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Appendix B2 - Ofcom's cost benefit analysis of rebalancing

This note analyses Ofcom's cost benefit analysis of the rebalancing of the tariffs for MPF, SMPF and WLR that is presented in Annex 5 of the second consultation on 'A new Pricing Framework for Openreach.'

OVERVIEW

Ofcom has forecast BT's costs for the provision of CRS products on the basis of BT's model which is based on BT's CCA FAC accounts. Ofcom has concluded that for these CRS products whilst BT is making returns in excess of its cost of capital at present, over the next four years the overall return that BT will make from these services will decrease below its cost of capital, unless the prices of the services increase.

In addition Ofcom has used BT's model to analyse the relative prices of the CRS products MPR, SMPF and WLR and has decided to *"place significant weight on CCA FAC in determining the appropriate charges for the Core Rental Services."*[1] On the basis of this analysis Ofcom concludes that there is an imbalance in prices because the present price for MPF rental is less closely aligned with the underlying costs of providing the service than WLR and SMPF. Ofcom has therefore decided that the relative prices of the CRS products should change to align them with the CCA FAC numbers.

Ofcom has undertaken an impact assessment which considers the costs and benefits of rebalancing the MPF, SMPF and WLR prices. The assessment is based on:

- The evidence for an imbalance and the appropriate cost benchmark for evaluating the relative prices of the CRS products;
- The static and dynamic efficiency considerations which might suggest that rebalancing of prices is appropriate.

Ofcom concluded that there is an imbalance and that static and dynamic efficiency considerations point to the need to rebalance. In this appendix we consider each of the key elements in Ofcom's assessment. The path of prices by which rebalancing is achieved is not considered here but is covered in a separate section.

EVIDENCE OF AN IMBALANCE

Ofcom has based the need to rebalance the prices of the CRS products on the premise that there is an imbalance that needs addressing. However, the available

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1 A New Pricing Framework for Openreach – second consultation ("the second condoc"), paragraph 6.2

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evidence suggests that there is no imbalance and indeed, if there is an imbalance, it may be not in the direction that Ofcom has estimated.

Contribution to fixed and common[2] cost recovery by each CRS product is unknown

Ofcom has analysed the relative prices of the products using a BT/Openreach CCA FAC model which projects the future costs of the CRS products using the regulatory accounts, with associated cost allocation rules defined by BT, as an input.[3] Based on this analysis Ofcom states that MPF makes a lower contribution to the recovery of common costs than WLR and this provides the rationale for adjusting the relative prices of these products.[4] However, the evaluation of the contribution to the recovery of common costs of the CRS products requires reliable estimates of the corresponding LRIC of the different products. As stated above, under BT's CCA FAC model there is no explicit estimate of the LRIC of different products, or the attribution of common costs. Therefore it is not clear how Ofcom can come to any view about the contribution to common costs of the CRS products, in the absence of an estimate of relevant LRIC.

Whilst it is possible, from the point of view of audited CCA FAC accounts, for an attribution to be judged to be reasonable, the same attribution of costs may be totally inappropriate in a forward-looking LRIC analysis.[5] Therefore, the use of BT's CCA FAC costs as the basis for setting the relative prices of the CRS products if fundamentally flawed, absent an explicit assessment of the corresponding LRIC figures. It seems *not possible* to make any statement about the degree of imbalance of the existing relative charges, in comparison to relative efficient changes, without an explicit consideration of the relative incremental costs of the different services.

MPF appears to make a higher proportional contribution to the recovery of common costs

Furthermore, the only available such evidence indicates that if anything, based on current prices, the current imbalance is in the opposite direction from the one suggested by Ofcom. As shown in Table 1 below, the only data available of the underlying LRIC cost (BT's unaudited estimates) shows that based on *present* prices, MPF actually makes a slightly higher proportionate contribution to the recovery of common costs than WLR residential in combination with SMPF.

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2 Reference to common costs in this note should be taken to correspond to fixed and common costs, unless otherwise stated.

3 Ofcom makes a number of adjustments as details in Annex 10 to the second condoc

4 Paragraphs 4.10 and A11.1

5 For example, BT's own calculations of FAC and their unaudited LRIC estimates for MPF connections and rentals show that the extent to which FAC costs exceed LRIC costs varies very significantly by the service provided. For MPF connection BT's 2007/08 FAC estimate of 53.18 is only 7% above the LRIC estimate of 49.79 whereas for MPF rental the FAC estimate of 105.86 is 63% higher than the LRIC estimate of 64.85

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£ per annum per line	MPF	WLR residential + SMPF
Current Charge	81.69	116.28
BT 2007/08 LRIC estimate	64.85	93.48
Implied contribution	16.84	22.80
As a percentage of LRIC	26.0%	24.4%

Table 1: LRIC estimates of MPF, WLR residential and SMPF in 2007/08

Source: Ofcom second condoc Figure A5.2 updated using LRIC estimates from BT current cost accounts

There are good reasons for considering that the appropriate contribution to common costs is a proportional contribution to the recovery of fixed and common costs (equi-proportional mark up, or EPMU).

- It is likely that many of the costs that are identified as common are not truly fixed and common in the sense that they are entirely invariant with the scale of the business. Rather for many of the costs, due to the high complexity of BT's varied multiproduct business, it has not been possible to identify cost drivers.[6] However, if the volume of BT's business was to increase, then a share of these costs would be likely to increase. To the extent that at least some of these costs vary with the overall volume of the business, if these costs were allocated in a way similar to the other variable costs, BT's estimate of the LRIC of the individual products would be expected to increase, in proportion to current LRIC estimates. This implies that SMPF+WLR should have a greater allocation of these (supposedly) common costs than MPF. An EPMU recovery would be representative of such an allocation.

- For truly fixed and common costs, when considering the recovery of common costs shared between different products, the static efficiency objective is achieved if the ratio of prices faced by the buyers of the products reflects the ratio of opportunity costs (typically estimated in practice by incremental costs), adjusted if appropriate to reflect demand characteristics – Ramsey pricing. Under Ramsey pricing a relatively higher proportion of common costs are recovered from services with relatively inelastic demand and less from those with relatively elastic demand. [7] However, if the elasticities of demand for the different products are equal, then applying Ramsey pricing would lead to EPMU. Therefore, in this case, applying an EPMU is an efficient outcome.

Furthermore, Ofcom states that there is little to choose between this CCA FAC costing methodology and LRIC+EPMU *"as both involve accounting rules for recovering*

6 For example, this may include certain corporate overhead costs.

7 Technically super-elasticities need to be considered that take into account both the own-price elasticity of the products as well as any cross-price effects (i.e. the interdependence of the demands for different products)

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common costs from different products without regard to the implications for efficiency."[8] At paragraph A5.32 Ofcom further states that "*LRIC+EPMU is not conceptually superior to FAC as a cost basis for setting charges*". We note however that elsewhere Ofcom has explicitly backed the use of LRIC and EPMU, as the following statements show:

> *Ofcom's view is that the most appropriate and economically efficient basis for regulatory charge controls is forward-looking LRIC.*
>
> *Ofcom considers that EPMU, as a basis on which to recover common costs, strikes a reasonable balance between practicality and efficiency*[9]

Unlike LRIC+EPMU, there is no conceptual basis for the common cost allocation implied from using CCA FAC – as common costs are not identified the allocation is simply unknown (CCA FAC is simply based on a set of assumptions proposed by BT which are reviewed by Ofcom). Where charges are therefore set for a set of products that share common costs, then the use of FAC on its own appears unable to support the derivation of *efficient relative prices*.

We further note in this respect, that there are good reasons to expect that the ratio of incremental costs of WLR to MPF will increase further in the future.

BT's 2007/08 LRIC estimates are the most appropriate

Ofcom has suggested that one reason for not using BT's LRIC estimates is their variance between years. However, as Table 2 below shows BT's FAC estimates have also varied significantly in that time and Ofcom has used these as inputs to the 2012/13 model.

Moreover it is reasonable to assume that the 2007/08 estimates are the most reliable. As the volumes of the MPF, SMPF and WLR products have increased this would suggest that there would be greater certainty about the allocations that are used to arrive at the cost estimates for these products.[10] BT's estimates of the difference between the LRIC costs and FAC costs of MPF and SMPF+WLR has increased over time (from a point where the difference was, implausibly, negative). As the analysis in the next section shows, we expect there to be a further increase in the relative difference in costs between MPF and SMPF+WLR in the future. Furthermore, we note that the LRIC estimates for MPF appear to be declining (which may reflect some scale economies) whilst those for WLR+SMPF have not varied significantly.

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8 Second condoc paragraph A5.30

9 Wholesale Mobile Voice Call Termination statement, June 2004, paragraphs 6.16 and C.1.

10 MPF rental revenues increased from £6m in 2005/06 to £70m in 2007/08, whilst SMPF rental (external) revenues increased from £1m to £36m and WLR residential (external) revenues from £74m to £217m

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	2005/06	2006/07	2007/08
LRIC			
MPF	157.99	72.96	64.85
SMPF+ WLR external (residential)	95.11	92.23	93.48
Difference	*-62.88*	*19.27*	*28.63*
FAC			
MPF	221.86	127.82	105.86
SMPF+ WLR external (residential)	155.49	153.48	134.81
Difference	*-66.37*	*25.66*	*28.95*

Table 2: Comparison of BT FAC and LRIC costs

Source: BT current cost accounts, £

Forward looking incremental costs

Ofcom states that the prices set for the CRS products should send efficient price signals to the CPs about which input is the most appropriate to use. In this regard it is worth considering further Ofcom's position that prices should be set on the basis of its adjustments to BT's CCA FAC cost projections.

It is important to consider how the provision of voice and broadband services will change as BT migrates from the existing PSTN- and DSLAM-based voice and broadband networks to the NGN platform which will allow the combined delivery of voice and broadband services.

Technology considerations

Before considering the NGN network configuration it is useful to consider the current network configuration. As Figure 1 below shows, at present BT provides voice and broadband services using separate PSTN and DSLAM equipment.[11] Therefore, there are distinct access network costs for the provision of WLR and bitstream services. This means that using BT's infrastructure to provide voice and broadband to a subscriber has significantly different cost implications than providing voice alone (due to the incremental costs including the splitter, the DSL line card and the DSLAM).

11 BT does use some MSANs at present but retains the PSTN equipment and effectively uses the MSANs in the same way as the DSLAMs.

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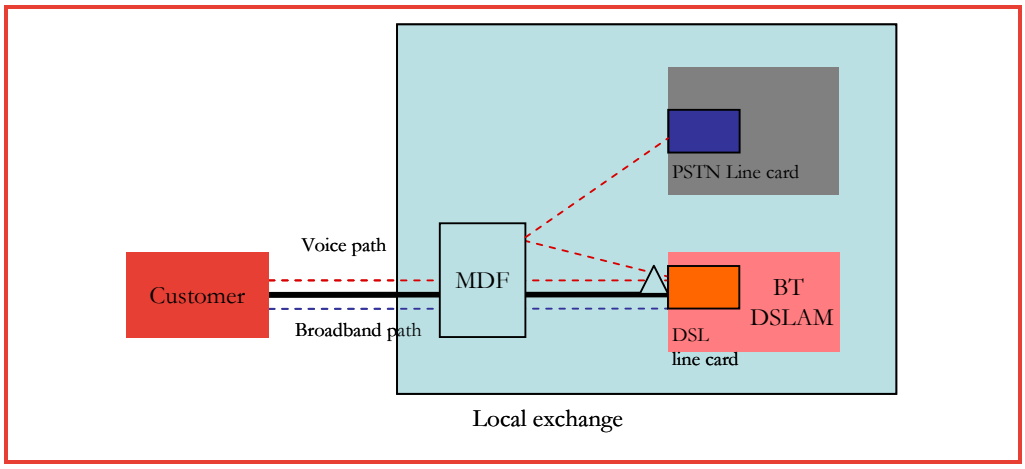

Figure 1: Provision of voice and broadband using BT infrastructure (illustrative)

As BT migrates customers from the existing PSTN network to the NGN network, MSANs will be used to provide voice services (in place of PSTN concentrators) in addition to broadband services (in place of DSLAMs). This is represented in Figure 2 below. Voice services will be provided by "combi-cards" which provide both a narrowband analogue voice telephony interface and a broadband DSL interface.

Using MSANs implies that the same access network equipment is used to provide both voice and broadband, as it is to provide voice only (or broadband only). This implies that, using NGN technology, there will be significant changes from present in BT's relative costs of providing WLR alone to a CP, and in its costs of providing WLR and a bitstream product: if Openreach provides WLR only, it is expected to incur approximately the same incremental cost in the access network to providing both WLR and a bitstream product to the CP.

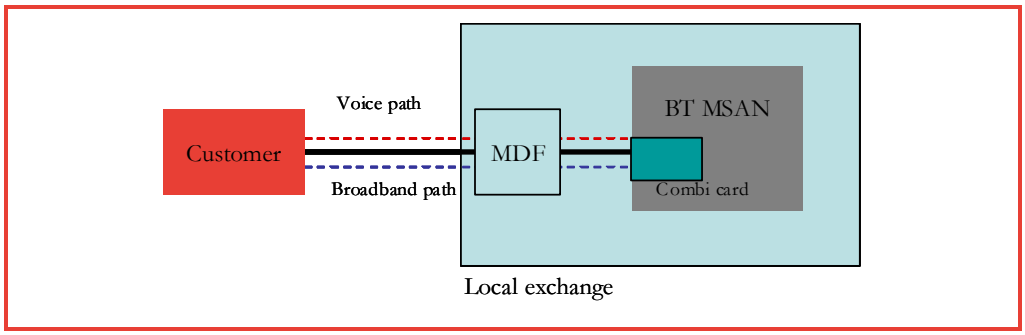

Figure 2: Provision of voice and broadband using a BT MSAN (illustrative)

This change in the incremental costs needs to be reflected in the wholesale prices, otherwise there will be inefficient price signals to CPs. The entire incremental cost should be recovered from WLR when CPs purchase WLR

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only[12], (or from BTR when it internally provides a WLR equivalent to serve a voice only customer), as this reflects the incremental costs to BT of providing the service. Because costs scale with number of customers, the MSAN and combi card costs should be allocated on a per line basis (irrespective of whether the end user is voice only or voice and broadband), rather than a per service basis. A per line allocation was applied by Openreach in Ofcom's first consultation document. However, now BT and Ofcom are proposing that these costs should be allocated on a per-service basis. This means that a voice-only customer would get allocated half the cost of a voice and broadband customer,[13] even though the incremental access network costs for the two customers would be approximately the same.[14]

The forward-looking cost differences

Ofcom recognises the importance of considering the differences in the costs that BT incurs to provide wholesale inputs to CPs. However, in this period of significant technological evolution, BT/Ofcom's methodology for projecting forward the current CCA FAC cost basis appears to give estimates which depart significantly from FL-LRIC+EPMU. In particular we note that:

- MSAN line card costs should be allocated on a per-line basis, not a per-service basis.
- With NGNs MPF will be an input into WLR implying convergence in the underlying processes and infrastructure used to provide the two products.[15]
- The FAC estimates do not take full account of the costs associated with the migration of customers from the legacy PSTN network to the NGN network.

In this regard, we provide below illustrative calculations provided by TalkTalk of the differential in BT's cost of providing MPF to CPs ("MPF external") and WLR-only (i.e. when not provided in combination with bitstream), by estimating those cost elements which differ between MPF external and WLR when BT is using MSANs. Those elements include:

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12 And when neither BT nor another CP is providing the customer with broadband using BT's infrastructure.

13 Using BT infrastructure.

14 Ofcom has justified this at A10.78 "*In the First Consultation we concluded that the method Openreach proposed to use for the allocation of line card costs appeared to increase line card costs reflected in the WLR charge. Consumers of WLR would therefore be required to pay more for a similar service due to a change in the means of delivering that service.*" However, allocation of costs in this way does not imply that WLR customers would have to pay more for supplying voice services when BT implements the NGN. The apparent increase in costs referred to by Ofcom neglects two important effects: (1) the cost of the PSTN line cards is artificially low because they are reaching the end of their economic life and are nearly fully depreciated - under straight-line depreciation this leads to low capital charges; (2) much of the cost savings under NGN are in the core network and this is not considered by Ofcom.

15 Therefore many of the current differences in MPF and WLR costs would not be expected to remain under NGN.

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- Those elements of the MSAN incremental to the provision of voice services based on BT's estimate of line card costs in 2011/12 in the first consultation document;
- The future cost of transferring customers from BT's PSTN network to BT's MSAN;
- The cost of cabling between the MDF and the MSAN;
- Provision of directories;
- Backhaul; and
- Service, sales and systems to reflect that WLR is a more complex service than MPF.

In addition, an adjustment is required to take into account the lower line length of MPF external lines compared to BT's average line length, and the lower incremental costs per line this implies.

The identified cost differentials are set out in Table 3: Differential cost between WLR and MPF (under NGN) below.

Cost category	*Estimate additional cost for WLR residential (£ per year 2012/13)*
Line card costs	16.56*
Transfer to MSAN	5.70
Tie cables	1.97
Directories	1.83
Backhaul	5.00
Service, sales, systems	4.00
Intrinsic cost differential between MPF and WLR	**35.06**
Line length adjustment	3.25
Total identified differential	**38.31**

Table 3: Differential cost between WLR and MPF (under NGN)

Source: TalkTalk calculations, based on information provided by Ofcom and BT

** This figure is based on BT CCA FAC numbers which include PSTN and NGN line card costs and is likely to underestimate the line card costs attributable to an NGN line.*

The identified differential of £38.31 compares to a projected average differential of £10.38 in Ofcom's low and high cases.

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OFCOM'S JUSTIFICATION FOR REBALANCING

As indicated above, the available evidence suggests the absence of a current imbalance. If anything, any imbalance could require the reverse rebalancing from the one proposed by Ofcom - increasing rather than decreasing of the difference between MPF and WLR charges. We do consider next however the case presented by Ofcom on the merits of rebalancing to reduce the differential between MPF and WLR.

Ofcom considers static and dynamic efficiency considerations that may influence the decision about whether it is appropriate to rebalance the charges for MPF, SMPF and WLR. Ofcom quantifies only one potential efficiency effect – the potential (static) competitive distortion arising from CPs' choice of wholesale products. The other dimensions have not been quantified. Ofcom has concluded from its analysis that the static competitive distortion is the most important factor and therefore that rebalancing is preferable to no rebalancing.

Below we firstly consider the static efficiency considerations about the appropriate level of MPF charges and then consider the dynamic efficiency factors.

Static efficiency

The main static efficiency issues that Ofcom takes into account are:

- Potential distortion to CPs' choice of wholesale products – by which Ofcom appears to mean sending the right price signals to CPs so that there is an alignment between the choices they make between using different inputs (MPF versus WLR+SMPF) and productively efficient outcomes. This implies that the choices CPs make should lead to the lowest costs to provide equivalent services to consumers on a forward-looking basis.[16]
- Demand considerations – whether taking account of demand factors would imply that prices should not be rebalanced.

We consider these factors in detail below.

Potential distortion to CPs' choice of wholesale products

Ofcom states at A5.36 that the primary static efficiency consideration is the potential competitive distortion to CP's choice of wholesale products. Ofcom considers that there is a competitive distortion where CPs choose to use MPF as an input to providing retail voice and broadband services rather than SMPF +WLR, because the prices for the services do not reflect their CCA FAC costs (which it believes is representative of incremental costs plus an appropriate contribution for common costs). In particular, Ofcom states that:

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16 As the costs are considered on a forward-looking basis, this factor can also be considered to be a dynamic efficiency effect (either a SMPF-based CP chooses to buy more DSL line cards or become a MPF-based operator which would require investment in MSANs, combi cards, etc).

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> *For an efficient outcome for society, CPs should be choosing between MPF and WLR+SMPF-based on an assessment of the incremental costs of MPF plus their own additional costs compared to the incremental costs of using WLR+SMPF. This would be achieved if the difference in charges were comparable to the differences in incremental cost for Openreach.*[17]

In other words, Ofcom seems to be suggesting that imbalanced prices would result in productive inefficiencies due to inefficient investment choices.

Ofcom considers that an "extreme upper bound" of the static welfare loss from distortions to wholesale product choice can be calculated by considering the difference in the absolute contribution to common costs from MPF and WLR+SMPF per line and multiplying this by the estimated total number of MPF lines used by CPs in 2012/13. The calculation is as follows:

- Using the data shown in Table 1 above Ofcom states that there is around £6 difference in the present absolute contribution per line to common costs of SMPF+WLR compared to MPF;[18]
- Based on Ofcom's estimation the volume of MPF lines used by CPs other than BT may rise to 4m by 2012/13;
- Ofcom therefore consider that the upper estimate of the distortion is equal to £24m per annum (£6 for each of the 4m external MPF lines).

Ofcom recognises at A5.68 that *"such upper limits are likely to very significantly overstate the potential scale of this static welfare loss."*

It is correct that if there is any distortion to wholesale product choice, it is likely to be many times lower than shown by Ofcom's calculation. In particular, Ofcom has not considered how many lines would be provided using MPF rather than SMPF+WLR specifically due to the current differential in prices being maintained.

There are a number of reasons for which the results of Ofcom's analysis are flawed:

- as discussed above, the calculated LRIC costs do not reflect the true forward looking incremental costs associated with CPs' decision to use MPF rather than SMPF+WLR.
- as considered in Annexe 1 below, the extent to which there will be inefficient usage of MPF in 2012/13 is not clear. If MPF is the efficient technology when BT is using MSANs in the local exchanges (as it is expected to do for around 48% of lines by 2012/13[19]) then there may be no inefficiency. In fact, as described above, there may presently be an

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17 Second condoc paragraph A5.63.

18 22.80 minus 16.84 is approximately £6.

19 According to Ofcom's projections BT will have 9.9m WLR internal lines compared to 9.0m MPF internal lines. We assume that this means BT is expected to roll MSANs out to exchanges that account for around 48% of lines.

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inefficiently high level of SMPF usage because the current costs do not take into account the future cost implications of the choice of inputs. Therefore the impact of the distortion to wholesale product choice may act in the opposite direction from that considered by Ofcom.

- it is not clear where the present inefficiencies Ofcom is calculating would come from. Ofcom states at A5.68 that *"Providing voice and broadband services using MSANs and MPF involves less jumpering and less duplication of equipment in exchanges compared to SMPF and WLR."* Therefore, Ofcom appears to accept that at present there are additional cost implications of a customer being connected using SMPF+WLR than using MPF. If this is the case then based on current costs alone, it may be desirable for Ofcom to promote the use of MPF.

In addition to the above reasons, Ofcom's calculation uses the total number of external MPF lines (those used by CPs) as a proxy for the maximum number of CP lines that would be inefficiently using MPF rather than SMPF+WLR. However, it is likely that the number of customers that would be served by CPs using MPF lines rather than SMPF lines *specifically because* the current price differential is maintained would be very much lower.

There are historical reasons why certain operators decide to use technology based on SMPF inputs rather than MPF: the development of MSAN technology to provide both voice and broadband has occurred during the last few years, and providers that made broadband investment decision previous to that used DSLAMs. Because MSANs are the modern efficient technology, it is likely that any new entrant operators would use MPF rather than SMPF+WLR irrespective of the changes in the relative prices proposed. However, for existing SMPF-based operators migration of technology is a significant cost, given that much of the cost of the legacy DSLAM equipment has been sunk.

In many cases it will be clear for particular operators whether using MPF is more appropriate than using SMPF+WLR – for example, because an operator has decided that MSANs represent the efficient technology choice and that legacy DSLAMs should be upgraded. Therefore relatively small changes in the differential between the prices of SMPF, WLR and MPF[20] may not change the operators' decisions over which type of input to use because the strategic decision for a CP to use MPF rather than SMPF + WLR is only partly related to the price of these inputs. Ofcom recognises this when it states that the historical evidence suggests that the cross-price responsiveness of the demand for MPF and SMPF and WLR is low.[21]

For example, for a provider such as Sky, broadband and voice are provided as part of a bundle of services and there are strategic decisions about whether it should move to MPF-based technology including the suite of services that it may

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20 Under the difference between Ofcom's "No rebalancing" option and the "full rebalancing over 4 years" option the difference in MPF charges is £3 per annum in 2009/10, £4 in 2010/11, and £5 in 2011/12.

21 Second condoc paragraph A5.68

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be able to offer. Sky also makes clear in section 5 of its submission to the first consultation there are many operational and business planning issues that affect such a decision to migrate customers from SMPF-based services to MPF-based services. These factors are independent of the prices of wholesale inputs.

There are presently around 1.5m MPF lines,[22] the majority of which are TalkTalk lines. At the very least these lines should be excluded from Ofcom's calculation. There is no evidence that these lines should be considered to be inefficiently using MPF as an input product (rather than SMPF +WLR). Furthermore, for TalkTalk which has invested in an MSAN platform it is unreasonable to consider that future customer additions would inefficiently be added using MPF.

For these reasons we consider that Ofcom is correct when it suggests that its estimate of productive inefficiency of £24m per annum is a vast overestimate – indeed the appropriate value for this inefficiency may be zero. If we assume that a 1/3rd of all switching in exchanges that BT has not migrated to MSANs by 2012/13 may be inefficient, based on the price differential between MPF and SMPF +WLR, then this would suggest that the actual number of inefficient lines would be around 440,000. This is likely to be an over-estimate, as it ignores the other factors provided earlier and the fact that BT is likely to roll out MSANs to many of the other exchanges after 2012/13, so SMPF providers switching to MPF in those exchanges may be efficient anyway. Based on 440,000 lines and Ofcom's assumption that there is a £6 difference in the absolute contribution per line would imply a potential distortion of approximately £2.6m. However, as described below, £6 may well not be an inappropriate figure – we provide below a calculation of prices that could be expected to result in increased consumer welfare, with no impact on productive efficiency – in other words no competitive distortion and, therefore, no productive inefficiency.

Ramsey-based Pricing

Ofcom appears to accept that in static efficiency terms Ramsey-based prices are desirable.[23] Ofcom takes issue with a number of the assumptions that Frontier has made to arrive at illustrative Ramsey prices including the way the own-price elasticities were estimated, the range of empirical results and the fact that several of the studies were not from the UK.[24] Nonetheless, at paragraph 5.47 Ofcom accepts that *"currently demand for MPF is driven more by broadband than voice and that demand for broadband is likely to be more sensitive than voice."* All things equal, this would imply that less common cost should be recovered from MPF than WLR in order to maximise efficiency. Ofcom accepts this when it states that *"this might*

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22 Second condoc paragraph A5.68

23 Similarly in the leased lines consultation Ofcom appear to accept the superior welfare effect of Ramsey Pricing. At paragraph 3.93 Ofcom states that *"A Ramsey Pricing rule, which allocates common costs between services, by marking-up incremental costs of each service based on demand sensitivity (i.e. demand-elasticity) could potentially result in higher welfare for consumers."*

24 Frontier now has results from a recent UK academic paper that calculates elasticities for narrowband and broadband products. The elasticities derived there support the elasticities assumptions used in Frontier's October 2008 Ramsey note. Details are provided in Annexe 1 below.

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suggest it would be more efficient to set a slightly lower mark up on marginal costs for MPF than for WLR."

However, Ofcom indicates at A5.47 that it does not believe that significant weight should be attached on Frontier's illustrative Ramsey price estimates. But Ofcom has not attempted to make any calculation of the effect of Ramsey allocation of common cost on the static efficient prices for the CRS products, nor has Ofcom examined whether alternatives to the simplifying assumptions made by Frontier would be likely to imply the need for greater or less rebalancing.

Ofcom justifies this in part when it states at A5.46 that *"the cross-price elasticities between these different wholesale products may be significant."* However, it provides no evidence to substantiate this. As discussed above we consider that there are many factors that will influence a CP's choice of wholesale input and price is only one of these.[25] This suggests that the cross-price responsiveness could in practice be relatively low. We note that at A5.68 Ofcom recognises that the historical evidence suggests that this is the case.

A simple analysis using Frontier's illustrative Ramsey framework as described in the Frontier October 2008 note shows that the magnitude of the Ramsey considerations on economic efficiency could in practice be significant.[26]

Ramsey pricing implies that because the demand for narrowband services is significantly more inelastic than the demand for broadband, more common costs should be recovered from WLR, which is used to provide narrowband services only, than from MPF which is used to provide both narrowband and broadband services. This is because the demand for narrowband will be affected to a lesser extent than the demand for narrowband and broadband by changes in price of the services. Ofcom states that in the longer term demand for MPF is likely to be driven by demand for voice-only services as well as broadband. By this Ofcom appears to imply that the elasticity for MPF-based services may fall. Based on the analysis of the NGN network architecture above, this could be the case. However, it is still the case that MPF-based lines are likely to be used to provide both voice and broadband, with WLR based lines providing mainly voice, therefore some form of Ramsey-based pricing would be expected to still be relevant.

Table 4 below shows the prices for the wholesale inputs that are implied by Frontier's Ramsey illustration using the latest cost and volume data provided by Ofcom in the second consultation document, under two scenarios about what would happen to WLR+SMPF prices. We provide further details of the scenarios, assumptions and results of the Ramsey analysis in Annexe 2 below.

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25 There are other reasons to expect that operators would not switch choice of technology (and input) such as the cost of migrating customers.

26 We provide the details of the key assumptions and results in Annexe 2 below.

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	CCA FAC	Ramsey scenario 1	Ramsey scenario 2
WLR	114	134	126 - 146
MPF	104	86	91 - 99
SMPF	17	17	
WLR + SMPF			118 - 126

Table 4: Wholesale prices implied by CCA FAC and by Ramsey in 2012/13, £

Source: Ofcom second condoc pages 236-239 and Frontier analysis

Using Frontier's demand elasticity estimates, and under the assumption of linear demand curves and ignoring cross-price effects these volume changes imply a fall in the consumer surplus for narrowband voice and an increase in the consumer surplus of bundled broadband and voice with a net effect of approximately £97m in 2012/13 in scenario 1 (which assumes that the relative WLR price increase is not passed on by WLR+SMPF based providers to consumers), and between approximately £3m and £5m in scenario 2 (where the relative price increase is passed on). Note that under the methodology used to estimate the impact of Ramsey based prices in Scenario 2, there is a zero competitive distortion effect, hence the estimate provided is the net impact on consumer welfare.

Dynamic efficiency

Ofcom concludes at A5.99 that "*it is unclear whether the additional dynamic benefits which might result from further encouragement of MPF use would outweigh the possible increasing static losses.*" However, Ofcom has not quantified any of the dynamic efficiency benefits. Below we consider Ofcom's analysis of the dynamic efficiency considerations:

- Gains from increased and more effective competition in voice
- Gains from continued/increased competition in broadband; and,
- Openreach's investment incentives.

Gains from increased and more effective competition in voice

Ofcom notes that CPs have provided examples of the benefits of competition in broadband including: innovation in bundling, pricing and service; timely and efficient investment; and, greater pressure on costs from increased competition in the value chain. At A5.81 Ofcom states that it does not believe it is possible to quantify these efficiency gains but it considers that *"these gains are likely to be considerable."* Given the success of competition in broadband, it would appear likely that competition in voice could also provide significant benefits. Indeed,

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Ofcom notes that *"If voice competition based on MPF were to become sustainable, it may offer scope for competition to lead to pressure on costs and innovation in services."*[27]

Given these very significant potential benefits it is unclear why Ofcom has not attempted to understand these, quantify them and identify what this implies for the relative levels of MPF, SMPF and WLR charges. This appears to be an important omission in the impact assessment.

As TalkTalk notes in its submission to the first consultation, there has already been innovation in bundling voice with broadband when TalkTalk launched its free broadband offer. In addition TalkTalk includes voicemail for free for all customers. TalkTalk also offers a range of voice features using an innovative price plan where subscribers can either pay on a per-use basis or choose the specific features they want for a monthly charge (which is lower than BT's comparable monthly charges). Furthermore, TalkTalk has a product roadmap that includes call features that are not available to a WLR-based operator and can only be provided because TalkTalk has its own voice platform.[28] Therefore, going forward, there is significant potential for further innovation in voice features.

In addition TalkTalk is able to benefit from cost efficiencies from having its own MSANs because the core of its network uses only IP for voice and broadband, and avoids having separate circuits for voice.

Ofcom notes that if BT Wholesale is developing a Wholesale Voice Connect ("WVC") product that will provide more flexibility in the design and features of voice services. However, even though this may give CPs some more ability to offer some differences in voice services then, if there is no significant competitive pressure on BT from MPF-based providers and pressure between different MPF-based providers, then this would not create similar incentives for BT to innovate in services or reduce costs as appears to have been the case for broadband products.

The potential effects of competition in voice are significant. Ofcom projects that there will be 23.9 million fixed lines by the end of 2012/13. Based upon the analysis summarised in Table 3 above, the intrinsic cost differential between WLR and MPF is around £35. If this were applied to all BT fixed lines this implies that the annualised cost of providing wholesale voice access services on BT lines in 2012/13 will be around £840m (for the access costs of providing voice only). If the pressure from competition led to a decrease in the incremental cost of providing WLR equivalent services of only 5%, which led to an equivalent decrease of price of voice lines, this would be equivalent to an increase in consumer surplus of around £42m per annum.

Gains from continued/increased competition in broadband

MPF-based competition is necessary for there to be significant infrastructure-based competition on both voice and broadband products. However, investment

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27 Second condoc A5.91

28 These include Queue Buster a service which allows customers not to have to wait in call centre queues and Busy Buster a ring back service that include calls to mobile phones.

Updated

in MPF-based infrastructure will only occur if there is an appropriate margin between the price of MPF and the price of SMPF+WLR. However, as discussed above, there are good reasons for which the forward-looking cost of WLR has been underestimated. Unless the WLR prices are set appropriately then there will be an inefficiently low level of MPF-based investment and therefore an efficiently low level of facilities-based competition on voice and an inefficiently high level of service-based competition.

Ofcom has previously considered the margin between BT's prices for copper-based products and for more value-added wholesale products and the effect this has on CPs investment decisions. In 2005 and again in 2006 Ofcom welcomed commitments from BT that would maintain the margin on broadband wholesale products as being in customers' interests.[29] In this case it is likely that the margin between WLR and MPF proposed by Ofcom in 2012/13 is artificially low in a way that will disincentive CPs from investing in MPF-based technology leading to dynamic efficiency losses.

If there are insufficient incentives for SMPF-based providers to migrate to MPF, and competition based on SMPF is not sustainable in an NGN world, then this would imply that there will be either exit of some of the presently SMPF-based broadband providers from the market. Therefore, in the medium-term this will imply a decrease in the level of infrastructure-based competition in broadband.

The potential gains from the lower prices resulting from continued, and increased, competition in voice and broadband in an NGN world can be illustrated using an Ofcom model. In the second Spectrum Liberalisation consultation Ofcom uses a Cournot model to calculate the gains from increased competition in mobile broadband. [30] We applied Ofcom's model to provide some illustrative estimates of an upper bound from the potential gains from having greater competition in fixed voice and broadband.[31] The details of the analysis are provided in Annexe 3 below. Ofcom's model predicts that the gains from more intense competition amongst vertically integrated providers would be up to £120m per annum in 2015.[32]

In the longer term

Ofcom seems to argue that BT's future potential shift to NGA implies that promoting MPF-based competition is less relevant. However, when BT does

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29 Ofcom, Broadband Regulation, June 2005 paragraph 11 "*Until 1.5 million lines have been unbundled, BT has committed not to reduce the connection or rental prices of its ADSL broadband products (IPStream/BT Central or DataStream)…BT has also made commitments regarding the pricing of new IPStream/BT Central products, additional features and more bandwidth-intensive offerings. These commitments will have the effect of maintaining the margin available for typical scale LLU operators.*"

30 Ofcom, Application of spectrum liberalisation and trading to the mobile sector, A further consultation, 13 February 2009, Annex 9

31 This does not imply that the assumptions behind the use of the model are endorsed (although Ofcom has made those assumptions for the mobile broadband market).

32 In Cournot models the strength of competition is modelled by examining market outcome under different scenarios about the numbers of competitors. The intensity of competition is increasing with the number of competitors - this is a stylised assumption of such models

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start to implement FTTC solutions, which require removing the copper loops to the local exchanges[33], it is MPF-based operators that can most be expected to be able to compete (perhaps through the use of mini-MSANs, or some other equivalent, at the cabinet level if there is sub-loop unbundling).

However, for these operators to be able to compete when rolling out equipment at the cabinet level they will require significant scale. Therefore, the more that operators delay the migration to MPF the lower the chance of there being significant competition on broadband after the move to NGA. Therefore this provides an additional future potential benefit from encouraging MPF now.

Openreach's investment incentives

Ofcom considers that Openreach needs to be able to recover all its costs, including common costs, to provide it with sufficient incentives to invest. Ofcom considers that the allocation of common costs from BT Group should be treated as part of Openreach's costs. To maintain both BT Group's and Openreach's investment incentives each service must cover its incremental costs and BT Group and Openreach must cover their common costs in total.

However, this does not require equal recovery of common costs from all products. If BT is able to recover more common costs on certain non-regulated services (more than implied by LRIC+EPMU) then this may need to be taken into account by Ofcom when considering the common costs that should be recovered from regulated services. We note that under Ramsey pricing, if certain products recover more than a proportionate contribution to common costs this implies that other services should recover a lower than proportionate contribution – overall there is no over (or under) recovery of costs.

Information provided by Ofcom shows that, even if the prices of all CRS products were to remain at the same (nominal) levels until 2012/13, Openreach would still be making a return in excess of 10% (the mid point of Ofcom's assessment of Openreach's cost of capital).

Ofcom identifies the issue of the migration from the use of SMPF+WLR to MPF as a major factor on the finances of Openreach. Ofcom also recognises that the CPs' migration and that of BT's own migration to MPF should be considered separately. Ofcom appears to imply that because of this migration it is necessary for SMPF+WLR to make the same absolute contribution to common costs as MPF. Otherwise, Ofcom considers that there may be a risk that BT is unable to recover its costs.[34]

The same absolute contribution to the recovery of common costs from MPF and SMPF+WLR is not necessary to provide sufficient investment incentives to BT.

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33 We understand that BT's announced FTTC roll out will involve mini DSLAMs in the cabinets and that copper loops will continue to be connected from the local exchange to the customer premises. BT will continue to provide voice services using the local exchanges. Therefore, MPF-based operators will continue to be able to provide services to customers.

34 Ofcom states at paragraph A.195 that *"A major factor impacting on the finances of Openreach is the change in the mix of services, in particular volumes moving from WLR & SMPF to MPF."*

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It is straightforward to produce forecasts of the volumes of MPF, SMPF and WLR, and to set prices, such that the overall recovery of common costs is ensured even where there is migration and different contributions. Similar volume forecasts are undertaken in many price controls. Of course, where there is uncertainty over volumes then this can have an effect on the overall recovery of costs. However, it is perfectly feasible to introduce mechanisms by which prices can be adjusted in the future if the volumes that actually occur are significantly different from those forecast[35] and Ofcom has indicated that it will consider the possibility of revisiting the price control after two years, if there are reasons to do so.

Summary of efficiency considerations

The available evidence shows that there is no significant imbalance in the relative pricing of the CRS products. However, if there were an imbalance in the prices then we have considered the case for rebalancing based on efficiency grounds. As Table 5 below shows, some of the considerations support rebalancing, others favour no rebalancing and some factors do not point clearly either way. In aggregate the case for no rebalancing appears to be significantly stronger than the case for rebalancing. We note that on balance our analysis shows that considering static efficiency effects alone the benefit from no rebalancing is around £3.3m.[36]

35 For example, because Royal Mail's price cap is based on actually achieved volumes (rather than historical volumes) it has a mechanism which compensates for any over or under recovery in one year in the following year.

36 See Annexe 2 for further details

Updated

Factors favouring rebalancing	Factors neutral	Factors favouring no rebalancing
• More efficient choice of inputs (although may be zero, or favour no rebalancing) • Potential risk of BT under/over-recovering common costs if volumes differ from forecasts (if no adjustment mechanisms implemented)	• Regulatory certainty • Investment incentives for Openreach	• Welfare benefit from Ramsey pricing • Potential reduced costs in voice provision • Potential gains from competition • More innovation in voice services • Openreach is forecast to over-recover common costs even with nominal price freezes
• Quantified value: Approximately £2.6m		• Quantified value: In excess of £100m

Table 5: Summary of efficiency considerations and the implication for rebalancing – numbers for 2012/13 unless stated otherwise

Source: Frontier

Appendix B2 - Ofcom's cost benefit analysis of rebalancing

Updated

ANNEXE 1: EFFICIENT TECHNOLOGY CHOICE WHEN BT IMPLEMENTS NGN

Given that the access network cost to BT of providing voice and broadband services to a subscriber using MSANs is approximately equal to the cost of providing voice alone, future competition that is based on the use of WLR and SMPF would appear to be productively inefficient.

Consider a new customer that takes voice and broadband services from a SMPF+WLR operator that has DSLAMs collocated in BT's local exchanges. The CP will incur incremental costs to provide broadband to the customer including the DSL line card and cabling (although there will be some costs that are sunk). In addition, if the customer is in an exchange that will convert to MSANs under the BT 21CN programme (and BT's legacy PSTN equipment will be removed) then to continue providing WLR BT will have to incur incremental costs in the MSAN, the combicard, and cabling. However, BT would incur the same incremental costs to provide both WLR and bitstream products to the CP as to provide WLR only. Therefore, the CP's incremental costs would appear to be productively inefficient i.e. the same service could be provided to the customer at lower cost if the CP did not use its own infrastructure to provide broadband. Rather, it would be efficient for only BT's infrastructure to be used.

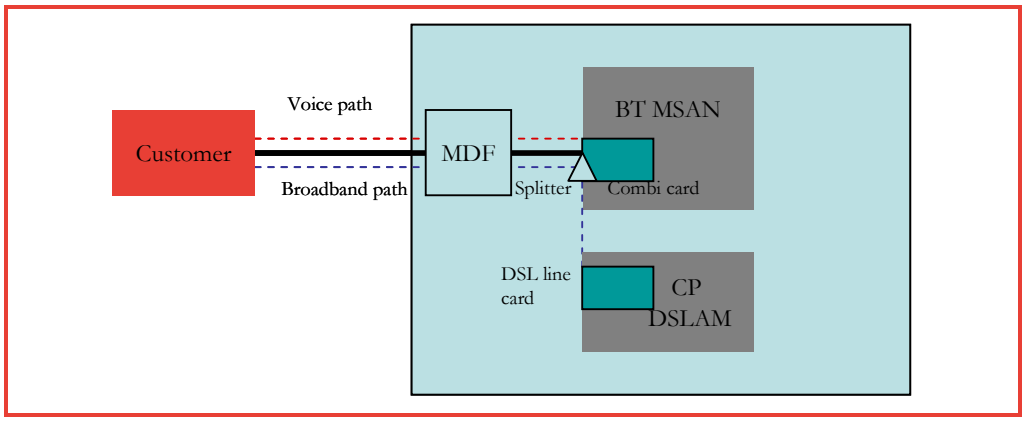

Figure 3: BT provides WLR and CP uses SMPF (illustrative)

However, if a customer takes voice and broadband services from a MPF-based operator BT will not need to incur the incremental costs detailed above i.e. BT will not need to take into account that subscriber when dimensioning the MSAN and it will not need to provide jumpering and tie cables between its MSAN and the MDF. Therefore there are potentially significant costs that are avoided by BT.

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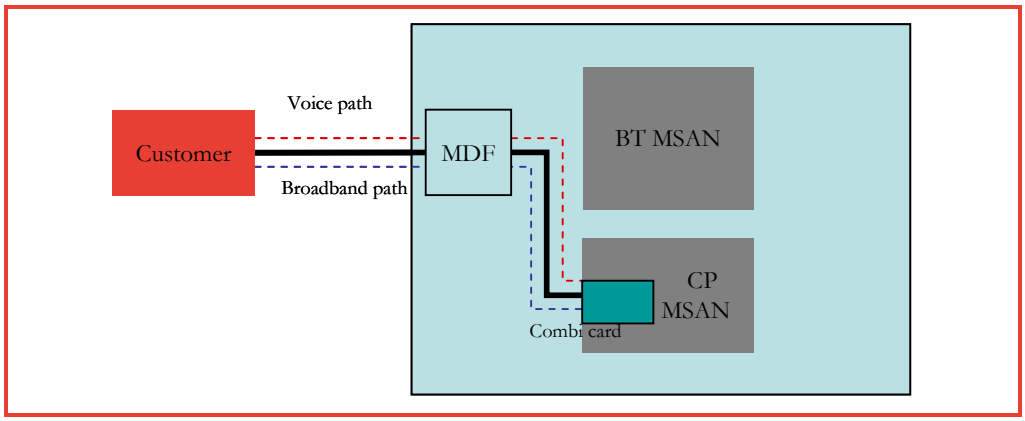

Figure 4: CP uses MPF to provide voice and broadband to end customer (illustrative)

Under this analysis, in the future competition based on the use of MPF would clearly be more efficient that competition based on the use of SMPF. Therefore, from the point of view of productive efficiency it is welfare enhancing for provision of voice and broadband services to consumers to be MPF-based prior to the roll out of MSAN technology into BT's exchanges. To create the appropriate incentives for this to occur, the target SMPF and WLR prices need to take into account the forward-looking cost implications of BT continuing to provide these services. Otherwise this may lead to an inefficiently high level of SMPF+WLR usage in the future and an inefficiently low level of MPF usage. Therefore, there seem to be strong productive efficiency reasons for promoting competition on MPF rather than on SMPF+WLR. Ofcom's assessment seems to have ignored such considerations.

For existing SMPF-based operators that have already sunk significant costs there is an issue of deciding whether to become an MPF-based operator and, if so, when to migrate to MPF. We note that BT's charge for switching customers from SMPF+WLR to MPF is around £35 and this is likely to also have an impact on operators' decisions. If this charge were too high this would contribute to an inefficiently low level of MPF usage.

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ANNEXE 2: RAMSEY-BASED PRICING

This Annexe details the key assumptions that are made in arriving at an estimate of the allocative inefficiency of setting prices based on CCA FAC/LRIC+EPMU instead of Ramsey-based prices.

We assume that operators make zero economic profit and, therefore, that the welfare effects of using different allocations of common cost can be calculated by considering the change in consumer surplus under the different retail prices that are implied by the changes in wholesale charges.

Key assumptions

We use the same framework that is described in the Frontier August 2008 and October 2008 notes on Ramsey prices. We provide a brief overview of the assumptions here.

We assume that the demand for narrowband, narrowband and broadband and broadband can be modelled separately, and we use the same retail elasticities shown in Table 6 below. In addition, we assume that there are linear demand curves. This assumption is not critical because, given the scale of the changes in retail demand implied by the change in wholesale charges the welfare effects depend only weakly on the form of the demand curve.

Service	Retail demand elasticity
Narrowband (WLR)	-0.10
Narrowband and broadband (MPF)	-0.96
Broadband (SMPF)	-1.38

Table 6: Estimates of own price elasticity of demand

Source: Frontier analysis

In regard to the elasticities, Ofcom noted in the second consultation document that the studies that Frontier used to arrive at elasticity estimates *"were from a number of developed countries, and especially the US, rather than relating specifically to the UK. Also, some of the studies relate to the early years of broadband development, when conditions may have been different to today."*[37] Ofcom should be aware that there is a recent UK-only study that calculates dial-up and broadband elasticities for four types of UK household. We reproduce the results from the study in Table 7. We note that both the narrowband and broadband results support the numbers used in Frontier's October 2008 note.

37 Second condoc paragraph A5.45

Updated

Service	Retail demand elasticity
Dial up	-0.08 to -0.36
Broadband	-1.17 to -1.59

Table 7: UK-only estimates of own price elasticity of demand

Source: Robertson, et al, A segment-based analysis of Internet service adoption among UK households, Technology in Society 29 (2007) 339–350

We continue to follows Ofcom's assumptions that the projected CCA FAC costs are representative of LRIC+EPMU and that the level of incremental costs is 70% of this with the remaining 30% assumed to be fixed and common costs. Whilst we do not accept that FAC projections do represent LRIC+EPMU, for the purposes of this example, which is to illustrate the magnitude of Ramsey effects this assumption is not critical as it is the relative difference in prices between the different product that is implied by Ramsey allocation of common costs that is important.

We update the data using the cost projections provided by Ofcom in the second consultation document as summarised in Table 8 below.

	FAC (average of high and low cases)
WLR	114
MPF	104
SMPF	17

Table 8: Fully allocated costs projections for 2012/13, £

Source: Ofcom second condoc pages 236-239

We assume that the downstream market is competitive so that wholesale costs incurred by operators are fully passed through to retail prices.

Results

Under these assumptions we find that Ramsey prices indicate that the mark-up on WLR should be significantly increased compared to a LRIC+EPMU allocation of common costs and that the mark-up for MPF should be significantly decreased. The results are summarised in Table 9 below.

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	Incremental costs	Allocated costs (% mark-up)	Total cost
FAC			
- WLR	80	34 (43%)	114
- MPF	73	31 (43%)	104
- SMPF	12	5 (43%)	17
Ramsey			
- WLR	80	54 (67%)	134
- MPF	73	13 (19%)	86
- SMPF	12	5 (43%)	17

Table 9: Comparison of 2012/13 Fully Allocated Costs and Illustrative Ramsey Prices, £

Source: Frontier analysis

If retail prices change in line with wholesale prices, this implies changes in the demand for the retail products that use MPF and WLR. As Table 10 shows the increase in price for WLR implies that there will be a small decrease in the demand for narrowband only, conversely the decrease in price for MPF implies a significant increase in the demand for broadband and voice.

	Under FAC costs	With Ramsey prices
Narrowband only	6.92m	6.83m
Broadband and voice (using MPF)	12.90m	13.38m

Table 10: Retail demand for products/volumes of wholesale inputs

Source: Ofcom volume projections and Frontier analysis

Welfare calculations

In order to arrive at estimates of the welfare impact of the proposed Ramsey-based prices, compared to the counterfactual of FAC prices, it is necessary to consider what would be expected to happen to retail prices as a result of the use of the Ramsey-based wholesale prices. The objective of applying Ramsey-based prices is to try and ensure that there is a relatively greater recovery of common costs from the products that face a more inelastic demand, compared to the products that face an elastic demand, at the retail level. This objective therefore requires that:

- the price of WLR at the wholesale level is set at the Ramsey-based level, which means a higher allocation of common costs because of the low narrowband elasticity; and,

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- the price of MPF is set at the wholesale level at the Ramsey-based level, which means a lower allocation of common costs because MPF will be used to offer broadband and voice services at the retail level which, combined, have a higher elasticity.

We would expect the retail prices for narrowband only and for broadband and voice based on MPF to reflect the differences in wholesale prices, and therefore the demand for narrowband only, and MPF-based broadband and voice to be as presented in Table 11: Scenario 2 Ramsey-based prices (£ 2012/13) above, under the assumption of linear demand curves.

In order to arrive at the calculation of the impact on consumer welfare/surplus, it is necessary to come to a view as to what is the impact of applying the Ramsey-based prices at the wholesale level to the retail price of WLR+SMPF-based broadband and voice services. There are two possible scenarios:

- Scenario 1: To the extent that SMPF+WLR based providers of broadband and voice will be expected to compete with MPF-based providers, they would not be able to pass on any higher wholesale price to higher retail prices, over and above the prices offered by MPF-based providers of broadband and voice services. If SMPF+WLR providers were able to absorb the higher wholesale price, and still be able to compete with MPF-based providers, then there would not be any additional impact on consumer welfare as a result of using a Ramsey-based price for SMPF+WLR, over the impact on consumer welfare related to the changes in demand presented in Table 11; and,
- Scenario 2: SMPF+WLR based providers could choose to pass on the increase in wholesale prices resulting from the use of Ramsey-based prices to higher retail prices. In this case the optimum prices for the three services would differ from those in the first scenario.

In order to estimate the prices, and hence the increase in consumer surplus in Scenario 2, we have developed our methodology further, assuming that:

1. The SMPF+WLR common cost recovery per line is the same as the MPF common cost recovery per line (thus there is no issue of competitive distortion or productive inefficiency due to the prices unduly favouring one wholesale solution over the other);[38]
2. That the retail price for narrowband only customers is dependent on the WLR annual rental;
3. That the retail price for narrowband and broadband customers is dependent on the MPF annual rental; and,

38 This is an important assumption, which implies that the estimated impact on consumer welfare is likely to be an underestimate of the likely impact. As indicated before, we expect that even if the difference between the charges for WLR+SMPF and MPF was larger than the estimated difference of incremental costs, in practice this could have a minimal impact on the choice of input, if such difference was relatively small. Therefore there would be a minimal, if any, impact on productive efficiency.

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4. There is perfect pass though of changes in wholesale prices to changes in retail prices.

The starting point is the FAC prices and it is assumed that the recovery of fixed and common costs is equal in absolute terms between WLR and MPF prices, and that no common costs are recovered from SMPF. The methodology applied then maximises the consumer surplus estimate by varying the differential between the MPF and WLR prices, subject to the constraint that the total contribution to the recovery of fixed and common costs remains constant.

Assuming a £33.6 fixed cost per line per year (which gives the same total fixed and common costs as under Scenario 1) this model results in the prices shown in Table 11 below.

	FAC	Ramsey
MPF	103.84	91.42
WLR	114.22	145.80
SMPF + WLR	131.35	118.93

Table 11: Scenario 2 Ramsey-based prices (£ 2012/13)

Source: Frontier analysis

The change in prices from the FAC prices, assuming these are fully passed on to end users, results in an increase of £5.2 million in consumer surplus in 2012/13. If we impose an additional constraint that the SMPF price must be non-negative then the model results in the prices shown in Table 12 below.

	FAC	Ramsey
MPF	103.84	98.90
WLR	114.22	126.41
SMPF + WLR	131.35	126.41

Table 12: Scenario 2 Ramsey-based prices with the additional constraint that the SMPF implied price is non-negative (£ 2012/13)

Source: Frontier analysis

Applying the prices shown in Table 12 results in an increase of £3.3 million in consumer surplus in 2012/13, compared to setting prices at the FAC levels.

In practice, we expect that it is unlikely that SMPF+WLR based providers of broadband and voice would be able to absorb fully the higher Ramsey-based wholesale prices, as this would require them to achieve higher efficiency savings, and/or reduced profits, compared to a counterfactual of the use of FAC prices. We would therefore expect the impact on consumer surplus from the use of Ramsey-based prices to be closer to the estimates derived for the second scenario.

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Note that the two estimates are not directly comparable, as under the second scenario, there are no risks of offsetting reductions of productive inefficiency due to differential recovery of common costs from MPF and SMPF+WLR.. Table 13 below provides the estimated net impact on consumer surplus under each of the scenarios presented above.

	Net consumer surplus difference (£m)
Scenario 1 (excludes potential productive inefficiency effect)	97
Scenario 2 (net effect, with productive inefficiency effect of zero)	3.3-5.2

Table 13: Consumer surplus impact of using Ramsey-based prices (compared to FAC prices)

Source: Frontier analysis

Updated

ANNEXE 3: COURNOT CALCULATIONS

This Annexe details the key assumptions that are made in arriving at an illustrative estimate of the potential increase in welfare from having more intense competition for voice and broadband, which is modelled by a greater number of fixed voice and broadband competitors. We follow the model that is provided by Ofcom in Annex 9 to the Ofcom consultation *"Application of spectrum liberalisation and trading to the mobile sector: A further consultation."* We should note that the calculations presented here simply show the implications of applying Ofcom's model to the voice and broadband access market, if the Cournot model could be used as a basis for describing such a market – they should not be interpreted as an endorsement of the model as such as used by Ofcom.

Ofcom's model is simple and assumes a Cournot oligopoly with *n* competitors. Based upon a forecast for the future output, price and number of operators in the market and using an estimate of the demand elasticity, the model calculates

- the shape of the demand curve – Ofcom consider two possibilities a linear demand curve and a negative exponential demand.
- the average marginal cost which is consistent with a Cournot equilibrium and the forecast price and output.

The model then allows a calculation of how consumer and producer surplus vary if the number of operators is different from that assumed when forecasting the future output and price. We follow Ofcom and provide results assuming that there are zero fixed costs.

We have assumed the following assumptions for the price of a combined voice and broadband service and the level of demand in 2015.

Factors	*Assumptions*
Price of combined voice and broadband bundle – per annum	£240
Number of voice and broadband subscribers	20,000,000
Number of competitors	4
Elasticity	-0.96

Table 14: Assumptions made in estimating gains from future competition

Source: Frontier

If we then assume that there are three competitors rather than four then the model predicts an increase in the price and a decrease in the output as shown in Table 15 below.

Updated

Model predictions	Linear demand	Negative exponential demand
Price of combined voice and broadband bundle	255.62	260.83
Number of subscribers	18,750,000	18,400,888

Table 15: Output from model assuming 3 operators

Source: Frontier calculation based on Ofcom model

Because the price increases, consumer surplus decreases and producer surplus increases. Overall there is a fall in welfare because the difference between price and marginal cost increases. As shown in Table 16 below, Ofcom's model forecasts that a fall in the number of competitors from four to three would imply a fall in total welfare of up to 120 million in 2015 alone.

	4 competitors	3 competitors	Difference
Based on linear demand curve			
Consumer surplus	2.50	2.20	-0.30
Producer surplus	1.25	1.46	0.21
Total welfare	**3.75**	**3.66**	**-0.09**
Based on negative exponential demand			
Consumer surplus	5.00	4.60	-0.40
Producer surplus	1.25	1.53	0.28
Total welfare	**6.25**	**6.13**	**-0.12**

Table 16: Results of Cournot analysis, £ billion

Source: Frontier calculations based on Ofcom model