory price benchmark. In setting charges using a glide-path Ofcom applies a symmetric approach to the treatment of upside and downside risk. Whilst the price MNOs may charge is fixed by regulation this does not prevent them from earning higher or lower returns than their cost of capital.
- A18.86 In addition T-Mobile considers that the above discussion of cost recovery is a relevant argument to the issue of 3G spectrum costs. It argues that the full value of the payments made by the MNOs in 2000 for their 3G licences should be included in the cost base for regulated charges. This issue is discussed in more detail in Annexes 13 and 14.

²⁷⁵ See Section 9 (see paragraphs 9.77-87) and Annex 13 for further details

Real options

A18.87 Finally, in the September 2006 Consultation it was noted that certain stakeholders had raised issues in relation to real options and how these should be taken into account in setting MCT charges.²⁷⁶ It is convenient to capture the discussion of real options in the cost of capital annex since both topics relate to risk and efficient cost recovery.

A18.88 In response to the September 2006 Consultation, Ofcom received one substantive response in relation to real options, namely that of Orange. However, following the March 2006 Consultation, two other responses on real options were also received. The final sections of this annex are organised as follows: the first section introduces the subject of real options; the second contains a summary of responses received (incorporating responses to the first consultation); and the third sets out Ofcom's views on the responses received. The final section sets out Ofcom's conclusions.

Introduction

A18.89 The notion of real options refers to a situation where there are opportunities associated with investment, particularly in respect of the option to delay the investment to a future time of the firm's choosing²⁷⁷. The traditional NPV method of appraising investment decisions is based on the assumption that the investment opportunity is a case of "now or never". According to the proponents of the real options approach, the traditional NPV method is incomplete in that it overlooks the issue of timing – i.e. firms often have flexibility about when to invest.

A18.90 A real option in respect of an investment opportunity can be understood as the real analogue of a financial call option. An investment opportunity (call option) is the right but not the obligation to buy at some time in the future an asset (the underlying stock) which will provide a stream of future returns. Making the investment is akin to exercising a call option and purchasing the underlying stock. Financial call options are valuable, since they allow the passage of time to reveal new information about the value of the underlying stock, meaning that the investor can better decide whether to "exercise" the option and purchase the stock. Similarly, real options are valuable. Where the firm can delay its investment decision, the passage of time alleviates some uncertainty in net returns (e.g. demand and costs) of the underlying asset. The corollary of this is that when a firm makes an irreversible investment, it foregoes the possibility of waiting for new information to arrive that might be critical in determining the overall desirability or timing of the project. According to the real options approach, the giving up of this option to wait and see (where one exists) upon making the investment is a real opportunity cost of the investment, and thus, the economic cost of investment must include this lost option value.

A18.91 The real options literature generally emphasises the following cumulative factors as contributing to the existence and value of real options:

- Uncertainty of returns;
- The extent to which investments are irreversible or sunk; and
- The degree of flexibility about the timing of investment.

²⁷⁶ See paragraph A18.62 et seq of the September 2006 Consultation

²⁷⁷ There are other types of options, such as the ones *created* when investment is expended – these are discussed further below.

- A18.92 All else being equal, generally, the option to delay is more valuable the greater the uncertainty about future returns and the greater the irreversibility of the asset. Put differently, the real option is of little value where there is certainty and /or the investment is reversible.
- A18.93 In addressing the responses to the first consultation, Ofcom was not convinced of the appropriateness of real options in the present context, mainly in light of Ofcom's view that the cost model contains factors that lead to investors being adequately compensated without further adjustment for real options.

MNO Responses on real options

T-Mobile

- A18.94 T-Mobile argues that Ofcom's approach to risk does not appropriately compensate investors for the option to delay that is given up when a sunk cost investment is made. Where an MNO makes a sunk cost investment in the face of uncertainty, the MNO gives up an option to delay the investment in order to resolve future uncertainty. The giving up of this option is a real opportunity cost that should be accounted for and compensated in any regulated charge. T-Mobile argues that if this is not taken into account, MNOs will continue to delay investing.

Orange

- A18.95 Orange's basic contention is that the mobile industry meets the basic conditions required for the relevance of real options to pricing. Orange argues therefore that Ofcom's current approach does not adequately account and compensate for the investment risk associated with the uncertainty of returns and irreversibility of the assets.
- A18.96 Orange argues that Ofcom's cost model provides only a rough proxy for the uncertainty that operators face by including a number of scenarios, and accounts only partially for the irreversibility of investment through depreciation profiles. Orange believes that a major flaw in the methodology of the cost model is that it does not recognise how an operator might try to manage risk through the optimal timing and type of investments. According to Orange, the real options approach can deal explicitly with a range of factors related to uncertainty and irreversibility, such as whether it is more efficient to invest in GSM 900 or GSM 1800 band infrastructure. Not accounting for these factors would be overlooking the cost arising when the option to delay is lost once irreversible investment is undertaken.
- A18.97 Orange presented a paper by Weeds and Mason, which consisted of augmenting a LRIC model to take into account the value of real options.
- A18.98 The paper first sets out the benchmark case of a LRIC without uncertainty, where traffic (the primary driver of returns) is deterministic, which it considers characterises Ofcom's cost model. Given that future traffic volumes are uncertain, the model is then adapted with the assumption that traffic growth varies randomly through time (i.e. is stochastic). Since traffic drives revenues and costs, this assumption gives rise to uncertainty of net returns, which, combined with irreversibility, gives rise to valuable real options.
- A18.99 The basic question addressed by Orange's model is, as traffic grows going forward, at what point should incremental additions to capacity be undertaken to serve traffic growth? Under certainty, the firm invests in capacity just sufficient to serve current

traffic, which is efficient (subject to lumpiness of investment). However, in the stochastic model, the combination of irreversibility and uncertainty in traffic demand renders such an investment strategy *inefficient*. This is because the randomness of traffic may mean that matching capacity to current traffic leads to redundant over-investment (since that volume may have been an exceptional spike in traffic). In the face of irreversibility and uncertainty, delay in investment is efficient so that the passage of time can reveal more information about the sustained direction of demand. Thus, investment in new capacity is only undertaken where traffic volumes are *sufficiently* high, relative to current capacity. In the Weeds-Mason paper, this is denoted by the investment “boundary,” which is the volume of traffic that triggers the firm to invest in further capacity. This boundary is greater when the degree of uncertainty is greater. Intuitively, the investment delay will be longer when the fluctuation in traffic volumes is greater, since the true trend in traffic is correspondingly less clear.

A18.100 Noting that the Weeds-Mason model relates to multi-stage investments, delay is also increasing in the size of the incremental investment, and in the unit cost of this investment. The paper argues that the termination charge needs to reflect these option values – for the value of the real option foregone when investment is undertaken.

A18.101 The Weeds-Mason paper then estimates the likely order of magnitude for the mark-up on the termination charge required to take into account the value of real options. Based on a range of estimated parameters, Weeds-Mason estimate that the likely mark-up required is in the order of 40%. Orange claims that increasing the termination charge by this amount would ensure that MNOs face efficient incentives towards investment.

Vodafone

A18.102 In discussions following the March 2006 Consultation, it was suggested by Vodafone that MNOs have the option to refrain from “growing new service markets” while they gather intelligence on consumers’ willingness to pay for the new services. In this framework, “growing new service markets” relates to charging low prices for new services (and charging higher prices for others e.g. mobile termination) by recovering proportionately less in terms of common costs from new services (and more from existing ones e.g. mobile termination). However, Vodafone argued that whilst this is efficient, MNOs are not incentivised to follow this approach to pricing and instead take a more cautious approach, specifically, to recover common costs in relatively higher proportions from new services leading to higher prices and lower demand. The reasoning being that MNOs are incentivised to follow this more cautious approach because of a combination of uncertainty of consumers’ willingness to pay for new services and because prices are sticky (i.e. they cannot increase). If MNOs charge low prices for new services this may grow new service markets. However, if consumers’ willingness to pay turns out to be high and if at the same time prices are sticky, MNOs are not able to increase prices accordingly. Therefore, MNOs take a cautious approach, setting higher prices and waiting to see what consumers’ willingness to pay is like. Vodafone argued that this leads to slower penetration of new service markets and therefore that a disproportionate mark-up on termination is required to allow for recovery of common costs in order to address this inefficiency leading to the quicker cultivation of new service markets.

Ofcom's reasoning and conclusions with respect to the applicability of real options to the context of mobile termination

A18.103 Ofcom laid out its overall approach to the implications of real options for regulatory access pricing in its statement on its approach to risk in the assessment of the cost of capital. In that statement, Ofcom considered the circumstances under which a consideration of real options would be relevant to its regulatory activity. Consistent with the broad thrust of the literature, it laid out three main conditions under which real options might be relevant:

- i) There is an option to wait and see – i.e. investments are not now-or-never;
- ii) Net returns are uncertain; and
- iii) Investments are irreversible.

A18.104 Ofcom's statement on risk noted in turn that these can be informed by observation of the following more specific criteria:

- The presence of a significant amount of demand uncertainty;
- Investment cannot be staged, reversed, or piloted;
- Significant technology risk;
- Risk of stranding due to investment being customer-specific;
- Availability of other investment strategies; and
- No chance that loss of wait and see option will be mitigated by gaining a first-mover advantage.

A18.105 On the question of whether or not to incorporate real options in regulatory pricing, it is important to ensure that the approach is mimicking conditions and signals given by a competitive market; i.e. to ignore real options that would only be available to a monopolist. In Ofcom's statement on risk it was noted that:

“Ofcom seeks to promote competition, and to promote investment decisions that, as far as is practicable, mimic those that would be made in competitive or contestable markets, recognising that in doing so it is important to offer a fair reward for risk. In any adjustments to its approach that were made to take account of real options, Ofcom would be seeking to reflect the conditions that would prevail under competition, not to underpin the investment decisions and returns of a dominant firm...”

A18.106 In the context of competition Ofcom explained that in its view, allowance for the value of real options should not be made if the result is to provide firms with returns above their cost of capital. That is, in a competitive market, average prices over the life of the product are not above those that provide a normal return. In a regulatory context, the (average) price should hence still be set to yield an expected return equal to the WACC, or in other words, to provide investors with a “fair bet”. However, whilst the (average) *level* of prices is unchanged, real options may be relevant in a competitive market in terms of how they impact the appropriate *path* of

prices over time. Uncertainty of the outcome of an irreversible investment should thus be taken into account in the setting of prices over time. With the resolution of uncertainty through time, the price necessary to achieve the fair bet condition would fall. Thus Ofcom agrees that a premium relative to the case of investing under conditions of certainty may be appropriate but that it should fall over time as uncertainty relating to the prospects for the market decreases. The premium should, in Ofcom's view be sufficient to ensure the equality of expected returns and WACC.

A18.107 Ofcom considers and responds to each of the submissions in light of this framework and considerations set out in its statement on risk.

Response to Orange

A18.108 In responding to Orange' submission, consistent with the approach of Ofcom's statement on risk, it is useful to consider three main questions:

- i) Whether real options are relevant in theory in this case?
- ii) If so, is the application of real options theory likely to be feasible – e.g. are the informational requirements prohibitive?
- iii) In any event, to what extent is Ofcom's current approach already capturing these features?

i) Whether real options are relevant in theory in this case?

A18.109 This question is assessed against the criteria outlined in the statement on risk. As a general theoretical point, if all three of the conditions are demonstrably met, the case for a serious consideration of real options premium over the current modelling approach may be satisfied. Accounting for the real option which is surrendered when investment is made would then be necessary to ensure efficient investment incentives. In the absence of a premium for real options, the firm will tend to delay its investment until there is less uncertainty in demand or cost conditions. Whilst this delay is the predicted move according to real options theory, this would not be an efficient outcome to the extent that consumers' willingness to pay for the new service now is sufficient to cover the service cost including option value. However, as discussed below, the existence of these conditions is subject to some doubt, especially when assessed in the framework of a competitive market.

Whether option to delay/wait and see exists

A18.110 The issue here is the basic one of the extent to which an MNO indeed holds (or notionally holds) an option to delay. In reality, such an option exists for an MNO; an MNO has some flexibility around when and how much to expand capacity to serve growing demand. However, as discussed above, the pricing of termination in a regulatory context takes place under the assumption of a competitive market. In addition, while the relevant market for regulatory purposes is the termination market, an MNO's investment in further capacity is driven by and serves all types of traffic. In the other markets served by this capacity, such as mobile call origination, no MNO has been found to have significant market power. The implications of assessing regulatory pricing in the context of a competitive market are considered further below.

A18.111 As compared with a monopoly, a competitive or oligopoly market is likely to offer less overall flexibility for market players about their investment decisions. Due to strategic interaction, players need to take greater account of the moves of other players in the market and the effect of these moves on their payoffs from investing now or later. This is most clear in considering offsetting first-mover advantages, which may be especially important in network industries (where network effects confer value in being first in the market). Whilst a monopolist would usually be somewhat less concerned with (potential) competitors stealing market share, a firm in a competitive market faces a trade-off, as it needs to weigh up the advantages of investment delay (resolving uncertainty) against the risk associated with losing potentially valuable first-mover advantage to its competitors or new entrants.

A18.112 In this context, the first-mover advantage lost when delaying investment in capacity increments is the consequent inability to serve some portion of traffic. This delay may allow (hypothetical) competitors to invest pre-emptively in order to win and serve that traffic.

A18.113 Ofcom considers that accounting for real options in this context cannot take place in the absence of a consideration of the existence and strength of first-mover advantages.

A18.114 A related factor to take into account is that investment can also *create* real options. While it could be argued that the act of investing surrenders the option to delay, it may also create an offsetting option (or options) from the investment, the value of which is additional to the NPV of the investment taking account only of existing services. One example could be an MNO's ability to reach into new markets or to be in a position to adopt next generation technologies. To the extent that an investment creates real options, it lowers the required net returns of the investment from existing services.

A18.115 Under a comprehensive real options approach, these first mover advantages and other created options thus need to be considered alongside and offset against any options to delay. It is not clear *a priori* that the advantages of pre-emptive investment are worth less than the option to delay foregone by investment. In the absence of a robust demonstration that the real option to delay significantly exceeds these advantages, Ofcom remains unconvinced that Orange's real options model can be readily adapted to this context.

Uncertainty of returns

A18.116 Generally, the value of the option to delay is greater when uncertainty of net returns is greater. This is an empirical issue which needs to be assessed on a case by case basis. Ofcom makes the general point that there may be a tendency to overstate the uncertainty associated with the provision of a voice termination service. Given that the price is regulated and hence fixed in this context, the remaining uncertainty relates mainly to changes in traffic growth. In this regard, Ofcom also notes the conservative approach applied in Ofcom's cost model with respect to traffic forecasts (discussed below).

Irreversibility of investment

A18.117 The sunkness of investment in traffic capacity underpins the Weeds-Mason model and its results. The extent to which MNO investment is irreversible is, however, subject to some question.

A18.118 One issue is that it matters whether the assets are firm-specific or industry-specific. To the extent that assets can be on-sold to competitors in the event of redundancy, the lesser is the degree of irreversibility²⁷⁸.

A18.119 Another empirical question is the likely size of capacity increments. To the extent that required increments to capacity are small, the degree of exposure to downside risk is less.

ii) Feasibility of application

A18.120 The above discussion has cast significant doubt over whether the theoretical case exists for the application of a real options approach to this context. In any event, even if it is assumed that the theoretical case is sound, a high burden remains over whether the practical application of real options is *feasible*.

A18.121 The measurement of the value of the option to delay is itself very challenging, since the informational requirements are substantial. As expressed in the statement on risk (paragraph 9.57):

“...the problems associated with a detailed modelling exercise to quantify the value of real options would be prohibitive. Ofcom’s view is therefore that, for the foreseeable future, it will not be appropriate for it to attempt to develop a model with which to value real options..”

A18.122 Ofcom considers that in this regard best practice for implementation of real options adjustments is yet to be determined.

A18.123 Orange appears to recognise these difficulties by stating in reference to the Weeds-Mason model’s estimations that, “clearly, more extensive consideration is required to determine with accuracy the efficient termination charge.”

iii) Whether real options considerations are already accounted for in Ofcom’s model?

A18.124 Even if the theoretical and practical issues associated with real options were resolvable, Ofcom considers that, in any event, the cost model contains various features that takes into account, or at least compensate for, the essential underlying issues raised by the real options approach. Whilst Ofcom’s approach differs in certain respects from a real options approach, it essentially captures issues related to uncertainty and irreversibility, as discussed below.

A18.125 The essential concern of real options advocates is that the cost of investment must include the value of the real option given up by the investment. If this value is ignored by regulators, firms will tend to delay investment, due particularly to the wish to avoid the downside risk of outcomes associated with uncompensated reductions in the economic value of assets, such as where assets become stranded in the event that demand or cost conditions render assets redundant. Two risks in particular are worthy of note in this regard. One risk is that traffic will not be as high as expected, which, given that returns are principally determined by traffic volumes, will mean that investors do not fully recoup the cost of investment. Another risk is that technological change will lower the forward-looking cost of equivalent assets,

²⁷⁸ That said, due to the presence and effect of asymmetric information, second-hand markets tend to be characterised by prices which are less than true economic value. (This is known as the “lemons problem.”) This means that few assets are likely to be wholly reversible.

meaning that incumbent firms can potentially be undercut by new entrants deploying the new lower-cost assets. According to the real options framework, firms require an additional return to compensate them for the option given up to delay their investments, where delay would allow them to reduce the risks of under-recovery of cost for this reason.

A18.126 Ofcom considers these risks are relevant in a regulatory context. As discussed above in Section 9²⁷⁹ and Annex 5²⁸⁰, Ofcom's cost model already contains a number of features which address these issues.

A18.127 Firstly, a key modelling feature relates to assumed asset utilisation factors. The effective utilisation factors assumed in the model are substantially lower than 100% (which would be the appropriate underlying assumption in a world of certainty, where capacity and traffic are exactly matched). Thus, there is an expectation that some capacity will be spare, and this is allowed for in the model. An uplift to reflect real options, which themselves arise because of the possibility of less than 100% utilisation, would therefore involve significant double counting.

A18.128 However, whilst assuming less than 100% utilisation of assets seeks to address the issue that firms cannot perfectly match capacity with demand there is an additional point associated with Ofcom's price cap approach. The price cap is set on a forward-looking basis based on a fixed forecast for traffic volumes. Therefore the investor is subject to the risk of forecast error. The outcome of this uncertainty can be positive or negative for the investor depending on whether traffic volumes turn out to higher or lower than forecast volumes respectively. Therefore, whilst Ofcom's approach does not insure firms against forecast error it also does not limit their exposure to the upside which means that a balance is struck between the potential upside and downside²⁸¹ resolution of this uncertainty. If the price cap were set to exactly balance the upside and downside of forecast error this could be described as providing the investor with a "fair bet".

A18.129 Lastly, in this case Ofcom's approach to dealing with forecast error actually may lead to a better position for the investor than the balanced position described above. The traffic forecasts used by Ofcom to set the price cap correspond to conservative forecasts rather than central estimates. This means that in its judgement about the appropriate level of termination charges, Ofcom has taken values above the mid-point of the feasible range of efficient charge benchmarks. It has done this because of its concerns about the asymmetry of the detriment arising from the charge being too high on one hand, or too low on the other (see Section 9, paragraphs 9.193-9.196). The consequence of this is that from a forecast error perspective it is more likely that the actual cost of termination may be lower than that assumed in setting the price cap. In addition Ofcom's price cap is set according to a glide-path. Since the starting prices for the glide-path are above the assumed cost until the final year of the control this is an additional factor leading to the investor being in a better than balanced position in terms of expected returns.

²⁷⁹ Paragraphs 9.77-87 discuss Ofcom's approach to dealing with some of the key areas of uncertainty in its cost modelling, including future demand.

²⁸⁰ Annex 5 discusses Ofcom's cost modelling in detail, including the path of cost recovery that Ofcom uses in establishing efficient unit cost benchmarks for the final year of the charge control (2010/11). It explains that Ofcom's approach seeks to set an optimal path of cost recovery over time by mimicking the outcomes of a competitive market.

²⁸¹ Ofcom notes that whilst charge control regulation may not enable firms to vary price depending on future demand and costs and so may potentially affect returns, Ofcom considers that the cost of capital already reflects the impact of regulation on MNOs' pricing freedom through market estimates of MNOs' cost of capital.

Therefore these factors, taken together, should result in investors being offered a better than “fair bet” on their investment in MNOs.

A18.130 With regard to the issue of technological progress, Ofcom’s cost accounting methodology and approach to the timing of cost recovery addresses this concern. The risk (discussed above) of technological progress lowering the economic cost of equivalent assets is addressed in Ofcom’s cost model with the use of modern equivalent asset valuation and economic depreciation methods (see Annex 5 for more details). Economic depreciation ensures that the asset value changes over time in line with its true market value rather than in accordance with an arbitrary accounting rule. Where the modern equivalent asset values in the cost model decline this reflects the lower costs that a potential new entrant would face and therefore those costs of assets that an incumbent MNO might not be able to recover on a forward looking basis in a contestable market. Rather than deny MNOs the recovery of these costs (a concern expressed by T-Mobile discussed above at para A18.80), Ofcom uses economic depreciation to set the level and path of regulated prices. Economic depreciation ensures that those costs that might not be recovered due to falling modern equivalent asset values are recovered in earlier periods i.e. other things equal, prices are higher to allow cost recovery to be brought forward. Ofcom therefore considers that it has appropriately taken into account the risks associated with technological progress. In the same way as potential forecast error exists in Ofcom’s fixed traffic forecasts the same issue arises with Ofcom’s forecast asset values. However, since the outcome of this uncertainty can be positive or negative, Ofcom’s regulated prices provide investors with at least a “fair bet” (as discussed above),

A18.131 Taking the above into consideration, Ofcom considers that it would not be correct to add a premium to take into account real options to the efficient unit cost benchmarks calculated by the cost model. That is, superimposing a real options framework over the cost model is likely to involve double counting.

Response to Vodafone

A18.132 In Ofcom’s view real options are usually related to the management of irreversible investments in the face of uncertainty that is resolved over time. However, Vodafone’s framework discussed above relates to the recovery of common costs.

A18.133 Moreover the source of “option value” in the Vodafone model is the assumption that prices for new services cannot be increased, and the source of uncertainty that is resolved, is consumers’ willingness to pay for new services. However, it appears that the framework relies heavily on the assumption that prices (for new services) are sticky in that they cannot be increased.

A18.134 In the absence of robust justification for this assumption Ofcom does not consider this an appropriate framework by which to explore real options in the context of mobile voice call termination.

Response to T-Mobile

A18.135 T-Mobile makes a general point about the applicability of real options to the context of MCT. The discussion above deals with these general points.

Conclusion

A18.136 The fundamental issue raised by real options is whether the existing approach poses a significant risk of sub-optimal investment by MNOs. In particular, in the absence of an explicit real options mark-up, the question is whether MNOs would be likely to undertake too little investment or excessively delay investment.

A18.137 Ofcom believes that the considerations above cast doubt over the applicability of real options to this setting. The theoretical and empirical aspects remain subject to debate. Moreover, there are a range of features of the existing approach which ensure that investors continue to be adequately compensated for the opportunity cost of capital they invest and are incentivised to invest appropriately. Therefore, Ofcom does not propose any adjustments to its existing model to explicitly calculate a real options premium since this would involve double counting of factors compensated for in other ways by the modelling approach.

Annex 19

Welfare analysis

Introduction

A19.1 Section 7 sets out Ofcom's views on the likely detriment to consumers if MCT charges are unregulated. These are:

- i) Excessive prices overall;
- ii) Inefficient structure of prices;
- iii) Distortion of consumer choice;
- iv) Inequitable distributional effects; and
- v) Risk of anti competitive behaviour.

A19.2 In order to provide an order of magnitude indication of the consumer welfare gain from regulating MCT charges Ofcom has carried out a quantitative analysis that compares consumer welfare in two scenarios: one where there is no regulation and no threat of regulation and one where mobile termination charges are regulated as set out in Section 9.

A19.3 The approach adopted by Ofcom is to consider the case in which competition is so intense that firms' economic profits are driven down to zero in both the regulated and unregulated scenarios. It is therefore assumed that MNOs do not make excess profits overall as a result of setting excessive MCT charges. As such, the analysis focuses solely on the second source of detriment listed above (inefficient structure of prices) and does not capture the benefits to consumers if MNOs were to make excess profits in the absence of regulation (which were then removed as a result of regulation).²⁸² In addition Ofcom's estimate does not include any quantification of the welfare gains from regulation removing: distortions of consumer choice; inequitable distributional effects; or the risk of anti competitive behaviour. Therefore, the quantification set out below is likely to provide an underestimate of the full benefits of regulation.

Welfare model

A19.4 In order to estimate the welfare impact of regulation, it is not appropriate to consider only the relationship between the price and the consumption of calls to mobiles but it is necessary to account for the interaction between MCT charges and mobile retail markets. This is because MNOs can use profits from termination to reduce the prices of retail mobile services. This benefits mobile subscribers and potentially trades off against the detriment to callers of excessive charges. Therefore, focusing only on calls to mobiles might overstate the welfare gain from regulation and Ofcom has sought to capture the interrelationship between the demand for calls to mobiles and for other mobile retail services in its welfare analysis.

²⁸² In particular, the model focuses on the welfare cost that arises from fixed-to-mobile prices being too high relative to retail mobile prices.

A19.5 Ofcom has estimated the welfare gain from regulation in 2010/11 using a revised version of a basic economic pricing model with interrelated demand originally developed by Dr. Jeffrey Rohlfs for Ofcom.²⁸³ While the original form of the model was a Ramsey model which could be used, among other things, to estimate mark-ups for common costs, the model has been revised by Ofcom (as explained further below), and used only to capture the welfare gains from regulation. The model is at the aggregate industry level. As such, it does not explicitly provide separate estimates of the welfare gains from regulating each individual operator.

A19.6 The updated model considers five services:

- subscription;
- mobile calls (on-net, off-net and geographic);
- messaging;
- data; and
- fixed-to-mobile calls.

A19.7 An analytical simplification of the model is that it does not capture all the relevant services that are likely to contribute to the revenues of MNOs, such as international roaming and video calls.

A19.8 H3G has raised concerns on the use of Ofcom's welfare model to estimate the impact of regulation on consumer welfare and has suggested that an analysis of this kind is subject to limitations similar to those that prevent the use of an applied Ramsey pricing model to set MCT charges and that are discussed by Ofcom in Annex 17.

A19.9 Ofcom's welfare model is not equivalent to a Ramsey model which is designed to estimate specific mark-ups for common costs. While the welfare model captures the relationship between the prices of various services on the basis of an industry zero-profit constraint (as would be done with a Ramsey model) its purpose is not to calculate mark-ups for the recovery of common costs. Indeed, Ofcom's welfare model does not require the estimation of common costs since the service cost inputs to the model already allow for recovery of relevant common costs. Nevertheless Ofcom recognises that there are limitations in accurate modelling of welfare effects. This is reflected in the interpretation of the results, which as noted above and below are only intended to provide an order of magnitude indication of the consumer welfare gain.

A19.10 H3G has also noted that minor changes to the assumptions of the model can have a significant impact on the estimated levels of welfare. Ofcom recognises that any quantitative analysis undertaken on the basis of an applied welfare model is subject to a possibly significant margin of error.²⁸⁴ Nevertheless, Ofcom considers that, the quantitative welfare analysis that it has undertaken is informative of the effect of

²⁸³ A detailed description of the original model can be found at http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/main_report.pdf and Annex C (http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/ramsey_c0602.pdf) and Annex D (http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/ramsey_d0602.pdf)

²⁸⁴ Indeed this is one of the reasons for which Ofcom does not consider it appropriate to set MCT charges on the basis of the results of an applied Ramsey-type model.

regulation on welfare. First, the analysis focuses on the difference in consumer welfare in the two scenarios (i.e. regulation vs no regulation or threat of regulation) and this is less sensitive than the estimated level of welfare itself in each scenario to changes in the assumptions of the model. Moreover, as stated in the September consultation²⁸⁵, Ofcom's analysis is intended to provide only an indication of the order of magnitude of the welfare gain from regulation and not a precise estimate.

A19.11 H3G has also argued that Ofcom has not yet undertaken any relevant analysis of the specific welfare benefits of regulating H3G's rate, both because the market average regulated rate is different from H3G's rate, and because H3G argues that its current price is "un-regulated" and is significantly below the unregulated charge used in Ofcom's unregulated scenario.

A19.12 The impact on H3G of regulating its MCT rates has already been addressed in section 9. Ofcom's views on the appropriate counterfactual (i.e. unregulated) charge are considered further below.

Specification of demand

A19.13 The demand functions for the services considered are assumed to be linear and their position is calibrated by the combinations of quantities and prices described in the figure below.

Figure A19.1 Calibration of demand (figures in 2010/11, real 2006/07 prices)

| Service | Annual volume | Price |
|------------------------|------------------|------------------------|
| Subscription | 67.051m | £25.3 p.a. |
| Mobile voice calls | 96,472m minutes | 11.84 pence per minute |
| Messaging | 87,814m | 6.04 pence per message |
| Data | 12,455m Mbytes | 20 pence per Mbyte |
| Fixed-to-mobiles calls | 24,705 m minutes | 10.96 pence per minute |

A19.14 The volumes used for the calibration of the demand functions are consistent with the 2010/2011 forecasts of demand in the medium traffic scenario of the cost model. In the absence of better information, prices are based on current prices, forecast to be constant in real terms.²⁸⁶

²⁸⁵ At paragraph 7.23

²⁸⁶ The exception is the price for data has not been estimated on the basis of the current price. This is because the service is still at a relatively nascent stage. Instead the price has been forecast having

A19.15 The elasticity of demand matrix has been specified following the approach proposed by Dr. Rohlfs, which relies on a combination of assumptions and theoretical restrictions. More specifically:

- The own-price elasticities of demand are assumed to be equal to -0.3. These were the assumed own price elasticities used by the CC in 2002 after having considered the various estimates submitted by the parties in that inquiry.²⁸⁷ The same assumptions were also made by Ofcom/Oftel in the previous MCT review in 2004.²⁸⁸
- The cross-elasticities of subscription with respect to usage prices are derived so as to be consistent with the buy-through model (described in Dr Rohlfs' description of the model). A parameter used to determine these elasticities is the ratio of the usage of the marginal subscriber to that of the average subscriber. This parameter has been specified as one-third.
- The cross elasticity of subscription with respect to the price of fixed-to-mobile calls has been set equal to zero.
- The cross elasticity of fixed-to-mobile calls with respect to the price of subscription has been set so that the R-G factor is 1.5 and the net externality factor is less than 1.1²⁸⁹. The R-G factor has been set at 1.5 since this is the mid-point of the range considered in Ofcom's analysis of the externality surcharge and is consistent with the central estimate used by the CC in 2002. (See Annex 16 for more on this.)
- The cross-elasticities of demand for mobile voice and for messaging with respect to the price of subscription are specified so as to be slightly larger in absolute value than would be implied by symmetry of the partial derivatives of demand to reflect the existence of network externalities. The cross elasticity of demand for data with respect to the price of subscription is instead specified so as to satisfy the symmetry of the partial derivatives of demand.
- The cross-elasticities of usage demand with respect to usage prices have been specified so that the price that marginal consumers are willing to pay for one type of usage does not depend on the quantities of other types of usage.

A19.16 The resulting elasticity matrix used is shown below.

Figure A19.2 Elasticity matrix

| |
|---------------|
| Prices |
|---------------|

regard to forecast ARPUs for data services and the projected volumes of usage and subscribers from the cost model.

²⁸⁷ See Chapter 9 and in particular Table 9.11, though note that the CC's model contained only three services (i.e. did not include messaging and data services).

²⁸⁸ See paragraph 6.109 of the Ofcom June 2004 statement which refers to the model prepared by Dr Rohlfs for Oftel in May 2002 – available at the following link:

http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/main_report.pdf

²⁸⁹ As noted previously, the R-G factor is a measure of the network externality and is defined as the ratio between the social marginal value of subscription and the private marginal value of subscription. To a large extent this externality is reflected in the cross-elasticities of demand. The net externality factor is instead a measure of the network externality that is not captured by the demand system. It can be thought of as capturing the externality related to the option to call the marginal subscriber.

| | | | | | | |
|-------------------|---------------------|---------------------|--------------|------------|------------------|-------------|
| | | subscription | voice | ftm | messaging | data |
| Quantities | subscription | -0.30 | -0.67 | 0 | -0.31 | -0.15 |
| | voice | -0.10 | -0.30 | 0 | -0.10 | -0.05 |
| | ftm | -0.01 | -0.02 | -0.30 | -0.01 | -0.005 |
| | messaging | -0.10 | -0.23 | 0 | -0.30 | -0.05 |
| | data | -0.10 | -0.22 | 0 | -0.10 | -0.30 |

Specification of costs

A19.17 Estimates of the costs of production have been derived on the basis of the output of the cost model in 2010/11 (averaged across all five MNOs) in a traffic scenario consistent with the proposed regulated charges as follows (these costs therefore include a mark-up for the recovery of common costs):

- The cost of mobile calls is a weighted average of the costs of on-net, off-net and geographic calls. The cost of geographic calls includes also an estimate of the cost for fixed termination and transit derived from BT's charges for termination and transit.
- The costs for messaging and data have been set equal to the costs estimated by the cost model.
- The cost of fixed-to-mobiles calls has been set equal to the average regulated charge (excluding the externality surcharge) plus BT's fixed retention equal to 3.51ppm.
- The cost of subscription has been obtained by dividing the aggregate costs of customer acquisition and retention (CARS) by the number of total subscribers plus the total number of connections. This approach attempts to capture the fact that CARS are incurred by firms not only to increase the total number of subscribers but also to acquire customers from rival firms.

A19.18 All costs are weighted averages of the costs of 2G-3G and 3G operators. The estimates used in the model are shown below.

Figure A19.3 Costs of production

| Service | Cost |
|------------------------|---|
| Subscription | £ 95.38 p.a. |
| Mobile voice calls | 7.74 ppm |
| Messaging | 0.17 ppm |
| Data | 18.95 pp Mbyte |
| Fixed-to-mobiles calls | 8.40 ppm (excludes externality surcharge) |

Methodological issues raised by respondents

Appropriate counterfactual

- A19.19 The specification of the retail price of fixed-to-mobile calls is the key element that differentiates the regulated and the unregulated scenarios. All other prices and quantities are then set so as to maximise consumer welfare with MNOs profits constrained to be zero. The retail price of fixed-to-mobile calls can be decomposed into the wholesale mobile termination charge and a fixed retention.
- A19.20 In the regulated scenario, the wholesale termination charge is set equal to the regulated mobile termination charge averaged across all MNOs (in 2010/11). In the unregulated scenario, the wholesale price of fixed-to-mobile calls is set equal to the monopoly wholesale price, i.e. the price that maximises profits in the termination market (using the demand and cost for termination as specified in the model).
- A19.21 It has been submitted to Ofcom that the monopoly MCT charge considered in the model is inconsistent with the available evidence on unregulated MCT charges. The relevant price that should be used in the welfare analysis relates to the wholesale termination charge that would prevail absent regulation or the threat of regulation. Ofcom has derived an estimate of this unregulated termination charge on the basis of a standard model of profit maximisation. Unregulated MCT charges observed in the market do not necessarily correspond to the charges that would prevail if there were no regulation *and* no threat of regulation.²⁹⁰ Nevertheless, additional analysis has been undertaken as a sensitivity to estimate the welfare gain of regulation if the profit maximisation model were to overestimate the unregulated average MCT charge.
- A19.22 T-Mobile has argued that an accurate welfare analysis would compare the new regulated rates with current regulated rates. T-Mobile go on to argue that only by doing so can before and after effects be measured which would be in line with Ofcom's Approach to Impact Assessment (21 July 2005).²⁹¹
- A19.23 Ofcom's approach to IAs notes that: "When identifying possible options, we will generally start by considering the option of not changing the regulatory framework, either by not introducing regulation or by retaining existing regulation. This option – no new intervention – will be the benchmark or base case against which other options will be judged" (para. 5.13)
- A19.24 T-Mobile's argument that in order to be in line with Ofcom's approach to IAs, requires a comparison against current regulated rates, clearly implies that "retaining existing regulation" is interpreted by T-Mobile as maintaining the regulated charges at current levels. Ofcom disagrees. The current charge controls will expire, so the option of no new intervention would mean that the combined 2G/3G MNOs would no longer be charge controlled. Therefore, Ofcom continues to consider that the appropriate counterfactual is one of no regulation or threat of regulation.
- A19.25 In respect of the impact from regulating H3G's termination rates at the levels proposed, Ofcom continues to consider that it is appropriate to model the aggregate impact of regulating H3G alongside the other MNOs (as done in this annex) since

²⁹⁰ Ofcom noted previously (for example, at paragraph 4.46) the high underlying 3G charges proposed as part of the 2G/3G proposed blended rates. Moreover, these rates have been proposed with the clear threat of future regulation, even if 3G charges (prior to 1 April 2007) have not been controlled.

²⁹¹ http://www.ofcom.org.uk/consult/condocs/ia_guidelines/condoc.pdf

this captures the overall consumer welfare gains of regulating all MNOs at the proposed rates²⁹². In addition Ofcom has considered the impact on H3G specifically and this is discussed in section 9.

Pass-through and level of the fixed retention

- A19.26 The level of fixed retention used in both the regulated and the unregulated scenarios is the same, and it has been estimated on the basis of the fixed retention currently observed in the market for all fixed network operators (FNOs), which has been estimated to be 4.79ppm.²⁹³
- A19.27 Ofcom considers that the current level of fixed retention provides a reasonable proxy for the level of fixed retention that might prevail in the market under regulation.
- A19.28 It is more difficult to estimate the level of fixed retention that would prevail if the wholesale mobile termination charge were left unregulated since this would imply a relatively material change in the level of the termination charge compared to the one currently observed in the market. However, it is not clear if the fixed retention would increase or decrease in response to an increase in the wholesale termination charge. For simplicity Ofcom has decided to use in the unregulated scenario the same level of fixed retention that it has used in the regulated scenario.
- A19.29 The approach followed by Ofcom implies that, in the model, the difference between the regulated and the unregulated retail price of fixed-to-mobile calls is exactly equal to the difference between the regulated and unregulated wholesale mobile termination charge. In other words, the model assumes that pass-through is complete, i.e. that fixed-line operators fully pass through onto consumers any increase or decrease of the wholesale termination charge they face.
- A19.30 If, instead, the level of fixed retention varied according to the level of wholesale mobile termination charges, then pass through could be more or less than 100%. More specifically, if the fixed retention in the unregulated scenario is higher (lower) than the one used in the regulated scenario, then the model implies that the pass through of a reduction/increase in the regulated charge onto the price of fixed-to-mobile calls is more (less) than 100%.
- A19.31 T-Mobile has submitted to Ofcom that (i) Ofcom's approach ignores the available evidence on limited pass-through and that (ii) incomplete pass-through is not generally consistent with Ramsey pricing.
- A19.32 Ofcom notes that T-Mobile is correct in observing that, historically, changes in the wholesale termination charge have not been fully (i.e. 100%) reflected in the retail price of fixed-to-mobile calls. Ofcom's response to T-Mobile's concerns on the observed level of pass-through were addressed in section 7, and it is to be recalled that a significant amount of pass-through has actually been observed on fixed-to-mobile calls. Further, Ofcom reiterates that evidence of less than full pass-through is not inconsistent with efficient Ramsey pricing of fixed-line communications

²⁹² Ofcom's principal duty is to further the interests of citizens in relation to communications matters and to further the interests of consumers in relevant markets, where appropriate by promoting competition – see section 3(1) of the Communications Act 2003

²⁹³ The fixed retention is estimated by subtracting the average termination charge from the retail price of fixed-to-mobile calls observed in 2006 Q2 (10.96ppm).

services and is not necessarily suggestive of the full extent of pass-through of a reduction of mobile termination charges onto consumers.

- A19.33 Under Ramsey pricing principles, a change in the (marginal) cost of one of the services produced is expected to have an impact on the retail prices of all other services as well. It is also possible to verify that, in general, with linear demand functions, when the cost of one good/service increases (decreases) its Ramsey price can increase (decrease) by a lower or higher amount.
- A19.34 Inasmuch as retail competition in the markets for fixed-line communications services is sufficiently intense, fixed-line operators can be expected to pass through a reduction in wholesale termination charges onto consumers by reducing not only the price of calls to mobiles but also the prices of other services.
- A19.35 Modifying the welfare model to capture incomplete pass-through onto the retail price of fixed-to-mobile calls as suggested by T-Mobile does not appear desirable and it is likely to underestimate the static welfare benefits of regulation. This is because the model would not capture the impact that a reduction in the level of the mobile termination charge would have on the prices of other fixed-line communications services and therefore on the consumers of these services.

Results

- A19.36 The figure below shows the results of the analysis which compares an unregulated termination charge of 23.9 ppm (to the nearest 0.1ppm) based on Ofcom's estimate of the monopoly termination charge and a regulated termination charge of 5.2 ppm (to the nearest 0.1ppm) based on the weighted average (by termination volumes) of Ofcom's proposals for charges set out in Section 9.

Figure A19.4 Results of the welfare model²⁹⁴

| | Unregulated (MCT = 23.9ppm) | Regulated (MCT = 5.2ppm) |
|------------------|--|-------------------------------------|
| Consumer surplus | £54.5bn | £55.9bn |
| Consumer gain | £1.4bn | |

- A19.37 The analysis estimates the change in consumption of calls to mobiles and mobile retail services following a move (via regulation) to a more efficient price structure. The welfare gain amounts to £1.4 billion in 2010/11 (in real 2006/07 prices and to the nearest £0.1bn) and over four years under the assumption of a smooth glide path down to the target charge from the monopoly charge amounts to approximately £3.2 billion in present value terms²⁹⁵ at the beginning of 2007/08.
- A19.38 Ofcom has also estimated the welfare gain assuming that the unregulated price is lower than the one calculated above. In particular, we have considered an unregulated MCT of 14.5ppm (which is the average between the regulated and unregulated charged considered above). The figure below illustrates the results of the analysis.

²⁹⁴ Reported welfare estimates are 2010/2011 values in real 2006/07 prices.

²⁹⁵ Assuming a real discount rate of 3.5% as per the Treasury's Green Book and discounting at mid year intervals.

Figure A19.5 Results of the welfare model – Low unregulated MCT charge

| | Unregulated (MCT = 14.5ppm) | Regulated (MCT = 5.2ppm) |
|------------------|--|-------------------------------------|
| Consumer surplus | £55.5bn | £55.9bn |
| Consumer gain | £0.4bn | |

A19.39 The welfare gain amounts to £0.4 billion in 2010/11 (in real 2006/07 prices) and over four years under the assumption of a smooth glide path down to the target charge from the monopoly charge amounts to approximately £0.9 billion in present value terms at the beginning of 2007/08.

Annex 20

Notifications and SMP conditions

The revocation of notifications, identification of markets, the making of market power determinations and the setting of SMP services conditions in relation to H3G, O2, Orange, T-Mobile and Vodafone

NOTIFICATION UNDER SECTIONS 48 (1) AND 79 (4) OF THE COMMUNICATIONS ACT 2003

WHEREAS

(A) The Office of Communications (“OFCOM”) issued a notification pursuant to section 48(2) and section 80 of the Communications Act 2003 (the “Act”) setting out their proposals for the identification of markets, the making of market power determinations and the setting of SMP services conditions on 13 September 2006 (the “First Notification”);

(B) A copy of the First Notification was sent to the Secretary of State in accordance with section 50 (1)(a) of the Act, and to the European Commission and to the regulatory authorities of every other member state in accordance with sections 50(3) and 81 of the Act;

(C) In the First Notification and the accompanying explanatory statement, OFCOM invited representations about any of the proposals set out therein by 22 November 2006;

(D) By virtue of section 80(6) of the Act, OFCOM may give effect to any proposals to identify a market for the purposes of making a market power determination or any proposals for making a market power determination set out in the First Notification, with or without modification, where -

(i) they have considered every representation about the proposals made to them within the period specified in the First Notification; and

(ii) they have had regard to every international obligation of the United Kingdom (if any) which has been notified to them for this purpose by the Secretary of State; but

OFCOM’s power to give effect to such proposals is subject to sections 82 and 83 of the Act;

(E) By virtue of section 48(5) of the Act, OFCOM may give effect to any proposals to set SMP services conditions set out in the First Notification, with or without modification, where:

(i) they have considered every representation about the proposals made to them within the period specified in the First Notification; and

(ii) they have had regard to every international obligation of the United Kingdom (if any) which has been notified to them for this purpose by the Secretary of State;

(F) OFCOM received responses to the First Notification and have considered every such representation made to them in respect of the proposals set out in the First Notification and the accompanying explanatory statement; and the Secretary of State has not notified OFCOM of any international obligation of the United Kingdom for this purpose;

(G) The European Commission has not made a notification for the purposes of Article 7(4) of the Framework Directive as referred to in section 82 of the Act and the proposals do not relate to a transnational market as referred to in section 83 of the Act;

THEREFORE

1. OFCOM in accordance with section 79 of the Act identify the following markets for the purposes of making a market power determination:

- (a) wholesale mobile voice call termination provided to other Communications Providers by H3G in the United Kingdom;
- (b) wholesale mobile voice call termination provided to other Communications Providers by O2 in the United Kingdom;
- (c) wholesale mobile voice call termination provided to other Communications Providers by Orange in the United Kingdom;
- (d) wholesale mobile voice call termination provided to other Communications Providers by T-Mobile in the United Kingdom; and
- (e) wholesale mobile voice call termination provided to other Communications Providers by Vodafone in the United Kingdom.

2. OFCOM in accordance with section 79 of the Act make the following market power determinations in relation to the markets referred to in paragraph 1 above-

- (a) in relation to the market in sub-paragraph 1(a), H3G;
- (b) in relation to the market in sub-paragraph 1(b), O2;
- (c) in relation to the market in sub-paragraph 1(c), Orange;
- (d) in relation to the market in sub-paragraph 1(d), T Mobile; and
- (e) in relation to the market in sub-paragraph 1(e), Vodafone.

3. OFCOM in accordance with section 48(1) of the Act and section 79 of the Act hereby set pursuant to section 45 of the Act the SMP services conditions on the persons referred in paragraph 2 above as set out in Schedule 1 to this Notification.

4. For the avoidance of doubt, the notifications at

- (a) Annex A in the *Wholesale mobile voice call termination market review*, published by OFCOM on 1 June 2004, and any subsequent modifications to the SMP services conditions set by those Notifications, and
- (b) Annex 3 in the *Assessment of whether H3G holds a position of SMP in the market for wholesale mobile voice call termination on its network* published by Ofcom on 27 March 2007;

are revoked by this Notification when it takes effect under sections 48 (1) and 79 (4) of the Act.

5. The effect of and OFCOM's reasons for the decisions referred to in paragraphs 1 to 4 above are contained in the Explanatory Statement accompanying this Notification.
6. In making the decisions referred to above, OFCOM have taken due account of all applicable guidelines and recommendations which have been issued or made by the European Commission in pursuance of a Community instrument, and relate to market identification or analysis, as required by section 79 of the Act.
7. In making the decisions referred to in paragraphs 1 to 3 above, OFCOM have considered and acted in accordance with the six Community requirements set out in section 4 of the Act and their duties in section 3 of the Act.
8. OFCOM consider that the SMP services conditions referred to in paragraph 3 above comply with the requirements of sections 45 to 50 and sections 78 to 92 of the Act, as appropriate and relevant to each such SMP services condition.
9. Copies of this Notification and the accompanying explanatory statement have been sent to the Secretary of State in accordance with section 50(1)(a) and section 81(1) of the Act and to the European Commission in accordance with sections 50(2) and 81(2) of the Act.
10. This Notification shall enter into force on the 1 April 2007.
11. Save for the purposes of paragraph 1 of this Notification and except as otherwise defined in this Notification, words or expressions used shall have the same meaning as in the Act.
12. In this Notification:
 - “**Act**” means the Communications Act 2003;
 - “**H3G**” means Hutchison 3G (UK) Limited (registered company number 3885486) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by section 736 of the Companies Act 1985, as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act);
 - “**O2**” means O2 Limited (registered company number 1743099) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by section 736 of the Companies Act 1985, as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act);
 - “**Orange**” means Orange Personal Communications Services Ltd (registered company number 2178917) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by section 736 of the Companies Act 1985, as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act);
 - “**T-Mobile**” means T Mobile Limited (registered company number 2382161) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by section 736 of the Companies Act 1985, as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act);
 - “**United Kingdom**” has the meaning given to it in the Interpretation Act 1978 (c. 30); and

“Vodafone” means Vodafone Limited (registered company number 1471587) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by section 736 of the Companies Act 1985, as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act);

Neil Buckley

Project Director

A person authorised by OFCOM under paragraph 18 of the Schedule to the Office of Communications Act 2002

27 March 2007

SCHEDULE 1

The SMP services conditions imposed on H3G, O2, Orange, T-Mobile and Vodafone under sections 45, 87 and 88 of the Act as a result of the analysis of the market set out in this Notification, (“SMP conditions”)

Part 1: Application, definitions and interpretation of these conditions

1. The SMP conditions in Part 2 of this Schedule shall, except insofar as it is otherwise stated therein, apply to the markets set out in paragraphs 2 (a) to (e) above of this Notification.

2. In this Schedule:

“2G Public Electronic Communications Network” means a mobile Public Electronic Communications Network which operates using spectrum within the bands 880 to 915 MHz, 925 to 960 MHz, 1710 to 1785 MHz, or 1805 to 1880 MHz;

“2G Call” means a circuit switched conveyance of a speech teleservice only (as defined in the relevant standards of the European Telecommunications Standards Institute) which:

- (i) originates in a Public Electronic Communications Network (whether fixed or mobile);
- (ii) is conveyed via the gateway mobile service switching centre of the Dominant Provider and the 2G Public Electronic Communications Network of another Communications Provider (the “2G Provider”);
- (iii) is terminated using the GSM air interface of the 2G Provider, or by agreement, of another Communications Provider; and
- (iv) terminates on a GSM mobile handset of a Customer of the Dominant Provider.

For the purposes of this definition:

(a) “the relevant standards of the European Telecommunications Standards Institute” means the European Telecommunications Standard (ETS) of ETS 300 905 (GSM 02.03 version 5.3.2), Third Edition, January 1998, which has been produced by the Special Mobile Group of the European Telecommunications Standards Institute; and

(b) “GSM” means the Global System for Mobile communications, as defined in the relevant standards of the European Telecommunications Standards Institute;

“3G Public Electronic Communications Network” means a mobile Public Electronic Communications Network which operates using spectrum within the bands 1900 -1980 MHz or 2110 -2170 MHz;

“3G Call” means a circuit switched conveyance of a speech teleservice only (as defined in the relevant standards of the 3rd Generation Partnership Project) originating in a Public Electronic Communications Network (whether fixed or mobile) and which terminates on a mobile handset which is connected to the 3G Public Electronic Communications Network of the Dominant Provider.

For the purposes of this definition “the relevant standards of the 3rd Generation Partnership Project” means the following standards of the 3rd Generation Partnership Project-

- (a) 3G TS 22.001 V3.2.0 (2000-03) (Technical Specification: Digital cellular telecommunications system (Phase 2+), Technical Specification Group Services and System Aspects, and Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLAN)) (Release 1999);
- (b) 3GPP TS 22.002 V3.6.0 (2001-03) (Technical Specification: Technical Specification Group Services and System Aspects, and Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)) (Release 1999);
- (c) 3G TS 22.003 V3.3.0 (2000-06) (Technical Specification: Technical Specification Group Services and System Aspects, and Circuit Teleservices supported by a Public Land Mobile Network (PLMN)) (Release 1999); and
- (d) 3GPP TS 22.101 V 3.17.0 (2004-03) (Technical Specification: Technical Specification Group Services and System Aspects, Service aspects and Service principles) (Release 1999);

"Access Charge Change Notice" has the meaning given to it in Condition MA5.4;

"Access Contract" means a contract for the provision of Network Access;

"Act" means the Communications Act 2003;

'Base Year' means for each Relevant Year, the period of 12 months ending on 31 March immediately preceding that Relevant Year

"Call" means either a 2G Call or a 3G Call;

"Controlling Percentage" means, in relation to the Second Relevant Year, the amount of change in the Retail Prices Index in the period of 12 months ending on the 31 December immediately before the beginning of that Relevant Year, expressed as a percentage (rounded to one decimal place) of that Retail Prices Index as at the beginning of that period reduced by:

- (a) 15.1% for H3G;
- (b) 3.2% for O2;
- (c) 5.8% for Orange;
- (d) 5.8% for T-Mobile; and
- (e) 3.2% for Vodafone;

and, in relation to the Third and Fourth Relevant Year, the amount of change in the Retail Prices Index in the period of 12 months ending on the 31 December immediately before the beginning of that Relevant Year, expressed as a percentage (rounded to one decimal place) of that Retail Prices Index as at the beginning of that period reduced by:

- (a) 11.8% for H3G;

- (b) 2.5% for O2;
- (c) 5.3% for Orange;
- (d) 5.3% for T-Mobile; and
- (e) 2.5% for Vodafone;

“Charging Period” means any of the current charging periods published by the Dominant Provider;

“Director” means the Director-General of Telecommunications as appointed under section 1 of the Telecommunications Act 1984;

“Dominant Provider” means H3G, O2, Orange, T-Mobile and Vodafone;

“Fixed-to-Mobile Call” means a Call originating in a fixed Public Electronic Communications Network which is terminated on the Dominant Provider’s network and where the Dominant Provider sets the charge;

“Fixed-to-Mobile Interconnection Charge” means the charge for Calls made by the Dominant Provider for the Interconnection of a Fixed-to-Mobile Call, excluding any discounts offered by the Dominant Provider, whether in respect of any particular Customer or any category of Customers or any category of Calls;

“Functional Specification” shall have the same meaning as in Condition 18 of the General Conditions of Entitlement or its equivalent;

“General Conditions of Entitlement” means those general conditions set by the Director by way of publication of a Notification under section 48(1) of the Act on 22 July 2003, or its equivalent;

“H3G” means Hutchison 3G UK Limited whose registered company number is 3885486 and any Hutchison 3G (UK) Limited subsidiary or holding company, or any subsidiary of that holding company, all as defined by section 736 of the Companies Act 1985 as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act);

“Mobile-to-Mobile Call” means a Call originating in a mobile Public Electronic Communications Network of another Communications Provider which is terminated on the Dominant Provider’s network and where the Dominant Provider sets the charge;

“Mobile-to-Mobile Interconnection Charge” means the charge for Calls made by the Dominant Provider for the Interconnection of a Mobile-to-Mobile Call, excluding any discounts offered by the Dominant Provider, whether in respect of any particular Customer or any category of Customers or any category of Calls;

“Network Access” means the provision of Interconnection to the Public Electronic Communications Network provided by the Dominant Provider, together with any services, facilities or arrangements which are necessary for the provision of Electronic Communications Services over that Interconnection;

“O2” means O2 (UK) Limited, whose registered company number is 1743099 and any O2 (UK) Limited subsidiary or holding company, or any subsidiary of that holding company, all

as defined by section 736 of the Companies Act 1985 as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act);

“**Ofcom**” means the Office of Communications;

“**Orange**” means Orange Personal Communications Services Limited, whose registered company number is 2178917 and any Orange Personal Communications Services Limited subsidiary or holding company of the companies listed in (a) to (b) above, or any subsidiary of that holding company, all as defined by section 736 of the Companies Act 1985 as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act);

‘**Relevant Year**’ means any of the following:

(i) the period of 12 months beginning on 1 April 2007 and ending on 31 March 2008 (the “First Relevant Year”);

(ii) the period of 12 months beginning on 1 April 2008 and ending on 31 March 2009 (the “Second Relevant Year”);

(iii) the period of 12 months beginning on 1 April 2009 and ending on 31 March 2010 (the “Third Relevant Year”); and

(iv) the period of 12 months beginning on 1 April 2010 and ending on 31 March 2011 (the “Fourth Relevant Year”);

“**Retail Prices Index**” means the index of retail prices compiled by an agency or a public body on behalf of Her Majesty’s Government or a governmental department from time to time in respect of all items (which is the Office for National Statistics at the time of publication of this Notification);

“**Subscriber Number**” shall have the same meaning as in the Functional Specification;

“**T- Mobile**” means T-Mobile (UK) Limited, whose registered company number is 2382161; and any T-Mobile (UK) Limited subsidiary or holding company, or any subsidiary of that holding company, all as defined by section 736 of the Companies Act 1985 as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act);

“**Third Party**” means a person providing a Public Electronic Communications Network; and,

“**Vodafone**” means Vodafone Limited, whose registered company number is 1471587; and any Vodafone Limited subsidiary or holding company, or any subsidiary of that holding company, all as defined by section 736 of the Companies Act 1985 as amended by the Companies Act 1989 (or any subsequent amendment or replacement Act).

3. For the purpose of interpreting the SMP conditions in Part 2 of this Schedule:

(a) except insofar as the context otherwise requires, words or expressions shall have the meaning ascribed to them in paragraph 2 above and otherwise any word or expression shall have the same meaning as it has in the Act;

(b) the Interpretation Act 1978 shall apply as if each of the SMP conditions were an Act of Parliament; and

(c) headings and titles shall be disregarded.

Part 2: The SMP conditions

Condition MA1 – Requirement to provide network access on reasonable request

MA1.1 Where a Third Party reasonably requests in writing Network Access, the Dominant Provider shall provide that Network Access. The Dominant Provider shall also provide such Network Access as Ofcom may from time to time direct.

MA1.2 Subject to condition MA1.3, the provision of Network Access in accordance with paragraph MA1.1 shall occur as soon as reasonably practicable and shall be provided on fair and reasonable terms and conditions (including charges) and on such terms and conditions (including charges) as Ofcom may from time to time direct.

MA1.3 The charges for Calls as covered by SMP conditions MA3 and MA4 below shall be as set out in those conditions, but only for the duration of those conditions.

MA1.4 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

Condition MA2 – Requirement not to unduly discriminate

MA2.1 The Dominant Provider shall not unduly discriminate against particular persons or against a particular description of persons, in relation to matters connected with Network Access.

Condition MA3 – Control of Fixed-to-Mobile Interconnection Charges

MA3.1 Except in so far as Ofcom may otherwise consent under paragraph MA3.7 below, the Dominant Provider shall take all reasonable steps to secure that, during any Relevant Year, the Average Interconnection Charge does not exceed the Target Average Charge for the provision of Network Access.

MA3.2 In this Condition, the Average Interconnection Charge means the average of the Fixed-to-Mobile Interconnection Charges during the Relevant Year in question, which shall be weighted according to:

- (a) the profile by Charging Period of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls; and
- (b) the corresponding volumes by month or part-month of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls,

in the Base Year.

MA3.3 For the purposes of calculating the Average Interconnection Charge where any Fixed-to-Mobile Interconnection Charges are in force during a part only of the Relevant Year (commencing or ending at a date in the course of the Relevant Year), the weighting shall be derived from:

- a) the profile by Charging Period of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls; and
- (b) the corresponding volumes by month or part-month of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls,

in the corresponding part of the Base Year.

MA3.4 For the purposes of this Condition, the Target Average Charge means:

(a) for the purpose of the First Relevant Year

- (i) 9.1 pence per minute for H3G;
- (ii) 5.7 pence per minute for O2;
- (iii) 6.2 pence per minute for Orange;
- (iv) 6.2 pence per minute for T-Mobile; and
- (v) 5.7 pence per minute for Vodafone;

(b) for the purpose of the Second, Third and Fourth Relevant Years:

the Target Average Charge in the Base Year multiplied by the sum of 100% and the Controlling Percentage for that Relevant Year.

MA3.5 The Dominant Provider shall not make any Fixed-to-Mobile Interconnection Charge for:

(a) a Fixed-to-Mobile Call which terminates on a recorded announcement provided by the Dominant Provider informing the caller of an inability to complete that call so as to establish a two-way path where the mobile handset used by the called party is switched off, or rings and remains unanswered, or where coverage is not available from the Dominant Provider's Public Electronic Communications Network; and

(b) an unanswered Fixed-to-Mobile Call which is diverted in respect of the period before that call is answered.

MA3.6 Notwithstanding (and without prejudice to the generality of) the obligation imposed on the Dominant Provider by SMP condition MA3.1 above:

(a) if the Dominant Provider has failed to secure that the Average Interconnection Charge has not exceeded the Target Average Charge for the First, Second or Third Relevant Year, the Dominant Provider shall make such adjustments to its Fixed-to-Mobile Interconnection Charges and by such day in the following Relevant Year as Ofcom may direct for the purpose of remedying that failure. Such adjustments in the Second, Third or Fourth Relevant Year shall not be relevant for the purpose of establishing compliance with SMP condition MA3.1 above in that Relevant Year; and

(b) if it appears to Ofcom that the Dominant Provider is likely to fail to secure that the Average Interconnection Charge for the Fourth Relevant Year does not exceed the Target Average Charge for that Year, the Dominant Provider shall make such adjustments to its Fixed-to-Mobile Interconnection Charges and by such day in that year as Ofcom may direct for the purpose of avoiding that failure.

MA3.7 Where the Average Interconnection Charge is less than the Target Average Charge for the First, Second or Third Relevant Year, the Dominant Provider shall not make such adjustments to its Fixed-to-Mobile Interconnection Charges in the following Relevant Year to recover the difference between the Average Interconnection Charge and the Target Average Charge for the First, Second or Third Relevant Year, unless Ofcom have given their prior

written consent to such adjustments. Such adjustments in the Second, Third or Fourth Relevant Year shall not be relevant for the purpose of establishing compliance with SMP condition MA3.1 in that Relevant Year.

MA3.8 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

MA3.9 In this Condition:

‘**Average Interconnection Charge**’ has the meaning given to it in SMP condition MA3.2; and

‘**Target Average Charge**’ shall have the meaning given to it in SMP condition MA3.4;

Condition MA4 - Control of Mobile to Mobile Interconnection Charges

MA4.1 Except in so far as Ofcom may otherwise consent under SMP condition MA4.7 below, the Dominant Provider shall take all reasonable steps to secure that, during any Relevant Year, the Average Interconnection Charge does not exceed the Target Average Charge for the provision of Network Access.

MA4.2 In this Condition, the Average Interconnection Charge means the average of the Mobile-to-Mobile Interconnection Charges during the Relevant Year in question, which shall be weighted according to:

(a) the profile by Charging Period of the Dominant Provider’s sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls; and

(b) the corresponding volumes by month or part-month of the Dominant Provider’s sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls,

in the Base Year.

MA4.3 For the purposes of calculating the Average Interconnection Charge where any Mobile-to-Mobile Interconnection Charges are in force during a part only of the Relevant Year (commencing or ending at a date in the course of the Relevant Year), the weighting shall be derived from:

(a) the profile by Charging Period of the Dominant Provider’s sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls; and

(b) the corresponding volumes by month or part-month of the Dominant Provider’s sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls,

in the corresponding part of the Base Year.

MA4.4 For the purposes of this Condition, the Target Average Charge means:

(a) for the purpose of the First Relevant Year

(i) 9.1 pence per minute for H3G;

(ii) 5.7 pence per minute for O2;

- (iii) 6.2 pence per minute for Orange;
- (iv) 6.2 pence per minute for T-Mobile; and
- (v) 5.7 pence per minute for Vodafone;

(b) for the purpose of the Second, Third and Fourth Relevant Years:

the Target Average Charge in the Base Year multiplied by the sum of 100% and the Controlling Percentage for that Relevant Year.

MA4.5 The Dominant Provider shall not make any Mobile-to-Mobile Interconnection Charge for:

(a) a Mobile-to-Mobile Call which terminates on a recorded announcement provided by the Dominant Provider informing the caller of an inability to complete that call so as to establish a two-way path where the mobile handset used by the called party is switched off, or rings and remains unanswered, or where coverage is not available from the Dominant Provider's Public Electronic Communications Network; and

(b) an unanswered Mobile-to-Mobile Call which is diverted in respect of the period before that call is answered.

MA4.6 Notwithstanding (and without prejudice to the generality of) the obligation imposed on the Dominant Provider by SMP condition MA4.1 above:

(a) if the Dominant Provider has failed to secure that the Average Interconnection Charge has not exceeded the Target Average Charge for the First, Second or Third Relevant Year, the Dominant Provider shall make such adjustments to its Mobile-to-Mobile Interconnection Charges and by such day in the following Relevant Year as Ofcom may direct for the purpose of remedying that failure. Such adjustments in the Second, Third or Fourth Relevant Year shall not be relevant for the purpose of establishing compliance with SMP condition MA4.1 above in that Relevant Year; and

(b) if it appears to Ofcom that the Dominant Provider is likely to fail to secure that the Average Interconnection Charge for the Fourth Relevant Year does not exceed the Target Average Charge for that Year, the Dominant Provider shall make such adjustments to its Mobile-to-Mobile Interconnection Charges and by such day in that Year as Ofcom may direct for the purpose of avoiding that failure.

MA4.7 Where the Average Interconnection Charge is less than the Target Average Charge for the First, Second or Third Relevant Year, the Dominant Provider shall not make such adjustments to its Mobile-to-Mobile Interconnection Charges in the following Relevant Year to recover the difference between the Average Interconnection Charge and the Target Average Charge for the First, Second or Third Relevant Year, unless Ofcom have given their prior written consent to such adjustments. Such adjustments in the Second, Third or Fourth Relevant Year shall not be relevant for the purpose of establishing compliance with SMP condition MA4.1 in that Relevant Year.

MA4.8 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

MA4.9 In this Condition:

'Average Interconnection Charge' has the meaning given to it in SMP condition MA4.2; and

'Target Average Charge' shall have the meaning given to it in SMP condition MA4.4.

Condition MA5 – Requirement to publish charges

MA5.1 Except in so far as Ofcom may otherwise consent in writing, the Dominant Provider shall publish its charges for the provision of Network Access and act in the manner set out below.

MA5.2 The Dominant Provider shall publish its charges for terminating a Call, separately from any of its other termination charges.

MA5.3 The Dominant Provider shall, within 28 days of the date that this Condition comes into force, publish its charges on which it provides Network Access.

MA5.4 The Dominant Provider shall publish any amendment to the charges on which it provides Network Access or in relation to any charges for new Network Access (an "Access Charge Change Notice") not less than 28 days before any such amendment or new charge comes into effect.

MA5.5 Publication of the information in conditions MA5.3 and MA5.4 shall be effected by:

- (a) sending a copy of such information or any appropriate parts of it to any person who may reasonably request such a copy; and
- (b) placing a copy of such information on any relevant website operated or controlled by the Dominant Provider.

MA5.6 The Dominant Provider shall ensure that an Access Charge Change Notice includes:

- a. a description of, and the proposed new charge for the Network Access in question;
- b. where applicable, the current charge for the Network Access in question; and
- c. the date on which or the period for which any amendments to charges will take effect (the "effective date").

MA5.7 The Dominant Provider shall not apply any new charge identified in an Access Charge Change Notice before the effective date.