Contents

Annexes F to J are published separately

Foreword

The telecoms sector provides the key building blocks of our increasingly rich and complex information society. As private individuals, we rely on telecoms to keep in contact with our friends, our loved ones, and the world around us. In the workplace, telecoms is an increasingly important component of business competitiveness. Looking ahead, if even a tenth of the claims being made for broadband by its champions are true, it will not only transform the way that we live and work but will have profound effects on our shared culture.

Regulation has had a decisive impact on the growth and structure of telecoms markets. For this reason, Ofcom (the Office of Communications) is launching a fundamental review of the telecoms sector and how it is currently regulated. The Review will enable us to set out a strategic direction for our activities in relation to telecoms, and will create a new settlement between the regulator, the companies we regulate and the citizen-consumer. The Review seeks to answer the five fundamental questions which are set out at the start of the Executive Summary of this document. Along with the measures we are taking to liberalise radio spectrum rules, this Review will be a key building block of our future approach to economic regulation.

The Review will be rigorous and evidence-based. In this first phase, we want, with the assistance of our stakeholders, to gain as full an understanding as possible of the prospects and challenges for the sector between now and the end of the decade. In Phase 2, which will commence this summer, we will take the lessons from this first consultation and create policy recommendations on which we will then separately consult. Finally, we will issue a statement by the end of the year which sets out our future approach.

The legislation under which we operate requires that we regulate only where strictly necessary. Many parts of the economy operate without the kind of detailed, sector-specific regulation that we apply to telecoms. Our starting point, therefore, is to ask the question: "Why regulate at all?" Although it is unlikely to be desirable in the short term to withdraw completely from sector regulation, we do want to develop a strategy which could lead, over time, to substantial scaling down of regulation.

It can sometimes be forgotten how far, and how fast, the sector has developed since BT (British Telecommunications plc) was privatised in 1984. Prices for calls have tumbled and quality of service has improved out of all recognition. New services have been widely and successfully deployed. Mobile is perhaps the most striking example: there was no mobile market in 1984, now more than eight out of ten of us live in a household with a mobile phone.

On the other hand, some aspects of the telecoms market remain problematic. Despite nearly 20 years of regulatory activity intended to promote competition, the detailed market reviews conducted by Oftel (Office of Telecommunications) last year concluded that BT remains in a position of Significant Market Power (SMP) in many of the fixed telecoms markets examined. This contrasts sharply with the optimistic expectations of governments and regulators, expressed at various stages over the years, that fully effective competition would rapidly be established and regulation could consequently be withdrawn. Nor do international comparisons always suggest that the UK is as far out ahead of the pack as we would wish and expect to be, given that we started the liberalisation process quicker than most of our competitors.

This document charts the evolution of regulation over the last 20 years, and the choices and dilemmas that regulators have faced. It seems likely that Ofcom will need to wrestle with similar choices and dilemmas.

We also look ahead to changes in technology and patterns of consumer demand that will shape the competitive landscape between now and the end of the decade. The last ten years have seen a shift in emphasis in the telecoms sector from traditional voice telephony services to new data services. Now a second wave of technology change is moving the industry from an analogue, narrowband environment to a digital, broadband environment. Some of this change takes place in the 'engine room', the networks of the various telecoms operators themselves, and is invisible to most of us, though no less important for that. However, some of it also will be reflected in new retail services for consumers.

There has been a tendency to regard regulation of the telecoms sector as a residential consumer issue. But in a knowledge economy, and certainly in a digital, broadband working environment, effective competition for business customers is equally important, and perhaps in sharper focus now than it was in 1984.

We will therefore look at the prospects for the introduction new voice services such as Voice over Internet Protocol (VoIP) and next-generation 'broaderband' services offering much higher capabilities than the broadband products currently available. We will also consider the scope for further competition between companies that we currently think of as being in different parts of the market, such as mobile and fixed. These changes are important because by increasing the scope for competition they may reduce the need for continued regulation.

It is always necessary for regulators to also ask the question: "What do consumers really want?" Regulators run the risk of adopting approaches which are too theoretical and insufficiently grounded in practicality. We will be undertaking extensive research into the attitudes, needs and expectations of consumers in each of the residential, small business and large business sectors in order to inform our decisions. We will also look at potential barriers to consumers' exercising choice such as lack of comparable market information.

A review of this breadth is a significant task, and it is important we do a thorough job. Equally, it is important for our stakeholders that we can set our strategic direction as soon as we can. We are aiming to complete the Review by the end of 2004.

The success of this Review is partly dependent on the quality of the inputs and insights that we receive from you. We recognise that predictions of the future cannot be an exact science. However, the more high quality feedback we get from market participants, consumers and other stakeholders, the better our prospects of correctly identifying the key trends and issues. Please therefore do tell us what you think.

David Currie, Chairman
Stephen A Carter, Chief Executive

Section 1

Executive Summary

1.1 In December 2003, Ofcom (the Office of Communications) announced a Strategic Review of Telecoms (the 'Telecoms Review'), to take place throughout 2004. The Review will take an over-arching look at the workings of the UK telecoms sector. It will assess whether the sector is delivering benefits to consumers, its future prospects, and the impact of alternative regulatory approaches. The outcome of the Review will be a new settlement for telecoms regulation.

1.2 The Telecoms Review will be in three phases. Phase 1 examines the current position and prospects for the telecoms sector, and should necessarily be quite brief. Phase 2 identifies and assesses options for Ofcom's strategic approach to telecoms markets. Phase 3 weighs up these options. The Review asks five fundamental questions, which will be the focus of Phases 2 and 3. At this stage, we invite stakeholders to give us their initial views on the following:

Question 1: In relation to the interests of citizen-consumers, what are the key attributes of a well-functioning telecoms market?

Question 2: Where can effective and sustainable competition be achieved in the UK telecoms market?

Question 3: Is there scope for a significant reduction in regulation, or is the market power of incumbents too entrenched?

Question 4: How can Ofcom incentivise efficient and timely investment in next generation networks?

Question 5: At varying times since 1984, the case has been made for structural or operational separation of BT, or the delivery of full functional equivalence. Are these still relevant questions?

1.3 This consultation document addresses the issues relating to Phase 1 of the Review. It reviews the current performance of the telecoms sector and assesses its future prospects.

1.4 The European regulatory framework for communications networks and services provides the over-arching context for Ofcom's approach to regulation. The UK fully supported its creation and played a leading role in its development. The UK has been assiduous in implementing the framework, effectively and on schedule, and Ofcom has carried on the work of Oftel (Office of Telecommunications 1984 - 2003) completing the reviews of specific markets required by the European Directive. Having done so, we believe it is now time to reflect on the future challenges for regulation. As the Review progresses, we will share our conclusions with our regulatory peers in Europe and with the Commission, and in return will want to draw on their knowledge and experience.

1.5 Telecoms regulation in the UK has its roots in the 1984 privatisation of BT. Although regulation has become very much more complex and, over time, has changed subtly in its objectives, many fundamental assumptions and regulatory tools have remained unchanged for 20 years. Yet in that time, telecoms has changed almost beyond recognition. Phone penetration is now almost ubiquitous; mobile penetration has risen from zero to around 75 per cent of adults; around 50 per cent of homes now have internet access; and broadband access is increasingly important to many households and businesses. The sector is now facing more fundamental changes, driven by changes in technology, consumers' demands and the financial environment.

1.6 Ofcom is a new regulator with a new set of duties. We have a statutory duty to reduce regulation where possible. Much of the detailed telecoms regulation introduced in the past was envisaged by many to be temporary, to allow competition to develop and to protect consumers while it did so. Given the fundamental changes in the telecoms sector over the last 20 years and its rapidly changing future, it is important that we return to first principles and ask whether there is still a case for such detailed sector regulation.

1.7 Telecoms regulation involves a number of trade-offs. For example, regulators often have to choose between regulation which is better at minimising prices in the short-term, and regulation that, through giving the right incentives to innovate and invest, will deliver price reductions and new products in the longer term. There are also trade-offs between promoting different types of competition – for example, competition on the basis of infrastructure or service provision.

1.8 Ofcom's starting point in making these trade-offs should be the benefits they deliver to the different types of telecoms users, such as low prices, greater choice, better quality and greater accessibility of services. But it is important that we look at what residential, small and big business consumers really value from the telecoms sector. Market research will therefore play an important part in our review.

1.9 The theme of this document is centred on the consumer outcomes and preferences that matter today, and the likely evolutionary paths for the telecoms sector. These will have critical implications for the choices that Ofcom makes on the trade-offs inherent in telecoms regulation. We are therefore asking you what a well-functioning telecoms market should deliver to citizens and consumers, and how Ofcom should weigh up the trade-offs in order to achieve it.

1.10 The main case for sector-specific regulation in telecoms has been that some telecoms companies have market power. The historic approach to regulation concentrated on voice telephony, and particularly on fixed voice. The intellectual case for regulation, and the form it took, developed with that in mind. However, the telecoms sector has entered a new era in which data has already eclipsed voice in terms of network use. Many of the resulting changes in prospect for the telecoms sector are likely to change the sources and extent of market power. It is therefore very important that Ofcom understands the likely nature and extent of these changes before considering any regulatory options. This document focuses on changes in five areas in particular.

1.11 **Competition in voice services** may change in nature, for two reasons in particular. The first is that competition between fixed and mobile operators will increase. If fixed and mobile services become economic substitutes for each other, it would be appropriate for regulators to consider a single economic market for voice services.

1.12 The second is that competition to conventional fixed voice services may also come from Voice over IP (VoIP). Already commonly used by business consumers, many commentators are predicting that this service could achieve mass-market take-up among residential consumers, perhaps bundled with broadband services. If so, it could allow new suppliers into the voice market, and existing sources of market power in the voice market may be eroded.

1.13 **Demand for broadband** is likely to continue to grow. This demand could be met by more of the existing broadband infrastructure (mostly cable and DSL), or possibly by the deployment of platforms using other technologies, such as wireless, satellite, passive optical networks or powerline. The more scope there is for competing access technologies, the less need there will be for regulation focused on broadband access infrastructure. Demand for broadband may reach the point that it surpasses the bandwidth capabilities of DSL and cable as currently deployed. In this case, it would be particularly important to ensure that the necessary investment in future 'broaderband' technologies was not hampered by regulation. One important determinant of this demand is the development of compelling broadband content – the opportunities for successful broadband content business models, and the barriers that may hinder them.

1.14 Packet-based networks using **Internet Protocol** (**IP**) are increasingly likely to be used by network operators, rather than traditional circuit-switched architectures. The growing use of IP for both voice and data is also likely to have implications for competition between long distance networks, possibly necessitating new forms of interconnection.

1.15 **Evolution in network design** is also likely to have important implications for sources of market power and regulatory policy. Functionality and intelligence may continue to increase at the 'edge' of networks (i.e. in terminal equipment); owning the network may therefore be less important for some aspects of the customer experience. If networks increasingly use IP (an open standard), service providers should be able to run any application over them that uses this standard, without needing to control the network. But if network operators use proprietary standards, control over these standards could be an important source of market power. The shift to IP itself also has important regulatory implications. As more and more traffic is diverted to IP networks, the fixed costs of the 'legacy' circuit-switched networks are likely to be spread among fewer and fewer customers. This could raise very important regulatory issues in the future around managing this transition.

1.16 **Realignment in the telecoms industry** has been predicted by many commentators for some time. This could be in the form of horizontal or vertical consolidation, or through alliances. New entrants may offset this trend towards greater concentration, for example, as telecoms companies who currently supply one type of telecoms product (e.g. mobile) supply another (e.g. fixed). There will also be an increasing convergence between the telecoms and media sectors as audio and video content is consumed over telecoms networks. These trends are important for telecoms regulation. Consolidation, alliances and market entry inevitably change market structure, with the result that the regulatory approach may need to be re-thought. For example, such changes may lead to more effective competition, or alternatively, to the creation of new forms of market power.

1.17 This document asks for your views on these changes, and what they imply for telecoms regulation. But similarly important is the impact that regulation itself is likely to have on the market's transition towards many of these changes. We are therefore asking for your views on two effects in particular.

1.18 First, investment in telecoms infrastructure is sensitive to the regulatory regime. If this regime is unpredictable, or aims to reduce prices at the expense of allowing reasonable returns to risky investment, it could deter investment. Although investment is not an aim of regulation in its own right, telecoms is a capital-intensive business, and so it is particularly important that regulation does not lead to under-investment in the sector.

1.19 Second, regulation designed to protect consumers, or to support consumer choice, can have many benefits. For example, it can make switching between suppliers easier, or protect consumers from unscrupulous suppliers. But there is sometimes a trade-off, because over-regulation can adversely affect the risks and returns that operators perceive in introducing new products. Our initial research indicates that consumers resent a lack of comparability and clarity in pricing; it may be important for the regulator to take an active role in providing, or signposting, information that enables consumers to make informed choices.

1.20 Finally, as the telecoms market evolves and competition develops, it will be important to examine the funding and provision of universal services. As we see change in the range of telecoms products that consumers use, and in the technologies used to provide them, it will also be important to examine the scope of universal service obligations. This document seeks your views on these issues.

1.21 The responses that Ofcom receives to this consultation document will be critical to our understanding of the way the telecoms sector is likely to evolve. In turn, our expectation for this evolution will fundamentally affect the assessment of alternative regulatory approaches that we will take in Phase 2. Therefore, it is very important that we hear the views of all interested parties to this document, including telecoms operators and service providers, telecoms equipment manufacturers, consumer groups and telecoms consumers, financial institutions, Government departments and others. Responses to this document are requested by **Tuesday 22 June 2004**.

1.22 In addition to the five fundamental questions for the Review as a whole, Figure 1 lists the Phase 1 questions that we are asking you to respond to in this document.

Figure 1: Phase 1 Questions in this consultation document*

6. How successful is the UK telecoms sector currently in delivering benefits to citizens and consumers?
7. How rapidly and extensively will fixed and mobile networks become substitutes for one another?
8. What impact will Voice over IP have on the telecoms market?
9. How rapidly and extensively will broadband be taken up in the UK, and what are the regulatory implications of such growth?
10. What scope is there for new, competing broadband platforms to be rolled out, and which technologies are most likely to be used?
11. When are operators likely to move towards 'all IP' architectures, if at all?
12. What are the implications of 'all IP' networks for the way networks interconnect with one another, and for the scope of competition?
13. Is there likely to be widespread demand for services that require 'broaderband' networks to be rolled out and, if so, how will such infrastructure be supplied?
14. How rapidly are broadband content businesses likely to emerge, and what factors will affect their viability?
15. How will future network evolution, such as growth of intelligence at the edge of networks, and the increased importance of control over technical standards and interfaces, affect the requirements of telecoms regulation?
16. Will it become uneconomic for operators to maintain the existing circuit-switched architecture at some point and, if so, when? What regulatory issues will this transition to IP networks raise?
17. Are consolidation, alliances, market entry or other forms of market evolution likely? What will their implications be for telecoms regulation?
18. What impact do different regulatory approaches have on investment decisions in telecoms, and what regulatory approaches does this imply that Ofcom should adopt?
19. What is the right role for consumer policy? What impact do different approaches have on telecoms companies' perceptions of risk and return?
20. What role should Ofcom take in signposting, providing, or ensuring that the market provides clear information to consumers, enabling them to make effective choices?
21. How may universal service arrangements need to evolve in response to changes in the telecoms market?

* The five fundamental questions for the Review *as a whole* are listed on page 4 of this document

Section 2

Responding to this consultation

This consultation

2.1 This document is the Phase 1 consultation document in Ofcom's Strategic Review of Telecoms. It seeks views on the future prospects for the UK telecoms sector. In preparing this document, Ofcom has taken into account inputs from telecoms operators and service providers, financial institutions and consumer organisations.

2.2 This consultation document is addressed to all organisations and individuals who have an interest in the telecoms industry in the UK. This includes, among others:

- businesses participating in the telecoms sector, including infrastructure-based operators and service providers, and manufacturers of telecoms equipment;
- others with a commercial or employment interest in the sector, such as trades unions;
- consumers of telecoms services, either as businesses or as individuals, and organisations representing consumers;
- individuals or organisations concerned with the impact of telecoms on particular groups of citizens, or on the economy as a whole; and
- Government departments.

2.3 A plain English summary of this document has been produced. The summary version has received a Crystal Mark for clarity from the Plain English Campaign. It can be found at: www.ofcom.org.uk/consultations/current/telecoms_review/plain_english/

Hard copies are available upon request.

2.4 Electronic copies of this document are available on Ofcom's website: www.ofcom.org.uk/consultations/current/telecoms_review/

Electronic copies of the research annexes to this document are available at: www.ofcom.org.uk/consultations/current/telecoms_review/annexa/

How to respond

2.5 Ofcom invites written views and comments on the questions raised in this document, to be made by **5pm on Tuesday 22 June 2004**.

2.6 Ofcom strongly prefers to receive responses as email attachments, in MS Word format, as this helps us to process the responses quickly and efficiently. Please attach with your response the cover sheet shown in Annex C. The cover sheet is available to download separately from the 'consultations' section of Ofcom's website. Please send your response to: **dougal.scott@ofcom.org.uk**, marked 'Strategic Review of Telecoms – consultation response'.

2.7 Responses may alternatively be posted or faxed to the address below.

Dougal Scott
Ofcom
Riverside House
2a Southwark Bridge Road
London SE1 9HA
Fax: 020 7981 3333

2.8 Please note that we do not need a hard copy in addition to an electronic version. We do not routinely acknowledge receipt of responses.

2.9 It would be helpful if your response could include direct answers to the questions asked in this document. These questions are listed together in Annex B. Ofcom would also be interested to receive comments on any other aspects of issues raised in this document, or on any issue that you think we should bear in mind in Phase 2 of the Telecoms Review. It would be helpful if you outline why you hold your views, and how Ofcom's proposals would affect you.

Further information

2.10 If you have any questions about the issues raised in this consultation, or need advice on the appropriate form of response, please contact Dougal Scott on 020 7783 4305. This consultation is the responsibility of Alex Blowers, Director of Policy Development at Ofcom, who is project director of the Telecoms Review.

Confidentiality

2.11 Ofcom believes it is important for everyone interested in an issue to see the views expressed by other consultation respondents. We would therefore usually publish all responses on our website (www.ofcom.org.uk) as soon as practicable after the consultation period has ended.

2.12 All comments will be treated as non-confidential unless you identify that part or all of your response is confidential and should not be disclosed. Ideally, anything you prefer to be confidential should be placed in a separate annex, so that non-confidential parts may be published along with your identity.

2.13 The consultation response cover sheet (in Annex C) includes a number of options for the confidentiality of your response, and we would be grateful if you would complete it.

2.14 Please also note that copyright in responses will be regarded as relinquished unless specifically retained.

Next steps

2.15 The responses to this consultation will be used to inform the next stage of the Strategic Review. The scope of this phase is discussed in more detail in Section 6, and the Terms of Reference of the Strategic Review of Telecommunications are included as Annex D.

2.16 As part of the consultation on this document, Ofcom will be holding a number of roadshows, seminars and other meetings with industry, the general public and other stakeholders.

2.17 Please note that you can register to receive automatic notifications of when Ofcom documents are published, at http://www.ofcom.org.uk/static/subscribe/select_list.htm

Ofcom's consultation processes

2.18 Ofcom is keen to make responding to consultations easy, and we have published some consultation principles (included in Annex A) that we intend to follow.

2.19 Please call our consultation helpdesk on 020 7981 3003 if you have any comments or suggestions on how Ofcom conducts its consultations. We would particularly welcome thoughts on how Ofcom could be more effective in seeking the views of people who are less likely to respond to a formal consultation exercise such as residential customers and those with small businesses.

2.20 Alternatively, you can contact Philip Rutnam with any comments or concerns about Ofcom's consultation processes. He is Partner, Competition and Strategic Resources, and Ofcom's Consultation Champion.

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Section 3

Introduction

3.1 On 12 December 2003, Ofcom announced that it would be consulting throughout 2004 on a Strategic Review of Telecommunications ('the Telecoms Review').[1] The Review will be comprehensive, wide-ranging and evidence-based.

3.2 The Review will assess the options for enhancing value and choice in the UK telecommunications sector. It will have a particular focus on assessing the prospects for maintaining and developing effective competition in the UK telecoms markets, while also considering investment and innovation. This assessment will in turn shape the strategy through which Ofcom will promote competition or take other regulatory action to further the interests of consumers and citizens in the UK.

3.3 The review will comprise three phases:

- Phase 1: the current position and prospects for the telecoms sector;
- Phase 2: the options for Ofcom's strategic approach to telecoms regulation; and
- Phase 3: Ofcom's approach to telecoms regulation.

3.4 The key output of the Review will be a new settlement for telecoms regulation, with a statement issued by Ofcom by the end of 2004. This will enable casework and policy development to be located in a clear strategic framework, going forward to the end of the decade and beyond.

3.5 This document is the first of two consultation documents that Ofcom will be issuing as part of the Review, prior to our statement. It takes a forward look at the trends and challenges facing the sector in terms of changes in technologies, consumer demand and the telecoms industry. It asks for your views on all of these issues.

3.6 Anticipating the future is important because the telecoms sector is changing very rapidly. The regulatory strategy that Ofcom develops for today's telecoms sector will also be applied to tomorrow's. It is therefore very important that we can make the best possible judgements about how the sector is likely to evolve, and the responses we receive will be critical to those judgements.

3.7 Transparency and openness are key to Ofcom's regulatory approach, and we talk fully with all stakeholders throughout the consultation process. In preparing this document, Ofcom has already held informal meetings with a number of telecoms companies, financial institutions, and consumer groups. Ofcom will also be engaging fully with stakeholders to obtain their views on this document.

3.8 This introductory section of this document describes:

- the rationale for the Telecoms Review;
- the role and importance of telecoms sector regulation;
- Ofcom's statutory framework; and
- the relationship between the Telecoms Review and other Ofcom initiatives.

The rationale for the Strategic Review of Telecoms

3.9 Ofcom has a statutory requirement to reduce regulation where possible, and this is embedded in our founding principles. This gives significant protection to our stakeholders. It guards against 'regulators regulating because that's what regulators do.' It also protects against persisting with regulation that is past its sell-by date. Telecommunications is subject to a large quantity of highly detailed, sector-specific regulation. This is over and above the rules that apply to the rest of the economy, such as competition and consumer protection law. This extra regulation inevitably imposes some costs on the industry and, indeed, on consumers. This is why proposals for new regulations include regulatory impact assessments, to weigh up the costs and benefits of intervention. Our starting point for this Review has to be to ask whether the costs of on-going, sector-specific regulation are justified.

3.10 The case for sector regulation was made and accepted in 1984 when BT was privatised[2] and Oftel was established, and then again during the 1991 Duopoly Review. However, these assessments were highly specific to the circumstances of the time. By any

1 Section 6 discusses the next steps for the Telecoms Review, and Annex D provides the terms of reference.
2 BT was partially privatised in 1984, and the Government retained a 49 per cent shareholding.

standards, the sector has undergone very significant changes since 1984 and 1991.

3.11 Therefore, if continued sector regulation is required, we have to make the case for it from first principles. While it's unlikely there's a case for removing sector regulation entirely (and Ofcom must of course operate within the parameters laid out by the EU Regulatory Framework), we do believe that asking the question is a useful discipline for the Review. It will enable us to be proactive in identifying opportunities for deregulation.

3.12 There are a number of reasons why the time is right for the Review:

- to date, regulators have considered that there is not enough competition in the telecoms markets to allow sector-specific regulation to be withdrawn. This is contrary to the expectations of some commentators;
- fundamental changes in technology and consumer behaviour may render existing regulatory approaches obsolete; and
- other countries and markets are adopting different approaches to similar challenges, and we need to consider international and sectoral best practice.

In many telecoms markets, competition is not considered to have developed sufficiently to allow sector-specific regulation to be withdrawn.

3.13 In many parts of the economy, consumers are considered to be adequately protected by general competition and consumer protection laws alone. Telecoms, along with utility markets such as gas, electricity, water and rail, is additionally subject to a large-scale regime of *ex-ante* regulatory rules. In the case of telecoms, a key objective of these regulatory rules has been the promotion of competition. The underlying assumption has been that without significant effort, competition will not emerge.

3.14 However, much of this sector-specific regulation has often been envisaged as a transitory measure, on the way to full competition. Statements made by successive Director Generals of Oftel, and the Government and its advisers[3] have implied a clear expectation that regulation of this kind would create sustainable competition, allowing sector regulation to wither away.

3.15 To date, this hasn't happened. Regulators have not considered that competition in many UK telecoms markets has emerged to the point where regulation could be withdrawn. This conclusion was confirmed by the Oftel market reviews conducted in 2003. These identified that BT holds a position of Significant Market Power (SMP) in all narrowband call and exchange line retail markets, as well as in many wholesale markets[4], and that all network operators hold SMP in relation to terminating calls to their own customers.

3.16 Direct regulation to protect consumers, by means such as retail price control, has also been applied to the sector while competition has been developing. But since competition hasn't developed as anticipated, regulators have maintained a consumer protection regime for far longer than was envisaged back in 1984. For example, it was only in 2002[5] that Oftel felt there was enough competition in retail fixed voice telephony to contemplate removing certain retail price controls.

The sector has undergone very significant changes, and regulation may need to go the same way.

3.17 Not only was the regulatory framework expected by many to be transitory, but it also has its roots in a very different era: a time when the telecoms sector essentially consisted of a stable, fixed voice telephony market, with predictable growth, costs and network architecture. Annex G discusses the historical approach to regulation of the sector in some detail.

3.18 A number of fundamental changes have taken place in recent years, and more are in prospect. They bring into question the continued validity of some of the assumptions underlying the historical regulatory framework. A key objective of the Review is to understand the implications of these changes. The main ones are:

- a rise in demand for data services, and the growth of broadband;

3 For example, *Regulation of British Telecommunications' Profitability*, S.C. Littlechild, Department of Industry, 1983. In March 1996, Don Cruickshank, then Director General of Oftel, said, "I believe that the UK is genuinely at a turning point in the development of effective competition and that there will be dramatic changes in the market in the period ahead. Effective competition is around the corner – but it isn't here yet. The next set of controls on BT's prices may well be the last."

4 The results of Oftel's market reviews are described in more detail in Annex H.

5 Statement on Oftel's review of the fixed telephony market, June 2002.

- the growth in mobile and wireless networks;
- the increasing importance of innovation and service choice;
- the changes in consumer behaviour; and
- the changes in the financial and corporate environment.

Rise in demand for data services, and the growth of broadband.

3.19 Access and use of the internet has risen from 12 per cent of homes in early 1999 to around 50 per cent today. Approximately half of the traffic on the public switched telephony network, which was originally built for voice traffic, is now data. At the same time, business consumers are making ever-increasing use of Virtual Private Networks, often in place of leased lines.

3.20 The rise in demand for data services is leading to the creation of an entirely new telecoms network platform. This operates alongside the traditional core telephone network platform, but shares the copper into the home. At present, broadband remains the province of a minority of business and residential consumers. But in the next ten years broadband may move towards mass adoption, either gradually or possibly quite swiftly. The likely pattern of demand for broadband, and the scope for delivery of broadband products over different technology platforms, will be key issues for the Review.

3.21 These new data networks, which increasingly use Internet Protocol (IP), may display some distinct economic characteristics to the monopoly voice market in which current regulation has its roots. They may exhibit economies of scale to different extents, and at different places in the network. If so, regulation will need to recognise and respond to these new challenges.

Continued growth in mobile and wireless networks.

3.22 The mobile sector has now reached the point where penetration is comparable to fixed. In addition, the market has expanded from a single product – mobile voice telephony – to offer a huge range of additional services such as SMS, picture messaging, online information, entertainment services, and business-oriented services such as GPRS cards for laptops. A key issue for the Review will be to understand the likely future development of the mobile market. For example, there is already evidence of some switching of voice calls from fixed to mobile. Both fixed and mobile network operators have launched limited mobility services using Wireless LANs, and are considering launching devices that use both fixed and mobile networks for connectivity. The scope for convergence of fixed and mobile services, and whether the mobile providers could constitute a competitive constraint on fixed operators, will be important issues for the Review.

Innovation and service choice are increasingly important.

3.23 When BT was privatised, telecoms was largely a single product market: fixed voice telephony. There was little scope for innovation or service choice around this product. Now, of course, the situation is radically different. For example, the sector includes fixed and mobile services, voice and data products aimed at all customer segments, and complex managed network products for business customers. In all of these, innovation and service choice (in terms of functionality and features) are critical in delivering benefits to customers.

Changes in consumer behaviour.

3.24 A striking feature of recent times has been consumer behaviour which was not initiated, or even predicted, by service providers. The growth in text messaging, of file sharing, and of peer-to-peer communities are all examples of consumers exerting direct influence over the evolution of the market. As part of the Review, Ofcom will carry out research to try to understand what consumers value most in telecoms markets, as well as considering aspects of the market structure which continue to inhibit the effective exercise of consumer choice.

Changes in the financial and corporate environment.

3.25 A basic assumption underlying the current regulatory structure is that where opportunities exist for companies to invest profitably in network infrastructure, they will do so. The UK telecoms sector was highly successful in attracting capital to finance business growth in the mid to late 1990s. However, with the crash in value of technology, media and telecoms stocks, the supply of external finance dried

up. Understanding how companies will be able to secure capital for investment in the future is an important element of the Review.

In other countries and markets, different approaches to similar economic challenges have been adopted

3.26 As the telecoms market evolves, it is important to consider what lessons in telecoms regulation we can learn from other countries and other regulated industries.

3.27 Virtually all developed economies have followed a broadly similar path to the UK in their approach to telecoms regulation. The EU liberalisation package introduced in 1997 shared many features of the existing UK approach, though it introduced significant regulatory elements over and above those present in the UK. The more recent EU Communications Framework of 2002 can be seen as an evolution of the same core principles of regulation. Even the US, which initially attempted to break up a national monopoly into a series of regional monopolies and a separate long-distance and international company, partially reversed its decision in the Telecommunications Act 1996. It adopted a regulatory regime that had many similar features to the UK and European model. Indeed, the only major market where privatisation and liberalisation took place without detailed sector-specific regulation, New Zealand, endured a protracted process of suit and counter-suit under mainstream competition law. This was considered by many commentators to have delayed the development of competition considerably.

3.28 However, there are significant differences in emphasis between the approaches adopted in different countries. For example, in the US a doctrine seems to be emerging that seeks to stimulate Voice over IP services (VoIP) through regulatory forbearance. The issue of pricing calls to mobile has been largely avoided through the principle of 'receiving party pays', in contrast to the UK's 'calling party pays' approach. Examining the success of different countries' varying approaches will be a key objective of the Telecoms Review.

3.29 Different approaches have also been adopted to regulate different utility sectors in the UK. For example, in gas, vertically integrated generation, transmission and distribution companies are no longer a feature of the market. The natural monopoly elements of the market are separate entities which are subject to enduring regulation, whereas regulation has been relaxed in the elements of the market where sustainable competition can develop. In water, promotion of competition at the residential level has not been attempted. Though there are many features of telecoms that make it different, learning from the experience of other sectors, where relevant, will also be a key objective of the Review.

The role and importance of telecoms sector regulation

3.30 The telecoms sector plays a critical part in the UK's economy. It contributes over 2 per cent of GDP,[6] and in 2002 it represented 7 per cent of all capital investment in the UK. Recent studies have also indicated that innovation in information and communication technologies (ICT) may be an important contributor to economic growth. The role of telecoms in the economy is discussed in more detail in Annex F.

3.31 Telecoms plays more than just an economic role. The ability to communicate is a pre-condition for full and active involvement in society. Telecoms networks are also increasingly seen as content delivery platforms in their own right, offering a range of information, entertainment and commercial services. They can also help to promote the availability of services that particularly benefit society, such as educational material or health services to remote locations.

3.32 Regulation of the telecoms sector is important because not only does it affect telecoms' contribution to the economy, it also affects the sector's wider contribution to society. Telecoms policy can help to promote full inclusion of certain social groups and to address the dangers of regional isolation. Although the public debate on Ofcom's role in safeguarding the interests of

6 Source: ONS Annual Business Inquiry 2002.

the 'citizen' has tended to be centred on broadcasting policy, telecoms regulation also contributes to citizenship objectives in this way.

3.33 Since BT was privatised in 1984, regulatory policy has promoted effective competition, while safeguarding consumers' interests as that competition develops through various forms of direct regulation. Over time, different degrees of emphasis have been given to these two objectives. But the active promotion of competition has always been a powerful feature of the regime.

3.34 Competition can bring very significant benefits in terms of lower prices, faster innovation, greater choice and service availability. Therefore, regulation aims mainly to deal with the entrenched dominance of an incumbent, in order to deliver the full benefits of competition to consumers. Ofcom has a duty to further the interests of citizens and consumers through, where appropriate, the promotion of competition. So the scope for extending competition in telecoms will be a key issue for the Telecoms Review.

3.35 However, a regulatory regime designed to promote competition is not without costs or risks. By encouraging market entry, a regulator could create damaging market distortions. For example:

- It could distort economic incentives to the point where business opportunities are artificially constructed where none really exists. This could create a form of dependent competition which is unsustainable in the longer term without continued regulatory intervention, but where the form of that intervention itself reduces efficient investment by market participants.
- It could result in the risk-takers not being properly rewarded. For example, it could allocate the rewards for investing in unproven technology away from the company that takes the risk, either to other companies in the form of a right to access the new technology at cost, or to consumers through price controls. This may undermine the incentive to invest in such projects.

3.36 Ofcom therefore needs to weigh up very carefully the costs and benefits of regulatory intervention before deciding on its policy approach.

Ofcom's statutory framework

3.37 The Communications Act 2003 gives Ofcom a set of duties which, although similar to the duties that Oftel had under the Telecommunications Act 1984, differ in some significant respects. Ofcom's principal duties are set out in section 3(1) of the Act. They are:

- **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.**

3.38 Section 3(4) requires that, in pursuing its duties under section 3(1), Ofcom must have regard, among other things, to 'the desirability of promoting competition in relevant markets' and to the desirability of encouraging investment and innovation in relevant markets.

3.39 Section 3(5) notes that Ofcom, in performing its duty of furthering the interests of consumers, must have regard, in particular, to their interests in respect of choice, price, quality of service and value for money.

3.40 Section 4 of the Communications Act sets out that Ofcom, in carrying out its functions, must also act in accordance with six European Community requirements that give effect to the EU regulatory framework. These requirements include:

- promoting competition in relation to the provision of electronic communications networks and services, and in relation to the provision and making available of services on facilities that are provided or made available in association with the provision of electronic networks and services;
- ensuring that Ofcom's activities contribute to the development of the European internal market; and
- taking account of the desirability of Ofcom's carrying out its functions in a manner which, as far as practicable, does not favour one form of electronic communications service, network or associated facility, or one means of providing or making available such a network, service or facility, over another.

3.41 Finally, Section 6 of the Communications Act requires Ofcom to keep the carrying out of functions under review with a view to ensuring that regulation by Ofcom does not involve:

- the imposition of burdens which are unnecessary; and
- the maintenance of burdens which have become unnecessary.

3.42 Therefore, in contrast to Oftel's regime, these duties and requirements present a new and different set of factors for Ofcom to consider before applying regulatory rules. For instance, Ofcom has an explicit duty to consider the impact of policy on the 'citizen' as well as the 'consumer'. We must also consider where competition would be 'appropriate'. And finally, the requirement to act in a consciously deregulatory fashion means that Ofcom must take a critical look at existing and planned regulation to ensure that it is both justified and 'fit for purpose'.

3.43 These duties, taken together, provide a powerful focus for Ofcom to review the operation of existing regulation and the scope for changes to regulation in the future. Once the review process has been concluded, Ofcom will decide which of its relevant regulatory powers are most suited to implementing its conclusions.

The relationship between the Telecoms Review and other Ofcom initiatives

3.44 In carrying out these duties, Ofcom is proceeding with regulatory initiatives in a number of other areas that feed into the Telecoms Review, and vice versa.

3.45 The Telecoms Review will build on the separate market reviews recently undertaken to implement the EU Directives in the telecoms sector. It is not designed to re-open these reviews. Instead, its objective is to take an over-arching look at the sector as a whole, in order to establish an overall strategy to ensure a clear and coherent approach to regulatory interventions at all levels.

3.46 One of the principles of the EU regulatory framework is that all regulatory interventions should be re-appraised regularly, to ensure that they remain appropriate. This process provides a natural opportunity to implement the conclusions of the Telecoms Review, in the event that they suggest that any particular intervention is out of line with the over-arching strategy. The European framework itself will be reviewed in due course and the conclusions of the Telecoms Review will inform Ofcom's thinking about any changes to that framework which would be desirable in the long run. In the meantime the current regulatory regime will continue and will be carried forward.

3.47 In parallel with this Review, Ofcom is also undertaking a review of the Universal Service Obligation (USO), dealing with the period up until the Universal Service Directive is reviewed in 2006. While the Telecoms Review will examine longer-term issues, such as the case for extending the USO to cover broadband, the USO review will concentrate on the current USO framework. In particular, the USO review will look at the policy on the provision (and removal) of public payphones, the issues raised by the relatively high number of disconnections, and the adequacy and appropriateness of text relay services for deaf people.

3.48 A number of the issues to be tackled by the USO review do have wider significance for the issues considered in the Telecoms Review. In particular, these centre on how to ensure the most appropriate balance between the interests of the citizen and the interests of the consumer (where these do not intersect), and the tension between promoting the overall economic welfare of consumers and the need to safeguard the interests of particular groups of consumers. In the Telecoms Review, we will address the overall policy context of USO measures, and provide forward-looking analysis of the possible evolution of USO policy in the light of changing market circumstances.

3.49 In November 2003, Ofcom published a consultation paper which stated Ofcom's intention of introducing trading for some types of spectrum in 2004. Tradability of spectrum has important implications for telecoms regulation in, for example, the entry barriers to certain wireless telecoms markets. It will be important that the Telecoms Review takes account of the forms of spectrum trading which will be permissible in the market.

3.50 In summer 2004, Ofcom will begin a strategic review of the spectrum framework (the 'Spectrum Review'). This review will develop a long-term framework for the development of spectrum management which maximises the benefits from a range of different approaches. The ongoing work on the Telecoms

Review will provide input into the Spectrum Review, and vice versa. The initial consultation document on the Spectrum Review will be published in early 2005.

3.51 Ofcom is currently undertaking an overview of broadband markets. Although this will be complete well before the results of the Telecoms Review are available, Ofcom will ensure where possible that the two reviews take a similar approach.

3.52 The results of the Telecoms Review will inform Ofcom's policy on a number of other regulatory issues which are currently under consideration. These include the issue of mandating access to wholesale end-to-end calls, a review of the Number Translation Services (NTS) framework, and the future of restrictions on BT's pricing of services for business customers. However, pending the outcome of the Telecoms Review, normal policy development will continue. In turn, we expect this continuing volume of casework to inform some of the strategic thinking in the Telecoms Review.

About this document

3.53 The remainder of this document discusses the evolution of the telecoms sector and possible implications for telecoms regulation. The remaining sections are structured as follows:

- **Section 4** discusses the trade-offs inherent in regulating telecoms, and how the need for regulation is created by distortions in the telecoms market caused by the existence of market power;
- **Section 5** discusses how the telecoms market may evolve in future, and how this might affect the need for regulation by altering market power in the telecoms market;
- **Section 6** describes the next steps for the Telecoms Review;
- **Annex A** lists Ofcom's consultation principles;
- **Annex B** summarises the questions that we would like you to respond to;
- **Annex C** contains a cover sheet that we ask you use in responding to this consultation;
- **Annex D** contains the terms of reference to the Strategic Review of Telecoms, published in December 2003; and
- **Annex E** provides a glossary of technical words.

3.54 This document is supported by a number of further annexes that provide more background and detail, which are published separately and available to download at: www.ofcom.org.uk/consultations/current/telecoms_review/annexa/

- **Annex F** discusses the role of telecoms in the economy;
- **Annex G** provides a review of telecoms regulation in the UK, highlighting past choices that have been made regarding the trade-offs discussed in Section 4;
- **Annex H** gives Ofcom's assessment of the performance of the telecoms sector to date. It assesses the sector's performance with consumers, the level of competition in different telecoms markets, the extent of innovation of investment in the sector to date, and the financial performance of the telecoms industry;
- **Annex I** identifies a number of trends in the behaviour and preferences of different types of consumer, and their possible implications; and
- **Annex J** identifies a number of trends in telecoms technology, and their possible implications.

3.55 Much of this document discusses 'consumers' of telecoms services. Ofcom uses this term, as it was used in the Communications Act, to mean all types of telecoms users: residential users (individuals or households), small and medium sized enterprises (SMEs), as well as large businesses.

3.56 Sometimes, we also discuss the role of BT as the incumbent fixed network operator in the UK. However, in Kingston upon Hull, Kingston Communications is the incumbent operator. Although we often refer only to BT for simplicity, we note that many of the same issues apply in relation to Kingston Communications in Hull.

Section 4

Telecoms regulatory policy and UK performance

4.1 Telecoms regulatory policy aims to find the right balance on a number of trade-offs. This section describes these trade-offs, and gives a brief summary of how telecoms regulation in the UK has addressed them in the past. It then summarises Ofcom's analysis of how well the telecoms sector is delivering benefits to citizens and consumers.

Trade-offs in telecoms regulatory policy

4.2 Telecoms regulatory policy aims to correct certain failures of the market, in the interests of citizens and consumers. Key outcomes include low prices, a high quality of service, a wide choice of products and providers, widespread access to services, and the introduction of new products over time.

4.3 Economists associate these benefits with achievement of three distinct types of 'efficiency':

- **'Allocative efficiency'** is achieved when prices are close to cost. This ensures that all consumers who value a product at more than its cost are able to purchase it;
- **'Productive efficiency'** means that the costs of production are minimised;
- **'Dynamic efficiency'** means that firms have the correct incentives to invest (e.g. in new infrastructure) and to innovate (e.g. to generate new products). Greater reliability and other quality improvements, and the creation of new products and services, are critically-linked to investment and innovation.

4.4 In theory, a fully competitive market without distortions will deliver allocative, productive and dynamic efficiency without need for specific regulation. Competition between providers drives prices down to cost. It also ensures that costs are minimised, since a firm that fails to do so will find itself unable to compete. The incentive to invest and innovate is strong, since innovation provides an opportunity to launch attractive new products that command a premium over existing rivals, at least for a time.

4.5 Some telecoms markets are generally considered to have characteristics which mean that they are not fully competitive in this way. For example, many have very high barriers to new firms entering the market and being able to compete with existing suppliers. In some telecoms markets, one or more existing suppliers have such economies of scale that smaller competitors have much higher costs. Telecoms also displays significant network effects, where the addition of more customers to a network benefits existing customers. These types of characteristics tend to result in one or more companies in a market having what is known in competition law as 'market power'.

4.6 Given these characteristics, telecoms regulation aims to mimic a fully competitive market in achieving the three forms of economic efficiency. However, regulation typically involves some trade-offs between the three, and the overall optimum can rarely be achieved. For example, cost-based regulation of prices (such as rate of return regulation practised historically in the US) achieves allocative efficiency but may be poor for productive efficiency. This is because, with regulated prices falling in line with costs, cost-reducing measures yield little benefit to the producer. Dynamic efficiency may also be weak, especially when investment is risky, as the best that might be attained through investment is a regulated return on the investment cost. A price cap that is fixed for a period of time, although better for productive efficiency, risks prices becoming out of line with costs and may therefore be poor for allocative efficiency.

4.7 More generally, if investment and innovation are important for the development of the sector, ways must be found to reassure investors that returns will not be 'regulated away' after the investment is made. Commitment by the regulator and consistency of regulatory actions are important in this context.

4.8 Telecoms regulation is also complex due to the complicated structure of the industry. Most industries, including telecoms, consist of a sequence of stages of production, often referred to as a 'value chain'. In the electricity supply industry, for example, electricity is generated, then carried over the high-voltage

transmission network or national grid, before being stepped down at the regional distribution network and supplied to the consumer. Telecoms networks are typically more complex than this. For example, the different stages of the network include: the phone or device (customer node), the access network, the access node, the backhaul network, the metro node, and the core network. Suppliers may provide services by either building or leasing each of these infrastructure layers. On top of this, service provision involves billing, distribution, customer care and other activities, and some types of telecoms service may also involve access to content. Figure 2 shows, in highly simplified terms, the route that a long-distance call may take through the network.

4.9 Regulation has tended to focus on promoting competition at one or more of these network levels. For example, if the incumbent was not required to offer wholesale access to the customer premises, competitors would be obliged to build their own access network if they wished to compete. This might be described as promoting competition in access infrastructure. Alternatively, a regulator may require the incumbent to offer an end-to-end wholesale product which competitors may resell to consumers, in order to promote competition at the service level. Between these extremes are many variants which combine elements of service-based and infrastructure-based competition.

4.10 There are trade-offs between promoting competition of these different types. A keenly-priced end-to-end wholesale product may generate significant competition at the service level but gives little incentive for investment in infrastructure, given the greater outlay and risk involved. However, infrastructure-based competition, if this flourishes, offers the prospect that further stages of the value chain become competitive, and regulation may then be drawn back from these parts of the network. However, this process may take time, with widespread competing infrastructure slow to develop, during which only a limited choice of suppliers is available to consumers. Moreover, unless retail prices are to be very high, the total margin between the retail price and the cost of access is limited, and a generous margin to stimulate competitive entry at one level implies that less is left over for entrants at the alternative stages. So this is why most regulation involves a choice – whether made explicitly or implicitly – between promoting competition at different stages of the value chain.

4.11 Technological change may affect the economics of different parts of the network – for example, the extent and nature of any scale effects. This in turn may affect the appropriate balance between these trade-offs.

4.12 The alternative positions that regulation may adopt on these trade-offs are likely to deliver various beneficial outcomes to citizens and consumers (through, for example, lower prices, greater innovation, more choice and so forth) in different measures. Therefore, an important issue for the Telecoms Review is the relative importance of these different outcomes. Economics provides an important mechanism for making these choices. For example it can, in theory, compare the merits of a 'static' benefit (such as lower prices), with a 'dynamic' benefit (such as faster innovation).

4.13 But sometimes, it is hard for this approach to access the information necessary to capture some of the more subtle considerations that are, nonetheless, very important to consumers. An important element of the Telecoms Review is the research that Ofcom is carrying out into the preferences of different types of consumer. Ofcom has carried out some initial research in Phase 1, based on secondary sources, and will commission more in Phase 2. Figure 3 shows the principal trends in consumer demand identified by our initial research, and these are discussed in more detail in Annex I.

Figure 2: Routing of a long distance call through the telecoms network

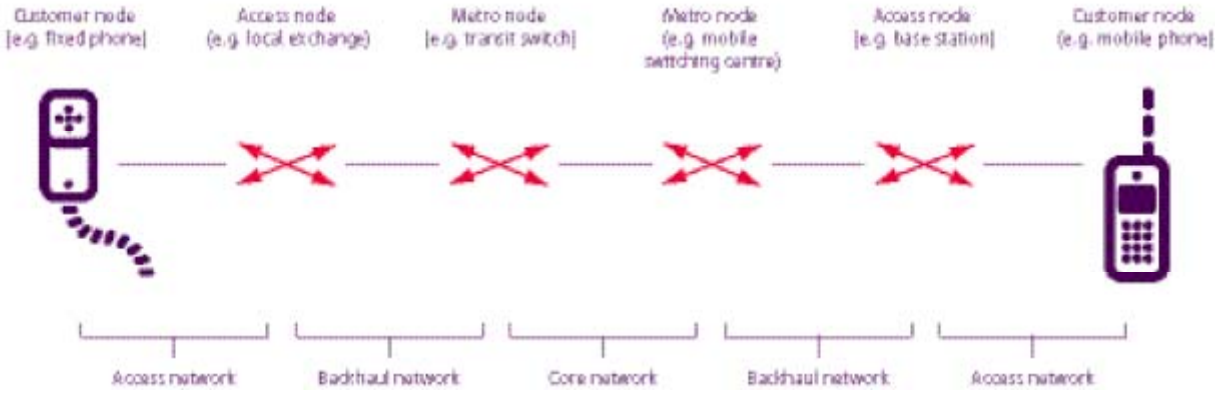
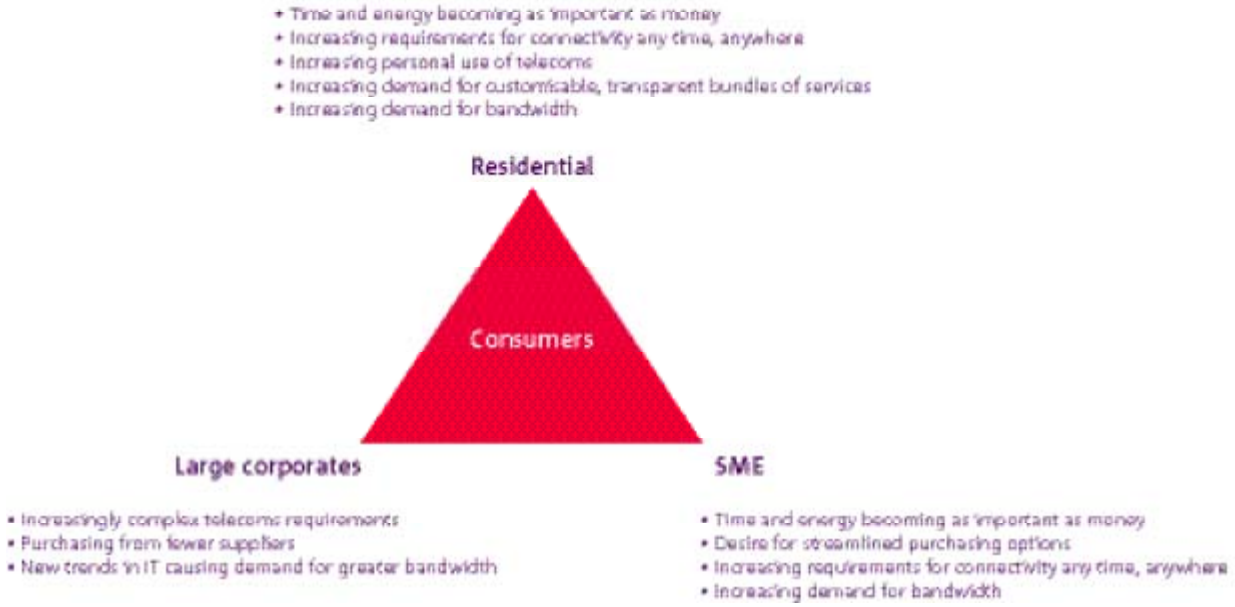


Figure 3: Trends in consumer demand



4.14 These trends have important implications when choosing the different types of benefit that telecoms regulation can deliver. For example, both residential consumers and SMEs display behaviour that implies that time and energy are becoming as important to them as money. Therefore, for some consumers, even quite low barriers to switching between suppliers (for example, price bundles that they find hard to compare), could prevent them from moving to alternative suppliers with lower prices. Similarly, these consumers would benefit from a telecoms service that made being a customer as untaxing as possible, through excellent levels of customer service. However, these consumers may not have the information they would need in order to choose such a better supplier.

4.15 In Phase 1, it is important for Ofcom to hear your views on what characteristics a well-functioning telecoms market would display. We want to understand what you consider to be the relative importance of the different benefits that the telecoms sector can deliver to citizens and consumers. For example, what is most important to you: that the market delivers low prices, or lots of choice, or that it is always the first in the world to deliver new products?

4.16 As well as informing us about the objectives of regulation, consumer feedback is important because it may have implications for the kind of activities that Ofcom should be involved with. For example, if you consider it particularly important that the market delivers clear, easily accessible information about prices and other aspects of choice, there may be a role for Ofcom in either helping to provide that information, or ensuring that it is provided properly by the market.

Past decisions on regulatory trade-offs

4.17 Over time, telecoms regulation in the UK has adopted different positions on these inherent regulatory trade-offs. Annex G discusses these past positions in more detail, and a summary is provided in this section.

4.18 When BT was privatised in 1984, the Government wished to create competition within all levels of fixed infrastructure. However, it was considered that multiple operators would not be strong enough to compete with BT's scale, so just a single competitor was licensed: Mercury. In order to encourage Mercury to compete using its own infrastructure, the Government included conditions in its licence which prevented it from leasing elements of BT's infrastructure, with the exception of interconnection for call termination. As well as creating this expected source of competitive pressure, the Government also wanted the benefits of lower prices to flow through to customers more rapidly than they might by competition alone. It therefore introduced a price cap on BT. Oftel was established to police the resultant licence conditions, including the price controls and interconnection agreements.

4.19 The 1991 Duopoly Review allowed more competitors into the market, and for the first time elements of service competition were permitted. For example, competitors to BT were allowed to lease infrastructure from BT, but only at retail prices. However, in the period after the Duopoly Review and up to 1997, there was a strong focus on infrastructure competition, particularly in the access network. The restriction on BT being able to provide entertainment services in its own right, introduced initially in the 1980s to provide a measure of protection to the fledgling cable TV industry, was maintained throughout this period. In other cases where regulation might have encouraged service competition at the expense of infrastructure competition, or long-distance network competition at the expense of access infrastructure competition, decisions generally erred on the side of promoting access infrastructure competition. For example, while number portability was introduced early, Oftel deliberately did not introduce carrier pre-selection (CPS) in this period. While CPS could have brought rapid benefits in terms of increased service provider-based competition and lower prices, Oftel considered this would come at the expense of infrastructure-based competitors. Oftel also changed the basis on which interconnection charges were set, in a way that favoured networks that built their own access infrastructure.

4.20 In the period since 1998, the balance has moved towards service provider-based competition. Among other things, this was partly the result of the 1997 EU Directives, and partly due to many competitive providers stopping rolling out infrastructure, following the collapse of investor confidence in the telecoms sector. The measures that Oftel introduced which favoured competition using elements of BT's network on a wholesale basis included carrier pre-selection, wholesale line rental, flat rate internet access call origination (FRIACO), and interconnection to BT's broadband network at the ATM layer. As a result of measures such as carrier pre-selection and wholesale line rental, service providers are now rapidly gaining market share in the fixed residential market.

4.21 In mobile, though the same trade-offs apply in principle, infrastructure competition at all levels in the network has been more widespread and sustainable than in fixed. There are now five network operators, and in its review of the retail market for mobile calls and access, Oftel found no operator to have SMP. As a result, Oftel did not have to make many of the more difficult choices between promoting service provider competition and promoting infrastructure competition.

The performance of the UK telecoms sector

4.22 The decisions that telecoms regulation has taken on these trade-offs over the last 20 years have helped shape today's UK telecoms sector. It is important that we now assess whether it is doing well or badly at delivering the kinds of benefits to citizens and consumers that were discussed above.

4.23 Figure 4 summarises how well different parts of today's telecoms sector are delivering benefits in terms of price, quality, choice and access to services, and how competition has developed. The scores are only intended for illustration, and represent a mixture of comparative measures (such as how well is the UK performing relative to other countries?), and absolute measures (such as how well has competition developed?). Annex H provides much more detail on our analysis. If you disagree with our assessment, please tell us why in your answer to Question 6 on page 23.

Figure 4: Summary of the benefits to consumers from the UK's telecoms sector

	Price	Quality of service and customer satisfaction	Service choice	Access to services	Competition
Fixed voice telephony	UK residential prices compare well with other countries; business prices above average	Very high levels of SME and residential consumer satisfaction; declining incidence of faults	Wide range of tariff structures and bundling options	Near ubiquitous take-up, only 1 per cent of households do not own either a fixed or a mobile phone	More competition in calls and access lines than other countries. Much of the call competition is from service providers, using alternative long-distance networks. BT still provides most access infrastructure
Internet	Narrowband and entry level broadband prices compare well with comparable markets; higher speed broadband more expensive	High satisfaction with broadband, lower satisfaction with connection speeds of narrowband	Full range of narrowband price structures. Some choice of broadband connection speeds, contention ratios, but flexibility in price structures only just emerging	Ubiquitous availability of narrowband. Broadband only available recently in many areas. Other areas need a 'trigger' level of demand in an exchange, and some households and exchanges not DSL enabled	Many service providers, but none with market shares over 30 per cent. Infrastructure provision largely provided by BT and cable companies. Almost all DSL lines use BT's access infrastructure
Mobile	Prices for pre-pay are lower than many other markets, and the UK is also relatively competitive in post-pay pricing	High overall satisfaction, although less satisfaction on cost and value for money. Incidence of dropped calls improving	3G services starting to become available but slow roll-out by incumbent operators. A full range of 2G and 2.5G tariff packages and devices is available	Mature networks cover almost all population and all except remote areas. Near-ubiquitous take-up amongst younger consumers; voice and text message usage increasing	High (licensing) barriers to entry at the network level, but the least concentrated market in Europe. Some new service provider competition, but many existing service providers now bought by network operators
Corporate network services	Published leased line prices are above European average	High levels of overall satisfaction with suppliers and reliability of service; less so for value for money and customer service	These services are the key focus of many Altnets. Competition has encouraged development of bespoke and tailored solutions	Most large corporate businesses are using some form of data network service. They may be reliant on BT infrastructure for some services	At least six players with significant market share although BT still retains around half the market; more for lower capacity leased lines

Key: Good Poor

4.24 Figure 4 shows that in general, the UK is delivering a good balance of benefits to consumers. For example, residential fixed telephony prices are cheaper than many other countries, and there is a very wide choice of mobile services and tariff packages. However, there are a number of areas where its performance is less good. For example:

- fixed telephony prices for small businesses are slightly more expensive than some comparator countries;
- for some time, access to broadband in the UK lagged behind comparator countries, and many broadband offerings were more expensive in the UK than in some other countries. Although this is no longer the case, penetration of broadband is still lower than some European countries. However, broadband penetration is now growing very rapidly in the UK; and
- the prices of most categories of leased line are more expensive in the UK than the EU average.

4.25 Price, quality, choice and access to services are very traditional measures of performance. As we discuss above, one of the tasks for the Telecoms Review is to assess what other ways of measuring the performance of UK the telecoms sector might also be important.

4.26 The table also shows that competition is more established in some parts of the telecoms market than others. The extent of competition is very difficult to measure, and cannot be determined just by looking at market shares. It is possible, however, to identify some broad trends, and these are discussed in more detail in Annex H. For example:

- BT's competitors have gained more market share in retail fixed call markets than they have in fixed access. BT has around 69 per cent of residential fixed call revenues, and around 50 per cent of business revenues. BT also has around 80 per cent market share of residential access lines, and a higher share of business access lines. However, its share is lower than incumbents in some other European countries, largely as a result of the higher penetration in the UK of cable TV networks capable of offering telephony;
- with five network operators and a number of non-network-based service providers, the UK's mobile market is potentially one of the most competitive in Europe;
- a variety of ISPs supply both narrowband and broadband services to residential and business consumers. BT's share of DSL is lower at the retail level than the incumbents' in some other European countries. However, at the infrastructure level, broadband is almost exclusively supplied over two infrastructures: cable TV networks upgraded with cable modems, and DSL supplied by BT; and
- a variety of suppliers provide corporate network services in the UK, giving a wide choice to corporate consumers. Many of these providers have their own long distance networks, and they also provide local access to some customers in some locations. But much of the access infrastructure for corporate consumers is provided by BT on a wholesale basis to these alternative providers.

4.27 Annex H also discusses two other measures of the sector's performance: whether the level of investment has been efficient, and the financial performance of the UK telecoms industry. It describes how investment levels have fluctuated significantly in recent years, and how the financial performance of the sector has also been very mixed, with weak results in particular by alternative fixed network operators.

Question 6: How successful is the UK telecoms sector currently in delivering benefits to citizens and consumers?

Section 5

The evolution of the telecoms sector

5.1 Section 3 noted that Ofcom has a statutory duty to reduce regulation where possible. We need to see if there are approaches that could lead to withdrawing regulation, where markets can or will become effectively competitive. Where there is a case for continued sector-specific regulation, it must be justified from first principles.

5.2 The central element of the case for sector-specific regulation in telecoms up to now has been the existence of market power. This has led to regulation designed to protect consumers directly and actively to promote competition.

5.3 Not only has the telecoms sector changed beyond recognition over the last twenty years, but it is also likely to change again very substantially in the period to the end of the decade. Among other things, these changes may be caused by technological trends (discussed in Annex J), changes in consumer demand (discussed in Annex I), and changes in the telecoms industry itself (such as mergers between companies). The effect of these changes may be to reduce or remove market power from parts of the market, so creating opportunities to withdraw from regulation. On the other hand, market power could increase in some parts of the market, or shift to different parts of the value chain, in which case there would be a continued case for sector-specific regulation, but with a change of emphasis and focus.

5.4 This section sets out the key changes, driven by consumer demand and technology change, that Ofcom considers could have a significant impact on market power, and hence on the regulatory requirement. This section looks at possible changes in four critical areas:

- competition in voice services;
- broadband and IP;
- evolution of network design; and
- the evolution of industry structure and strategy.

5.5 This section then considers how regulation can itself affect the transition to more open and competitive markets through the adoption of different regulatory approaches. Finally, it considers an important consequential effect of change on the potential future scope and funding of universal service obligations.

5.6 We would welcome views both on whether we have correctly identified the key trends, and also views on what these trends suggest about the broad approach to regulation that Ofcom should take.

Competition in voice services

5.7 The voice telephony market has been the historical focus of regulatory intervention, and provides the basis for much of today's telecoms regulation. In this section we deal with two possible changes to the voice environment. The first is increased competition for voice services across fixed and mobile platforms, and the second is the challenge to existing voice telephony businesses from VoIP services.

Fixed and mobile convergence in voice telephony

5.8 The market reviews conducted by Oftel in 2003 identified separate markets for fixed and mobile voice and data services. Oftel concluded that fixed and mobile services are insufficiently close substitutes to fall within the same market definition. Nonetheless, customers are already switching some mobile voice calls for fixed voice calls. There is also some switching from voice to non-voice communications, for example with people using text messaging in circumstances where in the past they might have made a voice call.

5.9 To some extent, this switching may represent a shift in behaviour driven by convenience rather than price. The important issue in assessing competition is whether switching between products will increasingly take place in response to changes in relative prices, such that mobile and fixed operations become economic substitutes[7] for voice and/or data services.

7 Two products being (demand) substitutes for one another has a precise meaning in economics. In response to an increase in the price of one product, consumers will switch to purchasing the other one, so that the demand for the latter rises as the price of the former goes up.

If two products are sufficiently close substitutes for each to constrain the other's pricing then these are likely to form part of the same economic market[8].

5.10 Seventy-six per cent of households now have access to both a fixed line and a mobile. In principle, an increase in the price of fixed calling might lead a number of these consumers to substitute a mobile service (voice call or text message) for some of their fixed calls. If such 'call substitution' were substantial it could constrain the price of fixed, with a small price rise from the competitive level being rendered unprofitable, and the two would be regarded as part of the same economic market. Currently the costs of mobile calls are significantly higher than those of fixed calls. In conducting its mobile market review, Oftel noted that mobile operators' traffic related costs are expected to remain above those of fixed networks. Oftel considered that consumers might well be prepared to pay some premium for the additional convenience of mobiles. However, it took the view that the cost differential between fixed and mobile exceeds this premium and the availability of mobile services is not a sufficiently strong constraint for them to be regarded as being in the same market as fixed.

5.11 Unit costs are declining both in fixed and mobile technologies. It may be that in the long term, the costs of the two platforms will converge and consumers will readily substitute between them. An important factor could be the release into the market of additional mobile network capacity as 3G networks come on line, reducing unit costs. Even if the unit cost of mobile remains higher than fixed, the difference may be sufficiently modest that consumers are willing to pay the very small premium implied for the greater convenience of mobile.

5.12 The shift in usage patterns could go further than the scenario of consumers who have both fixed and mobile erring on the side of mobile to make individual calls. 'Platform substitution' would occur if consumers stopped subscribing to one technology altogether because they preferred another; for example, if they did not have a fixed line because they had a mobile.

5.13 There is evidence of some consumers taking mobile services only, with no fixed line: currently 9 per cent of UK households have access to a mobile phone only. However, there is a question of whether such switching behaviour is sufficiently responsive to relative prices to bring the two into the same economic market. Some consumers (such as temporary workers or students) may choose to use a mobile on its own because of transitory living arrangements or convenience factors, and would not have taken a fixed line in any case. Some consumers may keep a fixed line because they prefer to use it for data communications. However, others may be more responsive to relative prices. In assessing whether to switch to mobile only, consumers will take account of the full costs of using each service, i.e. line rentals as well as call charges, or the cost of a bundle including most of the calls that the consumer wishes to make.

5.14 Even if the costs of fixed and mobile operations become sufficiently close to form part of the same economic market, the precise nature and speed of substitution between them will be affected by the business strategies of the various operators. Mobile operators might adopt a strategy of aggressive call pricing in order to grow market share, taking call volumes away from the fixed operators. To stimulate the trend towards platform substitution, and ultimately grow their businesses, mobile operators might offer large bundles of calls at low per-minute prices. Alternatively, an operator on one platform may extend its brand into the other platform, offering combined fixed and mobile services with a single bill and attractive bundles including both fixed and mobile minutes. Service providers without their own network infrastructure might also offer combined fixed and mobile services. Such a strategy could further increase

8 Substitution between products underpins the market definition approach used by Oftel for the market reviews, which is itself based on competition law. The European Commission's Notice on the Definition of the Relevant Market for the Purposes of Community Competition Law defines markets by examining substitutability between products. Suppose that the price of a product were permanently raised above the competitive level by a small margin (in the range 5-10 per cent). If substitution to other products were sufficiently high to render the price rise unprofitable because of the resulting loss of sales, the closest substitutes should be included as part of the relevant market. The market is the smallest set of products such that a profitable price rise can be implemented for the group. Although demand substitution is generally the most significant factor in this assessment, substitution may also occur on the supply side, i.e. when a supplier of another product (that is not necessarily a demand substitute) switches its production to the good in question.

substitution between fixed and mobile calling, although it might perhaps hold back full platform substitution. It should be noted that service providers without their own network infrastructure are dependent on wholesale agreements with existing networks, and hence may not have complete freedom of action in terms of their pricing strategies.

5.15 Finally, there may in future be a substantial blurring of the definition of 'fixed' and 'mobile' services, with the emergence of new technologies offering limited mobility and enhanced functionality. Wireless LAN 'hotspot' solutions using 802.11 technology are currently being deployed by both fixed and mobile network operators, giving high speed connectivity within a small area. Other limited mobility wireless technologies, such as 802.16 ('WiMax') may be deployed in future, giving different combinations of connection speed and coverage. As these technologies are deployed both by fixed and mobile operators, and as devices become capable of connecting to different access networks in fixed, limited mobility and fully mobile environments, the services of the two types of operator could converge, and distinctions between them blur. One implication of this is that substitution of traffic between fixed and mobile could potentially take place in the opposite direction from that described above, away from mobile operators and towards fixed operators.

Why it matters:

5.16 Existing regulation regards BT as having SMP in relation to fixed narrowband exchange lines, certain fixed narrowband calls markets, and call origination. Were a more competitive, cross-platform market for both calls and access services to develop in the medium term, this could affect a future assessment of SMP in these markets.

Question 7: How rapidly and extensively will fixed and mobile networks become substitutes for one another?

Effect of VoIP

5.17 Alongside the migration of voice traffic from the traditional, circuit-switched fixed telecoms network to mobile, migration may also take place onto IP networks.[9]

5.18 Ofcom uses the term Voice over IP (VoIP) to mean a voice call that is delivered over IP networks (either the public internet or a managed private IP network) instead of the traditional Public Switched Telephone Network (PSTN). However, as a retail proposition, it includes a number of different products. One is software which enables two computer users to speak to one another if both are online. Another allows a computer user to call any telephone while online. The most significant and mainstream products allow a conventional phone to be plugged into an adaptor box which converts the signal to IP. These are available both for narrowband and broadband connections.

5.19 VoIP potentially offers substantial benefits to consumers. In principle, it could lead to a step reduction in the core network costs of providing voice telephony. It also offers much greater scope for value-added voice services, such as multi-party conferencing, than traditional analogue circuit-switched delivery.

5.20 Some of the practical barriers to deployment are starting to be addressed, such as VoIP to PSTN interconnection, which allows VoIP users to interconnect seamlessly with existing switched voice telephony users, and problems around access to emergency services. However, interoperability in the VoIP environment remains a significant concern.

5.21 Corporate use of VoIP is now widespread, because complex corporate networks are increasingly used both for voice and data traffic. However, use of VoIP to date by residential and SME consumers has been restricted to use via computers by a small niche of internet users. Many telecoms operators worldwide are now either actively deploying, or at least outlining plans to deploy, retail VoIP services targeting all customer segments. Residential VoIP services may initially be bundled with broadband and, as the number of broadband users grows, this may drag VoIP in its wake.

9 These trends are not mutually exclusive – mobile networks may also use IP.

5.22 However, existing voice telephony providers are likely to face a mixed motivation in deploying VoIP. Existing access operators, having invested in a fixed voice network architecture, might be expected to seek to maximise returns on that architecture rather than incur the costs of a further cycle of investment. This, of course, partly depends where operators are in their investment cycle. An operator contemplating new network investment today might deploy VoIP rather than invest in PSTN infrastructure that is already technically obsolete.

5.23 We need to understand when, and how, operators may make the decision to roll-out large scale VoIP propositions. In principle, VoIP is a lower cost technology, and so could offer operators higher margins on voice calls. However, existing operators might prefer to delay its introduction if it 'stranded' existing network equipment, or if it precipitated such falls in prices that their margins ended up being lower. The feasibility of an existing operator delaying entry of VoIP is dependent on whether all other market players are likely to pursue the same strategy. This partly depends on whether all market participants have the same amount to gain from a decision to venture down the VoIP route. It would take just one company to break ranks – and in the case of VoIP, this need not be an existing voice telephony provider – to undermine the efforts of existing players to maintain the status quo.

5.24 Were it deployed on a very large scale, VoIP might display rather different cost characteristics than exist now. Currently, it uses bandwidth which has been put in place for data communications. As it becomes mass-market, it may not be able to take advantage of 'costless' access to bandwidth in this way. It will be important for Ofcom to understand the economic characteristics of VoIP in the course of the Review.

Why it matters:

5.25 The implications of VoIP deployment are potentially massive. From a competition perspective, VoIP could erode existing market power in relation to calls and access services. On the other hand, VoIP may not eliminate the need for regulation but merely alter the regulatory challenge – an issue that can only really be addressed by developing a detailed understanding of how a future VoIP market might develop.

Question 8: What impact will Voice over IP have on the telecoms market?

Broadband and IP

5.26 Not only is the market for voice services changing rapidly, but the rise in demand for higher speed data services may change the telecoms market in other, equally fundamental, ways. This section considers future trends in relation to broadband – its growing importance, and the consequences of this for investment and change in the telecoms market.

5.27 Ofcom has reviewed projections for broadband penetration in the UK, which range from 40 per cent to 50 per cent of households by 2008. This is comparable with projections for the US and the majority of European states, but well behind the economies of the Asia-Pacific rim. Whatever the exact number, by the end of the decade, broadband is likely to have grown from a niche product to a mass-market product and will be critical to the prospects of the sector. This is borne out by the importance attached to broadband growth strategies by telecoms companies themselves.

5.28 Some commentators have argued that broadband take-up could be even more rapid than this. Rather than a steady, predictable rate of increase, they suggest a 'tipping point' at some stage in the evolution of the broadband market. At this point, broadband would move very rapidly from a niche product to a mass-market product, and then to a 'must-have' product similar to voice telephony.

5.29 One important question is the extent to which this broadband growth occurs at the expense of the existing narrowband data market. The narrowband data market has evolved from the first dial-up services

using local, national and premium rate telephone numbers through to the development of unmetered internet services. All of these continue to be provided over the traditional circuit-switched network. This market is likely to decline in importance as broadband services largely substitute for narrowband, and therefore the principal competitive and regulatory issues in future are likely to arise in relation to broadband. The transition from narrowband data to broadband data may be less fundamentally disruptive than the potential transition of voice services to the IP environment. However, as we discuss below, the combination of the narrowband to broadband transition and the migration of voice services could, in combination, have important implications for the existing circuit-switched network architecture.

5.30 This sub-section considers the impact on market power, and the telecoms regulatory requirement, of four aspects of the growth of broadband. These are:

- the scope for competitive delivery of broadband services over different platforms;
- the scope for competition in IP networks;
- the deployment of new 'broaderband' services; and
- broadband content.

Question 9: How rapidly and extensively will broadband be taken up in the UK, and what are the regulatory implications of such growth?

Scope for competitive delivery of broadband services over different platforms

5.31 When assessing the scope for future competition in relation to broadband services, Ofcom must take a view on the extent to which inter-platform competition could emerge. Some larger business customers in metropolitan areas have a choice of alternative providers of fibre access. For smaller businesses and residential consumers, today's broadband services are largely being delivered through a combination of incumbent telephony networks upgraded to deliver DSL products, and cable TV networks upgraded to deliver 'cable modem' services.

5.32 However, wireless networks, satellite, 'powerline' (which delivers telecoms services over electricity cables) and passive optical networks are all possible sources of further access-level competition. Local loop unbundling (LLU), while not 'pure' platform competition, involves an element of infrastructure competition in access. In the course of the Review, it will be important for Ofcom to understand the scope for new competition from these sources. For example, many analysts do not include mobile networks when assessing the scope for competition in broadband. However, mobile networks are also deploying broadband architectures. They may be able to deliver broadband services which would, in terms of functionality, match some of those currently available on wired networks.

5.33 There has been substantial investment in broadband mobile access technologies; in particular, 3G. Wireless LAN 'hotspot' services are also being rolled out in many public places. However, in recent years there has been little inclination on the part of operators or the capital markets to fund large-scale new fixed access networks in the UK. But this may well change over time. Japan, Korea, the US and France are all attracting capital into access infrastructure, either in the form of new primary infrastructure (typically fibre-based) or Local Loop Unbundling (LLU), albeit in very different market environments to the UK's. Understanding whether such market developments could also happen in the UK (recognising that regulatory choices partly affect the answer to this question) is an important issue for the Review.

5.34 It is also important to understand how extensive the geographic reach of such new networks might be. There are likely to be different levels of competitive intensity in different parts of the country. Regulatory policy might therefore need to balance the requirements of urban areas where there may be scope for further network development, and rural areas where there is less likely to be any source of competition to BT's access network.

Why it matters:

5.35 If there is scope for further additional access network construction which competes with DSL and cable, this might suggest a declining case for regulation of broadband access over time. On the other hand, if there is little scope for roll-out of additional broadband networks in the medium term, this would suggest that broadband access needs to be an area where regulation is particularly focused. This is important because, as discussed in Section 4, there may be a trade-off between regulation to promote further access infrastructure build, and regulation designed to promote access to existing infrastructure.

Question 10: What scope is there for new, competing broadband platforms to be rolled out, and which technologies are most likely to be used?

Scope for competition in IP networks

5.36 Broadband is a significant driver of the migration by operators towards a so-called 'all IP' network. Such an 'all IP' environment would involve the progressive replacement of existing legacy networks over a period of time. Potential advantages for the operator include moving to a lower overall cost base, principally through the ability to 'de-layer' the network and strip out intermediate network protocols such as ATM and SDH, and also through benefiting from the cost savings associated with a single network architecture.[10] What were previously said to be disadvantages with this approach – most noticeably, concerns about the security and quality of service of an IP architecture – are now being addressed. For example, multi protocol label switching (MPLS) is already allowing very robust virtual private network (VPN) products to be rolled out to corporate consumers.

5.37 At present, networks interconnect to one another at different levels of the network architecture. BT, for example, offers a range of wholesale broadband offerings. These include IP Stream, which bundles the access part of the BT network with BT's IP network; and Data Stream, which allows other operators with their own fixed networks to take traffic from the BT access network and divert it, via an ATM interconnection, onto their own networks for onward delivery. As part of the Broadband Overview, Ofcom has been looking at options for increasing competition in the backhaul part of the market.

5.38 If networks were to deploy 'all-IP' architectures, an arrangement such as Data Stream could potentially be rendered obsolete, and new interconnection products might be required. This might shift the focus of regulation toward the viability and sustainability of competition in relation to the IP layer itself.

5.39 IP networks are frequently stated to exhibit large returns to scale, principally in terms of customer numbers and overall traffic volumes. Ofcom would like to explore this issue further, given its implications for the scope for future competition in the market. In particular, we would like to understand whether these scale economies are greater, lesser or different in nature from the scale economies which have traditionally been associated with the PSTN.

Why it matters:

5.40 Competition at the backhaul and core network level was an important component of the regulatory approach adopted by Oftel. If the introduction of IP changes the economics of these networks, it is likely to change the current assumptions underlying the regulatory structure in this market. We need to understand the scope for competition in this part of the market in the future, and what form that competition could take. We can then determine what regulatory regime (if any) is required to ensure effective competition.

Question 11: When are operators likely to move towards 'all IP' architectures, if at all?

Question 12: What are the implications of 'all IP' networks for the way networks interconnect with one another, and for the scope of competition?

10 These technology trends are discussed in more detail in Annex J.

Deployment of new 'broaderband' services

5.41 The current range of higher-bandwidth offerings available to UK consumers includes entry-level products aimed at residential consumers and SMEs offering download speeds below 512kbit/s; mid-range products offering 512kbit/s to 1 mbit/s; 2 mbit/s ADSL and SDSL services aimed at SMEs; and leased lines of 2 mbit/s and upwards aimed at larger businesses, which offer bandwidth plus no 'contention', guaranteeing a set amount of capacity for the customer.

5.42 In some other countries, a new generation of much higher speed services is becoming available, both for business and residential consumers. An issue for the Review is to what extent demand for these 'broaderband' services will develop here, and how the market will serve these needs.

5.43 Two possible stimuli for demand are the need for symmetrical bandwidth services which cater for peer-to-peer activities and transactions such as file sharing; and demand for download speeds which are sufficient to cope with full-motion video and video gaming. The technological capabilities for such services already exist, and they are now being deployed in Korea and Japan.

5.44 Further network investment would almost certainly be required to support these services, even by operators who already provide broadband. The cable network infrastructure may already be capable of supporting such download capabilities in theory, but we understand it would be necessary to make further investments to support a large-scale roll-out of higher bandwidth services, not least in relation to core network transmission capacity and server architecture. BT would need to make very significant network investments to support speeds of, for example, 5 to 10 mbit/s. It may need to deploy fibre much closer to the customer, potentially all the way to some customers' locations. Other broadband transmission infrastructures, including fixed wireless access technologies such as WiMax (802.16), might also provide a means for meeting this demand for higher speeds.

5.45 As well as demand from residential consumers for 'next-generation broadband', there is also potential demand from businesses, particularly SMEs. At present, DSL-variant products and cable-modem based products occupy a niche, serving businesses who do not require or cannot justify the expense of leased line services. Whether there will be continued demand depends on the relative pricing of these products and leased lines, and whether businesses themselves require ever-increasing bandwidth.

Why it matters:

5.46 In principle, decisions to invest in 'broaderband' networks, even if the scale of investment required is considerable, do not in themselves present any new issues or challenges for regulation. But it is important that regulation facilitates network investment where it is efficient and desirable. Investment may not always display these characteristics – as Section 4 sets out, there may be a trade-off between dynamic and other forms of efficiency.

5.47 Therefore, in practice it is important for Ofcom to understand if major new network build is required in the near term. A linked issue is where, realistically, such investment may come from. Whether there is scope for such investment from BT, from the cable companies, from mobile operators and/or from new entrants and new technologies could also have important consequences for regulation.

Question 13: Is there likely to be widespread demand for services that require 'broaderband' networks to be rolled out and, if so, how will such infrastructure be supplied?

Broadband content

5.48 One constraint on the uptake of broadband is the need to develop viable content models. This is particularly relevant to the question of whether a business case for 'broaderband' networks will emerge.

5.49 Broadband-enabled 'entertainment-type' services may need to compete with traditional linear broadcasting technologies (such as satellite DTH), and off-line DVDs and video games, for a share of consumers' expenditure. In the medium term a 'converged' market for video entertainment services could perhaps emerge, encompassing both these more traditional broadcast platforms and 'telco-type' platforms, at least for some categories of entertainment service. Clearly, there are strong players already operating within this space, in some cases with exclusive rights to certain premium content. Broadband-based services would need to find sufficient differentiation in order to secure the kind of margins which would justify the high upfront investments that would need to be made. For example, time-shifted TV is one such possible market opportunity.

5.50 A practical constraint on the development of broadband as a content delivery platform is the desire of major rights holders to restrict illegal file-sharing activity, and their corresponding reluctance to set up legitimate online content distribution channels. Our discussions with stakeholders suggest that two things are likely to be needed to give some rights holders sufficient comfort to release content for broadband distribution. The first is effective and agreed standards for digital rights management (DRM).[11] The second is a legal framework and enforcement mechanisms that can be used effectively against intellectual property infringement.

Why it matters:

5.51 Without compelling broadband content, there may be a ceiling on the demand for broadband from residential consumers. Access to entertainment content is also likely to be the stimulus for any residential demand for 'broaderband' connectivity in future. In this way, access to broadband content is likely to affect the speed of many of the other changes discussed in this section. Therefore, Ofcom is particularly keen to hear the views of stakeholders on the likely evolution of content business models, and the possible constraints on them.

Question 14: How rapidly are broadband content businesses likely to emerge, and what factors will affect their viability?

The evolution of network design

5.52 Alongside changes in the way that consumers wish to use telecoms, technological progress means that telecoms companies may increasingly change the way that services are delivered. In this section we discuss three trends in telecoms network architecture that may have implications for the sources of market power in the telecoms sector, and therefore for regulatory policy. They are:

- the growth of functionality and intelligence at the edge of networks;
- the control over standards and interfaces; and
- the 'legacy network' problem.

Growth of functionality and intelligence at the edge of networks

5.53 Annex J describes the trend towards greater and greater performance capabilities being built into the apparatus and devices connected to (or 'at the edge of') networks. The increasing demand from customers for options which allow personalisation and customisation, and the development of peer-to-peer file sharing, appear to be strongly correlated with this. Over time, the relative intelligence and functionality of consumer devices connected to the network may continue to increase, particularly while a bandwidth 'bottleneck' continues to exist between consumers' devices and the core network.

5.54 This could, in turn, make some elements of the consumer experience more dependent on the device and less dependent on functionality built into the network itself. On the other hand, some kinds of customer data (such as location data) may become more important in offering a rich customer experience.

11 Ofcom intends to consult on DRM later in the year, as part of its project to advance broadband development.

Therefore, control over these kinds of data may become an increasing source of competitive advantage.

5.55 While the deployment of intelligence at the edge of networks may be a strong trend, it may not take place evenly across all networks or service segments. The fixed voice, mobile voice, and broadband business models of different operators currently support widely divergent degrees of intelligence and autonomy at the edge of their networks. It will be important for Ofcom to understand whether this is a short-term divergence or indicative of a longer-term trend.

Why it matters:

5.56 If ever-greater service differentiation occurs in the device, rather than in the network, increased creativity and service innovation may not rely on control over the network. This could allow some of the regulation relating to control over networks to be removed. On the other hand, service delivery could increasingly rely on ownership of data such as customer location data, customers' personal data, software, intellectual property and so on, and this could pose challenges for regulation in new areas.

Control over standards and interfaces

5.57 The trend towards delivery of both fixed and mobile, and voice and data services over IP, has been discussed above. IP is an open standard, over which many different applications (including voice) can run. In principle, the increased use of IP means that much of the scope for innovation and competitive differentiation does not rely on control over the network. Any service provider can design a new service, and provided it runs over IP, they don't need control over the network in order to introduce it.

5.58 In contrast, proprietary standards may be an increasing source of competitive advantage. For example, if network operators deploy proprietary standards over their network, and own the licence to those standards, this may be used as a means of restricting or exploiting activities by service providers. Alternatively, if computer operating systems expand and become network operating systems, developers of those operating systems could gain control over the whole service activation environment.

5.59 In parallel, network operators may themselves come into conflict with equipment manufacturers over control of standards. As Annex J notes, telecoms standards have increasingly migrated towards being specific to, or controlled by, vendors rather than network operators. This may lead equipment vendors to have increasing market power in telecoms markets in the future.

Why it matters:

5.60 To date, much of the focus of telecoms regulation has been about the price that competing operators should pay to access each others' networks. In future, the standards that are deployed over networks, and the terms on which proprietary standards may be used by others, may take on a greater importance and pose new issues for regulation.

Question 15: How will future network evolution, such as growth of intelligence at the edge of networks, and the increased importance of control over technical standards and interfaces, affect the requirements of telecoms regulation?

The 'legacy network' problem

5.61 The rise in broadband relative to narrowband, and in mobile relative to fixed voice, and of IP networks, could all have an important knock-on effect. There could come a point where the existing circuit-switched architecture starts to become uneconomic for operators to maintain.

Why it matters:

5.62 During the transition, a group of customers may remain reliant on this 'legacy' circuit-switched architecture. The fixed costs of this network would remain constant, but would have to be recovered from this (declining) group of customers. If the rate of this

traffic migration is not correctly anticipated by the regulator when setting the rate of depreciation of network equipment for the purposes of determining interconnection prices, this could cause windfall gains or losses to consumers or to telecoms network operators.

5.63 The transition is also unlikely to take place evenly across customer groups or geographies. Customers remaining on the old network are likely to be clustered in particular locations and demographic groups. As a result, this transition is likely to raise significant universal service and consumer protection regulatory issues.

Question 16: Will it become uneconomic for operators to maintain the existing circuit-switched architecture at some point and, if so, when? What regulatory issues will this transition to IP networks raise?

The evolution of industry structure and strategy

5.64 Along with changes driven by technology and consumer demand, there may also be a realignment of the telecoms industry itself during the period under review. This may result in changes in market concentration or market power.

5.65 The financial performance of the telecoms sector is discussed in Annex H. It describes how there has been a fundamental re-evaluation of the value of businesses in the telecoms, media and technology sectors. Many network operators are either going through a financial restructuring process or are expected to do so. Many industry commentators have predicted for some time, and continue to predict, realignment in the sector, although opinions differ as to when it will take place.

5.66 This document does not address the underlying reasons for this realignment, but it is very important that Ofcom understands the prospects for the sector and the likelihood of changes in market structure. Were some kind of realignment to take place, it could be through:

- horizontal consolidation, (for instance, mergers of existing mobile networks, or alternative fixed telecoms networks);
- vertical mergers (for instance, service providers merging with network operators, or network operators with content companies);
- alliances which, although not mergers, are designed to reap some of the benefits that would flow from horizontal or vertical integration;
- market entry through brand extension, such as mobile telecoms companies extending into the fixed market and vice versa, or service providers and retailers from entirely different markets entering the telecoms sector.

5.67 Given that, in the short run, the majority of network operators' costs are sunk, the principal benefits of horizontal consolidation may be a merging of customer bases and a reduction in the number of competitors. Equally, there are trends towards vertical alliances. For instance, there is a tendency for network operators to partner with systems integrators who are bidding for the managed services contracts of large corporate customers, and tentative alliances are being formed between networks and content providers in the broadband environment.

5.68 Any proposed integration would be subject to the normal approval processes under competition law. However, Ofcom would like to understand the strength of the drivers for integration and alliances in the industry, whether vertical or horizontal.

5.69 In principle, aggressive organic growth or brand extension represent alternative strategies which do not involve merger or partnership. If current operators are sub-scale, or lack the efficiencies which flow from vertical integration, entry into related markets through brand extension may address this by making greater use of existing assets.

Why it matters:

5.70 If a trend towards mergers and alliances outweighs any trend towards market entry through brand extension, greater concentration in the market would be the likely result. This could raise issues for the scope of future regulation. In particular, there might be a case for increasing the flexibility and effectiveness of regulatory devices available to regulate markets where there is more than one player with some degree of market power.

Question 17: Are consolidation, alliances, market entry or other forms of market evolution likely? What will their implications be for telecoms regulation?

The transition and development of the market

5.71 So far, this sub-section has discussed how change in four areas might cause shifts in the nature of market power in telecoms, and therefore have implications for regulation. However, some effects go the other way. Regulation could itself affect the rate of transition towards these outcomes. This is a very important topic; for example, many commentators argue that the rate of deployment of broadband will be significantly affected by the form of regulation adopted.

5.72 In deciding whether to make changes (for example, by entering a new market or investing in new infrastructure), telecoms companies consider the risk and expected returns from doing so. These can be affected by regulation, and this section considers the impact it may have in two areas in particular:

- the impact of regulation on investment; and
- the impact of consumer protection measures, and the impact of regulation on consumer behaviour.

Regulation and investment

5.73 Investment is critical to development in most industries, and particularly in telecoms. Without substantial capital outlays, major improvements to the network, such as digitalisation in the 1980s and the creation of new services such as broadband, would not take place. Nonetheless, encouraging investment should not itself be an aim of regulation; instead it is important that regulation facilitates the economically efficient level of investment. It is therefore important for Ofcom to understand not only the scope for new technologies and services but also the drivers of the investments necessary to convert them from technical possibilities to practical offerings.

5.74 Investment depends on risk and return. Most investment projects involve up-front costs, such as installing physical infrastructure or designing and marketing a new product, which are incurred before significant revenues are earned. These revenues are risky; the investor does not know for certain at the start of the project exactly what revenues will accrue in the future. Risk is therefore an inherent part of undertaking investment. Firms will invest only if, on balance given the range of possible outcomes, they expect to make a commensurate return.

5.75 Similar principles apply to providers of finance, as well as the investing companies themselves. Financiers will not provide funds unless the expected return compensates them adequately for the risk involved.

5.76 In a regulated sector such as telecoms, regulation interacts with the investment process in critical ways. Once capital investment has been made, it may seem desirable to the regulator to push prices down towards the avoidable cost of production. In doing so, the return on investment may be undermined. If investors anticipate this behaviour then they will no longer be willing to invest, even if the project were an intrinsically desirable one.

5.77 In its extreme form, the problem is one of a 'regulatory hold-up': knowing that the investment cost is sunk and cannot be recovered, the regulator could, in theory, deliberately expropriate this by reducing

prices. However, even in the absence of deliberate intention, regulation might undermine investment through a number of mechanisms.

5.78 First, the mere fear of subsequent expropriation might be sufficient to deter investment. If investors do not trust the regulator, or if the regulator cannot signal its intentions in a way that is credible and reliable, investment may not take place – even though, in fact, the regulator would have taken due account of the capital outlays involved and included an appropriate return in determining regulation.

5.79 Second, assessing the appropriate rate of return to include in regulated prices is not straightforward. There are likely to be debates about the precise cost of capital, even if the calculation methodology is agreed. Moreover, for investments where the initial probability of failure is high, a return to success that merely covers the cost of capital is unlikely to generate an adequate return overall, as viewed from the start of the project.[12] This issue is particularly important in sectors where risks are high and innovative investments are highly desirable; it is less relevant for well-established businesses, or for companies undertaking a range of projects, some of which may succeed and some fail.

5.80 Regulatory systems in different countries use various mechanisms to reduce this problem. In the US, regulated utilities traditionally received a legally guaranteed rate of return on their qualifying investments, and had legal redress to courts to enforce this. On the other hand, the US system leaves open considerable scope for litigation around the details of the regulation and this can introduce unpredictability. The UK has pursued a more flexible strategy, instead relying on the length of the regulatory reviews and the informal 'regulatory contract' between regulated firms and the regulator to provide predictability. If the regulator were to behave opportunistically at one point in time, companies are likely to respond to this by cutting back on future investment. Given that companies make a sequence of investments over time, with the need for investment rarely diminishing, it is in the interests of the regulator to respect past investments in order to ensure that investment takes place in the future. In this way, and assisted by stated policy aims, regulators in the UK have been able to create an environment in which investment has taken place.

5.81 Competitors and new entrants, as well as incumbents, are affected by regulatory decisions. Competitors may not be formally regulated but the price that may be charged by a regulated firm generally creates a ceiling on the return that a competing firm may achieve. Where a competitor uses part of the incumbent's network, the competitor's return is partially dependent on the price that it must pay for this access. When both types of competitor are present – those that purchase access to the incumbent's infrastructure and those that compete directly with it – the effects of regulatory decisions become correspondingly complex.

5.82 It is important for Ofcom to understand the sensitivity of capital investment decisions in the telecoms sector, by various parties, to regulatory interventions. It has been argued by some commentators, most recently during the passage of the Communications Act, that previous regulatory approaches have had a 'chilling' effect on investment. On the other hand, the evidence would suggest that the UK has not performed appreciably worse than other countries in attracting investment as a result of its approach to regulation – in fact the available evidence suggests rather the opposite; this is reviewed in Annex H. Whatever the answer, the question going forwards is how Ofcom can adopt the optimal approach with regard to future investment.

5.83 One possible conclusion from this analysis might be that the regulator should, in certain circumstances, tolerate higher prices in order to ensure that the appropriate investment incentives are maintained. However, this is a step which no regulator charged with protecting consumers' interests can take lightly.

5.84 It would also be desirable to consider ways in which the regulator may achieve transparency and predictability in its approach to investment, in order to reassure investors that it will not act opportunistically

12 This point can be illustrated by considering investment to create a new pharmaceutical product. Suppose that, at the point when research is commenced, it is known that it may either succeed in creating a drug that treats a certain medical condition, or fail completely, each with probability one-half. If in the event of success the price that is permitted for the drug merely covered the cost of capital, the expected return on the project as viewed from the start will be half the amount needed to generate an adequate return.

or randomly to the detriment of investment. Some countries have experimented with mechanisms such as 'forbearance' from applying regulation (pioneered in Canada, and more recently a feature of the Federal Communications Commission (FCC)'s policy approach in the US), and the setting of clear margins and differentials between products on a forward-looking basis (as used in France). The UK has sought to implement the EU framework in a way which provides as much clarity as possible, but has stopped short of both the approaches identified above. We would like to understand the value that investors place on regulatory certainty, recognising that the granting of certainty comes at a price in terms of loss of flexibility to respond to changing market circumstances.

Why it matters:

5.85 Ofcom recognises the importance of investment by both incumbents and their competitors, where this is efficient and productive. Healthy levels of investment are fundamental to the process of creating competitive markets and, by extension, to satisfying consumers' needs. We therefore need to be aware of the ways in which regulation might inhibit investment that would otherwise be desirable – without, of course, encouraging investment that is inefficient. In particular, Ofcom would like to consider what approaches might be adopted towards creating a consistent and secure regulatory environment in which investment may take place.

Question 18: What impact do different regulatory approaches have on investment decisions in telecoms, and what regulatory approaches does this imply that Ofcom should adopt?

Consumer protection and behaviour

5.86 Regulation may also affect the risk and return that operators perceive in other ways. In particular, consumer protection regulation, and the impact that regulation has on consumer behaviour, may have an impact. In both cases, there is a trade-off between the beneficial intent of regulation and the possible damage from over-regulation.

5.87 Most competitive markets attract a certain number of unscrupulous suppliers. Telecoms is no exception, and measures are sometimes needed to protect its consumers. Often, self-regulatory or co-regulatory solutions can be most effective in achieving this, provided they include effective enforcement powers. However, over-application of this kind of regulation can slow the progress of emerging products or market trends. Occasionally, gentle application of such regulation might facilitate the emergence of new products, by preventing the unfettered market behaviour of disreputable suppliers from causing such a loss of public confidence that the development of the market in question is retarded or damaged. For example, regulation of premium rate calls was introduced as a response to consumers running up large phone bills unintentionally.

5.88 VoIP is an example of this balance. Requiring VoIP to conform to quality, or other thresholds of traditional telephony, could mean that many of its benefits do not flow through to consumers. On the other hand, regulation may be desirable to prevent VoIP products being launched which are of insufficient quality and not labelled as such, or which attract negative publicity because, for instance, customers do not realise that certain elements of the standard voice telephony service are not available.

5.89 The impact that regulation has on consumer behaviour may also affect the risks and returns that operators perceive. For example, the EU regulatory regime provides national regulators with powers which allow them to remove or limit the impact of certain barriers to consumers switching from one supplier to another. Again, it is important that Ofcom should get the balance right between acting to remove such barriers and interfering unduly in the normal operation of the market.

5.90 For markets to function effectively, consumers must be able to exercise choice and 'vote with their feet'. In the past, the Office of Fair Trading and Oftel have successfully removed certain barriers, such as lengthy mobile contracts and lack of number portability. On the other hand, over-zealous application of regulation to encourage switching could mean that operators fear that they would not recoup any investments they make in establishing customers with their products (for example, through their spend on marketing). This could discourage operators from introducing new services, to the detriment of consumers.

5.91 A further issue is whether all consumers enjoy adequate access to information, and are able to exercise choice, in the same way. It may be that some consumers naturally find it easier to exercise effective choice than others. Our initial consumer research (discussed in Annex I) suggests that some consumers resent a lack of comparability and clarity in pricing for telecoms services. Research conducted by the National Audit Office[13] supported this conclusion and also found a lack of awareness of alternative call providers among residential consumers. The House of Commons Committee of Public Accounts[14] has also suggested that the range and complexity of tariff packages and the lack of clarity of bills are confusing to consumers, and prevent them from making meaningful comparisons.

5.92 Ofcom recognises the importance of this issue and that it merits further study. While in theory it may not be necessary for all consumers to be able to exercise effective choice in order for the benefits of competition (for example, lower prices) to flow through to all, it might be a desirable objective for regulation to promote a wider understanding of the choices on offer. As part of the Review, it will be useful for Ofcom to understand the extent to which certain pricing and packaging options might work against this. A critical issue for Ofcom is the extent to which regulation should take an active role in signposting, providing, or ensuring that the market provides clear information to enable consumers to make informed choices.

Why it matters:

5.93 Ofcom is responsible for consumer protection regulation in telecoms as well as regulation designed to influence consumer behaviour (for example, through making switching easier or through ensuring that certain market information is available). It is very important that Ofcom strikes the right balance between protecting and delivering benefits to consumers, and over-regulating markets. Over-regulation could affect the risks and returns that telecoms companies perceive for introducing new products or other activities, potentially to the detriment of consumers.

Question 19: What is the right role for consumer policy? What impact do different approaches have on telecoms companies' perceptions of risk and return?

Question 20: What role should Ofcom take in signposting, providing, or ensuring that the market provides clear information to consumers, enabling them to make effective choices?

Emerging pressures on existing universal service arrangements

5.94 Finally, it is worth considering whether the trends we have identified also have significant implications for the final limb of current regulatory policy: the maintenance of universal service arrangements.

5.95 When BT was a nationalised monopoly, it funded unprofitable services that the Government deemed desirable, through cross-subsidisation from profitable services. Since then, BT and Kingston Communications have continued to be required to provide a set of services to disadvantaged consumers and to consumers in remote locations. A number of other providers also have certain Universal Service Obligations (USOs). The current regulations are described in Annex G.

13 Source: *Helping consumers benefit from competition in the telecommunications market*, National Audit Office, July 2003. The research found that 77 per cent of residential consumers could not name any indirect access call providers. This research is summarised in Annex I.

14 Source: *Helping consumers benefit from competition in telecommunications*, Eleventh Report of Session 2003-04, House of Commons Committee of Public Accounts.

5.96 Oftel carried out a review of universal service in 1999-2000 which concluded that the costs to BT of being a universal service provider were broadly neutral. However, at some point in the future, the growth in competition could complicate the funding of USOs. Hitherto, elements of USO such as the provision by BT of low-cost access for disadvantaged consumers (the residential Light User Scheme) have been possible through a subsidy from other profitable parts of BT's business. Competition tends to grow fastest in high margin services and hence can be expected to focus on these sources of potential funding for USO arrangements, thus eroding margins. This could potentially call into question the current costs and benefits of USO provision and require a re-evaluation of the funding options. The introduction of new sources of competition, such as the Wholesale Line Rental product, are likely to put downward pressure on call prices in the near term and developments such as VoIP may accelerate this process in the longer term.

5.97 In addition, there may be pressure to change the scope of USOs in the future. Annex G describes how USOs have been applied to services when there are significant network externalities associated with bringing more subscribers onto a network, and/or because inability to access a service by a particular group would result in significant exclusion of that group from society.

5.98 At privatisation in 1984, the proportion of households with a fixed line was just under 80 per cent. The current situation is very different, and the environment is likely to change yet again. Today, less than 1 per cent of households have access to neither a fixed nor mobile phone. The growth in fixed penetration and the maturity of the mobile sector could have a number of implications for the scope of USO obligations relating to voice telephony. For example, it might become increasingly anachronistic to oblige fixed operators to supply a fixed connection at a uniform price if the property is within mobile network coverage and mobile could provide connectivity instead.

5.99 Broadband uptake stood at around three million at the end of November 2003 (about 12 per cent of households), so a long way short of the 80 per cent of households that had a telephone line in 1984 when the USO was brought in for fixed telephony. Although people who do not subscribe to broadband could hardly be considered to be excluded from mainstream society, this assessment may change in the future. Low-cost access to broadband is likely to continue to be unavailable to consumers who live outside cable TV areas, a long way away from a BT exchange, or in an extremely small BT exchange area. In future, it may become increasingly important to design mechanisms, possibly using wireless or satellite technology, to ensure that these types of consumer have access to broadband at similar prices to consumers living in less remote areas.

Why it matters:

5.100 Ofcom recognises that there is an important 'citizenship' dimension to telecoms regulation, much of which is currently articulated through USO provisions. Ensuring that USO remains properly focused on the right outcomes, and that the method of delivery and of funding for USO is appropriate, is therefore extremely important.

Question 21: How may universal service arrangements need to evolve in response to changes in the telecoms market?

Section 6

Next steps

6.1 This Phase 1 consultation will last until Tuesday 22 June. During this period, Ofcom will be engaging fully with stakeholders to understand their views on the issues raised in this document.

6.2 As mentioned in Section 3, the Telecoms Review will be in three phases, and this document is the output of Phase 1 of the Review. The phases are:

- Phase 1: current position and prospects for the telecoms sector;
- Phase 2: options for Ofcom's strategic approach to telecoms regulation; and
- Phase 3: proposals.

6.3 As discussed in Section 3, the responses that Ofcom receives to this **Phase 1** consultation document will form an important input to Phase 2. The regulatory options that Ofcom should be considering for the future regulation of the UK telecoms sector, and the assessment of those options, depend critically on how the sector is likely to evolve. The responses that we receive to this consultation document will enable us to make much better judgements about this future evolution of the sector.

6.4 **Phase 2** of the Review will assess the scope for effective competition at relevant levels in the telecoms markets, and the extent to which it is likely to be sustainable in the foreseeable future. In the light of that assessment, Phase 2 will identify alternative approaches to regulating telecoms markets and analyse their strengths and weaknesses. It will then set out initial options for Ofcom's future approach to telecoms regulation. This phase will result in a further consultation document.

6.5 Ofcom will be analysing a number of areas during Phase 2. In particular, we will:

- carefully analyse the submissions received from the current consultation;
- carry out cost and business modelling of different combinations of networks, services, customer types and value chain elements in order to determine where competition is likely to be sustainable in the future, and where supply of services displays natural monopoly characteristics;
- undertake a more detailed review of trends in demand and consumers' behaviour; and
- review the lessons to be learnt from regulatory approaches in other sectors and from telecoms regulation in other countries.

6.6 **Phase 3** will consist of further analysis of the options presented in the Phase 2 report, in the light of comments received during the consultation. It will develop clear proposals for Ofcom's regulatory approach, and develop an implementation plan for these proposals. The outcome of this phase will be a new settlement for telecoms regulation, which will be published by the end of 2004.

The timescale for the Telecoms Review

6.7 Ofcom's intended timescale for the Telecoms Review is shown in Figure 5 below.

6.8 Ofcom aims to have completed the Review by the end of 2004, because in such a rapidly changing sector as telecoms, it is important that the conclusions of the Review can quickly be put into practice. This means that the overall timescale for the Review is very tight indeed. In order to allow a full ten weeks for the Phase 2 consultation (which will contain important policy options), we have kept the consultation period for Phase 1 (which does not) to eight weeks. This is less than Ofcom's standard ten-week consultation period, and represents a trade-off. We recognise that a longer period would give our stakeholders more time to consult within their organisations and prepare thorough responses. Conversely, if we were to make the consultation period for this first phase longer than eight weeks, we would not have time to give the responses the consideration they deserve before publishing the Phase 2 consultation paper and hit our year-end objective.

6.9 Even with this short Phase 1 consultation period, it will be necessary for us to work actively with stakeholders during the Phase 2 consultation, so that we can incorporate the main elements of the Phase 2 responses into our analysis prior to the end of the Phase 2 consultation period.

Figure 5: Telecoms Review overall timescale

Annex A

Ofcom's consultation principles

Ofcom has published the following seven principles that it will apply for each written consultation:

Before the consultation

1. Where possible, we will hold informal talks with people and organisations before announcing a major consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

During the consultation

2. We will be clear about who we are consulting, why, on what questions and for how long.
3. We will make the consultation document as short and simple as possible, with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened version for smaller organisations or individuals who would otherwise be unable to spare the time to share their views.
4. We will normally allow ten weeks for responses, other than on dispute resolution.
5. There will be a person within Ofcom who will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. This individual (who we call the Consultation Champion) will also be the main person to contact with views on the way we run our consultations.
6. If we are not able to follow one of these principles, we will explain why. This may be because a particular issue is urgent. If we need to reduce the amount of time we have set aside for a consultation, we will give those concerned prior warning that this is a 'red flag' consultation which needs their urgent attention.

After the consultation

7. We will look at each response carefully and with an open mind. We will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

In view of the complexity and range of issues considered in this consultation document, the Executive Summary is longer than two pages. We have provided a separate plain English summary of the document.

The consultation period for this document is eight weeks, rather than the normal ten weeks, for the reasons explained in Section 6.

Annex B

List of questions

Fundamental questions for the Telecoms Review

Question 1:
In relation to the interests of citizen-consumers, what are the key attributes of a well-functioning telecoms market?

Question 2:
Where can effective and sustainable competition be achieved in the UK telecoms market?

Question 3:
Is there scope for a significant reduction in regulation, or is the market power of incumbents too entrenched?

Question 4:
How can Ofcom incentivise efficient and timely investment in next-generation networks?

Question 5:
At varying times since 1984, the case has been made for structural or operational separation of BT, or the delivery of full functional equivalence. Are these still relevant questions?

Phase 1 questions

Question 6:
How successful is the UK telecoms sector currently in delivering benefits to citizens and consumers?

Question 7:
How rapidly and extensively will fixed and mobile networks become substitutes for one another?

Question 8:
What impact will Voice over IP have on the telecoms market?

Question 9:
How rapidly and extensively will broadband be taken up in the UK, and what are the regulatory implications of such growth?

Question 10:
What scope is there for new, competing broadband platforms to be rolled out, and which technologies are most likely to be used?

Question 11:
When are operators likely to move towards 'all IP' architectures, if at all?

Question 12:
What are the implications of 'all IP' networks for the way networks interconnect with one another, and for the scope of competition?

Question 13:
Is there likely to be widespread demand for services that require 'broaderband' networks to be rolled out and, if so, how will such infrastructure be supplied?

Question 14:
How rapidly are broadband content businesses likely to emerge, and what factors will affect their viability?

Question 15:
How will future network evolution, such as growth of intelligence at the edge of networks, and the increased importance of control over technical standards and interfaces, affect the requirements of telecoms regulation?

Question 16
Will it become uneconomic for operators to maintain the existing circuit-switched architecture at some point, and if so, when? What regulatory issues will this transition to IP networks raise?

Question 17:
Are consolidation, alliances, market entry or other forms of market evolution likely? What will their implications be for telecoms regulation?

Question 18:
What impact do different regulatory approaches have on investment decisions in telecoms, and what regulatory approaches does this imply that Ofcom should adopt?

Question 19:
What is the right role for consumer policy? What impact do different approaches have on telecoms companies' perceptions of risk and return?

Question 20:
What role should Ofcom take in signposting, providing, or ensuring that the market provides clear information to consumers, enabling them to make effective choices?

Question 21:
How may universal service arrangements need to evolve in response to changes in the telecoms market?

Annex C

Consultation response cover sheet

C.1 In the interests of transparency, we will publish all consultation responses in full on our website, www.ofcom.org.uk, as soon as possible after the consultation period has ended, unless a respondent specifies that all or part of their response is confidential. We will also refer to the contents of a response when explaining our decision, unless we are asked not to.

C.2 We have produced a cover sheet for responses (see over). Please send one with your response as this will speed up our processing of responses and, if you wish it, enable you to indicate clearly any confidential material that you do not want us to publish. We will keep your completed cover sheets confidential.

C.3 **We strongly prefer to receive responses in the form of a Microsoft Word attachment to an email**. Our website therefore includes an electronic copy of this cover sheet, which you can download from the 'Consultations' section of our website.

C.4 Please put any confidential parts of your response in a separate annex, so that they are clearly identified. This can include information such as your personal background and experience. If you want your name, contact details or job title to remain confidential, please provide them in your cover sheet only so that we don't have to remove them from your response.

Cover sheet for response to an Ofcom consultation

Basic Details

Consultation title: Strategic Review of Telecommunications – Phase 1

To (Ofcom contact): Dougal Scott

Your name:

Representing (self or organisation/s):

Address (if not received by email):

Confidentiality

What do you want Ofcom to keep confidential?

Nothing ☐

Whole response ☐

Part of the response ☐

Name/contact details/job title ☐

Organisation ☐

If there is no separate annex, which parts?

If you want part of your response, your name or your organisation to be confidential, may Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

Yes ☐ No ☐

Declaration

I confirm that the correspondence supplied with this cover sheet is a formal consultation response. It can be published in full on Ofcom's website, unless otherwise specified on this cover sheet. If I have sent my response by email, Ofcom can disregard any standard email text about not disclosing email contents and attachments.

Name Signed (if hard copy)

Annex D

Terms of Reference of the Strategic Review of Telecommunications[15]

Remit

D.1 Ofcom has decided that one its first key tasks will be to review the UK telecommunications sector. We propose to undertake a comprehensive, wide-ranging and evidence-based strategic review of these important and dynamic markets.

D.2 The Review will assess the options for enhancing value and choice in the UK telecommunications sector. It will have a particular focus on assessing the prospects for maintaining and developing effective competition in UK telecommunications markets, while having regard for investment and innovation.

D.3 This assessment will in turn shape the strategy through which Ofcom will promote competition or take other regulatory action to further the interests of consumers and citizens in the UK.

D.4 The key output of the Review will be an Ofcom statement specifying its approach to telecommunications regulation. This will enable casework and policy development to be located in a clear strategic framework going forward.

Why it matters

D.5 Telecommunications is a significant and growing sector in the economy. In 2002, UK telecommunications revenues were £50bn compared to £18bn in 1984 (at 2002 prices).

D.6 UK telecommunications revenue as a proportion of GDP has grown from 1.7% in 1985 to 2.3% in 2002. According to the most recent data (1999-2002) net capital expenditure by the UK telecommunications industry was on average over £9bn per year (at 2002 prices). This represents 8% of all the capital expenditure in the UK economy as a whole over the same period. By contrast, in 1984 net capital expenditure in telecommunications was just £3.7bn (2002 prices) which represented around 4% of all capital expenditure.[16]

D.7 The sector has been regulated by Oftel since the privatisation of BT in 1984 and over the last 20 years much has changed in the telecommunications sector. There are now approximately 170 public fixed telecommunications providers, five mobile providers, 59 mobile service providers and 700 internet service providers.

D.8 There are varying degrees of competition through the sector in the form of different services and at different points in the value chain. By 2002, BT's share of voice calls had fallen to 60% and international calls to 30%. However, in many markets such as residential access (82%) business access (87%) and wholesale call origination (78%), Oftel found that BT has Significant Market Power (SMP).

D.9 Technological innovation has driven changes in the underlying economics of the industry. There is increasing convergence between different sectors. In addition, the growth of the internet and the emergence of different broadband access technologies create new challenges and opportunities for the sector.

D.10 In other regulated sectors different models have emerged, with different lessons to learn. In gas and electricity, a clear separation of wholesale from retail has created much higher levels of competition in service provision but has embedded regulation in distribution. In rail, a similar separation has been adopted but has, however, failed to deliver the level of consumer benefit envisaged at the point of privatisation.

D.11 In other countries different models of regulation have been applied or a different emphasis has been placed within the context of a similar approach.

D.12 Oftel has undertaken many detailed reviews of particular parts of the sector over the last ten years. However, the sector as a whole has not been subject to a thorough and open strategic review since 1990/1991 when the Government, together with Oftel, conducted the Duopoly Review.

D.13 The telecommunications sector has undergone significant change since 1991. It faces major challenges in the future as technology and consumer demand evolve. Within the EU, the policy agenda will move beyond implementation of the most recent Directives. These factors, together with the creation of a new

15 These terms of reference were published by Ofcom in December 2003.

16 Some data in this paragraph have been amended from the terms of reference published in December due to changes in the basis of calculation.

sectoral regulator, make 2004 the right time to conduct a review of the UK's strategy for regulating telecommunications.

Overall approach

D.14 The key building blocks of our proposed approach will be:

1. Analysis

D.15 The approach will be evidence-based and include a summary of the development of competition in telecommunications. The Review will provide an assessment of the current position in the sector and the prospects for the future. There will be a detailed analysis of the scope for the further development of effective competition and the scope for changes, including the possibility of removing regulation.

2. New research

D.16 The Review will carry out a number of new research projects which will underpin the analysis and the recommendations. These will include market research on changing consumer preferences, research on the impact of new technologies and detailed cost and business plan modelling.

3. Expert advice

D.17 Ofcom will use expert external advisers to complement our own internal expertise. These advisers will bring to Ofcom additional detailed understanding of commercial activity, technical economic analysis and other areas.

4. Consultation

D.18 The Review will make full use of public consultation to allow all interested parties to submit information and set out their views and opinions on the key issues.

D.19 There will be two formal consultation stages to enable companies, groups and individuals to enter submissions and contribute to open discussions.

D.20 In addition, we expect to hold a number of seminars and workshops during the course of the Review, the output of which will inform the final conclusions.

Scope of the Review

D.21 The main focus of this Review is to carry out a strategic assessment of the role of regulation in the telecommunications sector as a whole, with a focus on the role of competition in delivering benefits for citizen-consumers.

D.22 Broader strategic questions, including the availability of key services to consumers, will also be addressed. However, the Review will not deal directly with detailed issues of consumer protection. It is therefore anticipated that the Review will not:

- deal with the detail of Universal Service Obligations (this will be subject to a separate review by Ofcom during 2004); or
- cover in detail technical regulation, consumer protection regulation, numbering regulation and other matters contained in the General Conditions of Entitlement.

D.23 The Review will not replicate the detailed individual market reviews which have been completed or which will be completed shortly. However, the conclusions of the Review are likely to have implications for future market reviews.

D.24 Some of the key issues the Review will address are set out at the end of this annex.

D.25 The remainder of this annex sets out the key aims, objectives and the approach proposed for each stage of the project.

Three Phases

D.26 The project will be broken into three phases, with consultation at the end of Phases 1 and 2 and separate reports at the end of Phases 1, 2 and 3. The phases are:

- **Phase 1** (to spring 04) – current position and prospects for the telecommunications sector.

- **Phase 2** (to summer 04) – options for Ofcom's strategic approach to telecommunications regulation.
- **Phase 3** (to autumn 04) – Ofcom's approach to telecommunications regulation.

D.27 The following section sets out our current expectations of the work involved in each phase.

Phase 1 – Current position and prospects for the telecommunications sector

Aims

- to review the importance of telecommunications to the UK economy;
- to assess the extent to which the UK market has delivered competition at all levels including fixed, mobile, narrowband and broadband sectors;
- to examine how far competition and/or regulation has delivered the goals of lower prices, higher quality of service and wider choice;
- to assess how consumers view the market and how they value different product/service outcomes;
- to review investment and innovation trends in the industry; and
- to establish the prospects for the telecommunications sector in the future, particularly in relation to consumer behaviour, technology and competition.

D.28 The main elements of this phase are as follows:

Sector overview

- an analysis of the sector as a whole summarising the role and importance of telecommunications in the UK economy.

Audit of competition and consumer benefit

- an analysis of the degree of competition, market-by-market, building on the work undertaken in the recent market reviews;
- research into the relative value that consumers place on different product/service attributes for telecommunications services;
- international benchmarking of prices and other indicators to review the comparative position of UK consumers;
- a financial analysis of the sector and key elements within it;
- an analysis of key trends and patterns of investment and innovation as they affect different parts of the telecommunications sector; and
- a brief review of past and current regulatory approaches.

Prospects and scenarios

- a review of the most likely prospects for the sector, including an examination of the technology trends, changing consumer preferences and industry prospects; and
- the development of alternative scenarios for the future of the telecommunications sector.

D.29 Much of the data required for this analysis will need to be collected from the industry. Ofcom looks forward to working with the industry in the collection and assessment of this data.

Report and consultation

D.30 At the end of Phase 1 (spring 2004) a report will be published setting out Ofcom's conclusions on the current position in the telecommunications sector and the likely prospects.

D.31 There will be a public consultation on these conclusions and submissions from interested parties will be welcomed. A number of seminars and discussions will be held to explore the issues raised in the report.

D.32 Ofcom will incorporate the comments it receives in its Phase 2 work.

Phase 2 – Options for Ofcom's strategic approach to telecommunications regulation

Aims

- to assess the scope for effective competition at relevant levels in the telecommunications markets and the extent to which it is likely to be sustainable in the foreseeable future;
- in the light of that assessment, identify alternative approaches to regulating telecommunications markets and analyse their strengths and weaknesses; and
- to set out initial options for Ofcom's future approach to telecommunications regulation – including both where regulation may need to continue and opportunities for withdrawing from regulation.

D.33 The main elements of this phase are as follows:

An analysis of the underlying economics of competition

- an evidence-based analysis of the scope for sustainable competition in telecommunications markets, especially at the network level; and
- detailed cost and business plan modelling to understand better the underlying economics of potential competition in telecommunications.

Review of other relevant sectors and international practice

- both national and international research into alternative models of competition and regulation in telecommunications and other sectors.

Options for different strategic approaches to regulation of telecommunications

- the development of criteria against which to assess alternative approaches to regulation; and
- the development of a number of options for regulation including a set of initial proposals for consultation.

D.34 For some of this analysis, in particular the cost and business plan modelling, Ofcom will require a significant amount of data from the industry.

D.35 Ofcom looks forward to working with the industry in the collection and assessment of this data.

Report and Consultation

D.36 At the end of Phase 2 (summer 2004) a report will be published for consultation.

D.37 This report will include initial policy proposals. Again external submissions will be welcomed and a number of seminars and discussions will be held. The report will also reflect any significant market developments that have taken place during early 2004.

D.38 The comments received will be considered in the preparation of the final report in Phase 3.

Phase 3 – Proposals

Aims

D.39 To produce a detailed final report which sets out:

- a review of the key policy issues and challenges; and
- a set of proposals for tackling these issues and challenges in a coherent regulatory framework. This will form the foundations of Ofcom's strategy for telecommunications regulation.

D.40 The main elements of this phase are as follows:

- further analysis of the options presented in the Phase 2 report in the light of comments received during the consultation;
- the development of clear proposals for Ofcom's regulatory approach; and
- the preparation of an implementation plan for the proposals including information on timing of any changes and the process for bringing those about.

Report

D.41 There will be a final report at the end of this phase (autumn 2004) which will include a statement of Ofcom's proposed approach.

Some key questions for the Strategic Review

D.42 The project remit aims to review the options for enhancing value and choice to UK citizen-consumers in the UK telecommunications sector.

D.43 The Review will seek to address a number of key questions, including:

- What is the position of UK consumers across a range of indicators including price, quality of service, range and choice of products and availability of services?
- How does the position of UK consumers of telecommunications compare with consumers in other countries? How does it compare with other sectors across a range of indicators?
- What is the extent of competition in main telecommunications markets today? How has that changed over time and how is it likely to develop in the future?
- How successful have past regulatory policies been in achieving their objectives?
- What are the likely prospects for the sector? What are the different scenarios for the future? What role do investment and innovation play in alternative future scenarios?
- How will technological change and consumer behaviour develop in the coming years and how are these likely to affect market structures?
- What is the scope for effective competition in telecommunications and the extent to which it is sustainable? How does this vary between, for example, infrastructure and service provision?
- What are the major barriers to effective competition and how can they be lowered?
- Where is regulation effective and where is it ineffective?
- Where are there opportunities for regulation to be withdrawn or minimised?
- What is the relevance of vertical integration in the telecommunications sector?
- What are the alternative models for regulation? What are the advantages and disadvantages of these?

Section E

Glossary

2G	Second generation of mobile telephony systems using digital encoding. 2G networks support voice, low-speed data communications, and short messaging services.
2.5G	In mobile telephony, 2.5G protocols extend 2G systems to provide additional features such as packet-switched connection (GPRS) and enhanced data rates.
3G	Third-generation mobile systems. 3G provides high-speed data transmission and supporting multimedia applications such as full-motion video, video-conferencing and internet access.
Access Competition	Competing telecoms networks which reach all the way to the customer. For example, when a cable operator competes with BT, it does so by having a separate wire into a home or business.
ADSL	Asymmetric Digital Subscriber Line. A digital technology that allows the use of a copper line to support high bandwidths in one direction and a lesser bandwidth in the other.
Allocative efficiency	Achieved when prices are close to cost: this ensures that all consumers who value a product at more than its cost are able to purchase it.
Altnet(s)	Alternative fixed network operator.
AT&T	The American Telephone and Telegraph Company.
ATM	Asynchronous Transfer Mode, a standard for high-speed data communications.
Bluetooth	Wireless standard for short-range radio communications between a variety of devices such as PCs, headsets, printers, mobile phones and PDAs.
British Telecommunications Act	The 1981 British Telecommunications Act, which separated British Telecommunications (BT) from the Post Office.
Broadband	A service or connection generally defined as being 'always on', and providing a bandwidth greater than 128kbit/s.
BRT	British Rail Telecom.
BSG	Broadband Stakeholders Group.
BT	British Telecommunications plc.

Bundling	Linking the purchase of one product or service to another, either by selling only as a package, or through the use of discounts for joint purchasing.
CC	Competition Commission.
Communications Act	Communications Act 2003, which received Royal Assent in July 2003.
Corporate network services	Data networking services provided to corporate customers, such as wide-area networks.
CPI	Comparative Performance Indicator.
CPS	Carrier Pre-selection. The facility offered to customers which allows them to opt for certain defined classes of call to be carried by an operator selected in advance (and having a contract with the customer) without having to dial a routing prefix, use a dialler box or follow any other different procedure to invoke such routing.
Data Networks	A network established and operated for the specific purpose of providing data transmission services.
DSL	Digital Subscriber Line. A family of technologies generally referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as 'twisted copper pairs') into high-speed digital lines, capable of supporting advanced services such as fast internet access and video-on-demand. ADSL, HDSL (High data rate Digital Subscriber Line) and VDSL (Very high data rate Digital Subscriber Line) are all variants of xDSL.
Duopoly Framework	The telecoms regulatory framework applying in the UK from 1984 to 1991, when fixed telecoms were provided by a duopoly of BT and Mercury.
DVB	Digital Video Broadcasting.
Dynamic efficiency	Achieved when firms have the correct incentives to invest (e.g. in new infrastructure) and to innovate (e.g. to generate new technologies or products).
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation.
Enterprise Act	Enterprise Act 2002 which, among other things, updates the current UK merger control framework with certain significant amendments.
ETSI	European Telecommunications Standards Institute, which has the primary responsibility within Europe for the production of telecommunications standards for pan-European application.
Ex ante	Before an event takes place.

Ex post	After an event takes place.
FCC	Federal Communications Commission. The US regulatory body that regulates all inter-state and foreign communications by wire, radio and television. Intra-state communications are regulated by state public utilities commissions.
Frame Relay Service	A packet-switched data service providing for the interconnection of Local Area Networks (LANS) and access to host computers.
Functional equivalence	The requirement for alternative network operators and service providers, in buying wholesale products from BT, to assess the same products using the same processes as BT's retail division.
GDP	Gross Domestic Product.
GPRS	General Packet Radio Service, a packet data service provided over so-called 2.5G mobile networks.
GSM	Global Standard for Mobile Telephony.
Horizontal consolidation	Mergers of companies who provide services in the same product market or the same stage in the value chain.
ICT	Information and Communications Technology.
IETF	Internet Engineering Task Force, consisting of over 80 working groups responsible for developing internet standards.
Infrastructure based competition	Competition between alternative telecoms operators who use their own infrastructure to supply some or all of the call routing.
Interconnection	The linking of one Public Electronic Communications Network to another for the purpose of enabling the people using one of them to be able (a) to communicate with users of the other one; (b) to make use of services provided by means of the other one (whether by the provider of that network or by another person).
Interface	A set of technical characteristics describing the point of connection between two telecommunication entities.
Internet telephony	A specific type of VoIP service that uses the public internet to carry the IP traffic (also referred to as Voice over the Internet).

Internet	A global network of networks, using a common set of standards (e.g. the Internet Protocol), accessed by users with a computer via a service provider.
Interoperability	The technical features of a group of interconnected systems which ensure end-to-end provision of a given service in a consistent and predictable way.
IP	Internet Protocol. The packet data protocol used for routing and carriage of messages across the internet and similar networks.
ISP	Internet Service Provider. A company that provides access to the internet.
ITU	International Telecommunications Union. A group of representatives from 161 countries headquartered in Geneva, Switzerland. The ITU publishes recommendations that influence telecom engineers, designers, manufacturers and service providers around the world. These have the status of an international treaty and are binding on member states.
LAN	Local area network. A network allowing the interconnection and intercommunication of a group of computers on a single site, primarily for the sharing of resources and exchange of information (e.g. email).
LLU	Local Loop Unbundling. A process by which BT's exchange lines are physically disconnected from BT's network and connected to other operators' networks. This enables operators other than BT to use the BT local loop to provide services to customers.
Local access	Connection between the customer's premises and the local PSTN exchange.
Local Loop	The access network connection between the customer's premises and the local PSTN exchange, usually a loop comprised of two copper wires.
Long-distance network competition	Competitors use their own networks for the long-distance portion of the call, but use the established operator's network for the local access part of the call.
LRIC	Long Run Incremental Cost. The costs caused by the provision of a defined increment of output, taking a long run perspective, assuming that some output is already produced. The 'long run' means the time horizon over which all costs (including capital investment) are variable.
Market power	The ability to raise prices above the competitive level for a non-transitory period.
Mercury	Mercury Communications Limited, the only fixed telecoms competitor to BT from 1984 to 1991.

Messaging service	A service enabling customers to exchange messages with each other through 'mailboxes' embedded in network equipment. Both voice and text messaging services are available.
MMC	Monopolies and Mergers Commission.
MPLS	Multi Protocol Label Switching, an IP technology used in many virtual private network (VPN) services.
Narrowband	A service or connection providing data speeds up to 128kbit/s, such as via an analogue telephone line, or via ISDN.
National Rate	The standard tariff for calls within the national call area.
NRA	National Regulatory Authority.
NTS	Number Translation Services. Telephone services using non-geographic numbers where that number is translated to a geographic or mobile number for final delivery to the called party.
OECD	Organisation for Economic Cooperation and Development.
OEE	Office of the E-Envoy.
Ofcom	The Office of Communications. The regulator for the communications industries, created by the Communications Act 2003.
Oftel	Office of Telecommunications, whose functions transferred to Ofcom on 29th December 2003.
ONS	Office for National Statistics.
PDA	Personal Digital Assistant.
Productive efficiency	Achieved when the costs of production are minimised.
PSTN	Public Switched Telephony Network.
ROCE	Return on Capital Employed.
RPI	Retail Price Index.
Satellite DTH	Satellite Direct to Home television services, such as that provided by BSkyB in the UK.

SDSL	Symmetric Digital Subscriber Line. Unlike ADSL, it offers the same fast data rate speeds in both directions.
Service provider competition	Competitors who do not own all their own infrastructure, but provide services that are conveyed over others' networks.
Service provider	A provider of electronic communication services to third parties whether over its own network or otherwise.
SME	Small or Medium sized Enterprise.
SMP	Significant Market Power. This test is set out in the EU Framework Directive, and is aligned with the competition law definition of "dominance". It is used by Ofcom to identify those operators who may be required to meet additional regulatory obligations.
Spam	Unsolicited commercial email or other unsolicited communications.
Telecommunications Act	Telecommunications Act 1984.
Telecommunications, or 'Telecoms'	Conveyance over distance of speech, music and other sounds, visual images or signals by electric, magnetic or electro-magnetic means.
Tetherless	Devices connected to a network which have limited mobility, using short-range radio-based systems, such as DECT, Bluetooth and Wireless LAN.
Universal Service Provider	Telecoms operators who are designated by Ofcom as Universal Service Providers. Currently BT and, in the city of Hull, Kingston Communications.
Universal Service	Under the Communications Act, the set of telecoms services set out by the Secretary of State which define a certain minimum set of services that should be provided to all citizens, or to those with special needs.
USO	Universal Service Obligations. The set of Universal Services that Universal Service Providers are required to supply.
Value chain	The sequential stages in production of a product or service.
VANS	Value Added Network Services.
Vertical integration	Mergers, or co-ownership between, producers that are active in different stages in the value chain for a particular good or service.
VoIP	Voice over Internet Protocol. A technology that allows users to send calls using Internet Protocol, using either the public internet or private IP networks.

VPN	Virtual Private Network. A technology allowing users to make inter-site connections over a public telecommunications network that is software-partitioned to emulate the service offered by a physically distinct private network.
WAN	Wide-area network. A network allowing the interconnection and intercommunication of a group of computers over a long distance.
WAP	Wireless Application Protocol.
Wireless LAN or WiFi (Wireless Fidelity)	Short-range wireless technologies using any type of 802.11 standard such as 802.11b or 802.11a. These technologies allow an over-the-air connection between a wireless client and a base station, or between two wireless clients.
WiMax	802.16, a fixed wireless access technology.
WLR	Wholesale Line Rental. A regulatory instrument requiring the operator of local access lines to make this service available to competing providers at a wholesale price.