



Electronic Networks

Challenges for the Next Decade



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(available on project website www.strategy.gov.uk/2002/electronic/main.shtml)

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FOREWORD BY THE PRIME MINISTER



Over the last few years, developments in network technologies and services have brought dramatic changes to our society. High-speed internet access, mobile phones, wireless networks and satellite systems have opened up new ways of communicating, finding information, being entertained, and doing business.

The pace of change shows no sign of slowing. That is why I asked the Strategy Unit to carry out this review of Government policy towards electronic networks. In particular, they were asked to look at the contribution that such networks can make to our national economy and society, and to review how best they should be regulated over the next decade. This review comes as we are in the process of debating the Communications Bill, and creating OFCOM, the new Office of Communications.

It is hard to make predictions about new technologies with any certainty, and unexpected change in electronic networks is always possible. However, based on the best current knowledge, this review concludes that innovation in electronic networks over the next decade is likely to result primarily from the evolution of existing networks rather than the creation of new networks. Wired technologies are likely to continue to play the main role; wireless networks are likely to operate alongside wired networks, but not replace them.

This is a very significant conclusion, since it implies that those network operators which are at the core of today's market are likely to maintain their strong position in the future. If that is so, the need for effective regulation will remain, although the regulator should try to identify areas where the regulatory burden can be lifted. While it will be key for OFCOM to ensure that competition develops wherever possible, the regulator must protect the interests of consumers through fair and proportionate regulation where competition does not develop.

Other issues highlighted include the importance of ensuring that networks are resilient to shocks; the important role of the EU in shaping our regulatory environment; the future definition of universal service obligations; and the potential future impact of a new generation of internet technologies.

This report is being published as a report to Government, and as such is not a statement of Government policy. However, I believe that it clearly sets out the most significant issues which we will face over the next decade, and proposes a sensible set of approaches to these issues. I hope that it will prompt a wide ranging debate, and look forward to receiving views on how best we ensure a vibrant and competitive market for electronic networks in the UK.

Tony Blair



EXECUTIVE SUMMARY

Background

This project has reviewed the challenges likely to be created by the development of electronic networks over the next decade, with a particular focus on regulatory goals and approaches

Electronic networks – including narrowband and broadband internet, and mobile networks – are important to the UK because they allow businesses to interact quickly and effectively, give consumers access to a wide range of information and services, and allow Government to communicate with citizens and deliver services effectively.


Electronic networks are currently undergoing significant change, driven by technological, social and commercial trends. The UK regulatory environment is also changing, in particular with the creation of a single regulator, the Office of Communications (Ofcom). In this context, the Strategy Unit was asked to carry out a project with three main objectives:

- To consider the importance of electronic networks, including the development of broadband, to the UK's productivity and long-run economic growth;
- To review the likely range of technology and market developments over the next decade, and the challenges they raise for Government and the regulator; and
- To take a strategic view of the Government's objectives in the development of electronic networks over the next decade, with a particular focus on the regulatory goals and approaches.

Effect on the UK economy

There is reasonable evidence from the US that ICT investment has had a positive impact on productivity and growth. However, evidence of the specific impact of electronic networks is less clear, as is evidence of the impact of ICT investment in other countries, including the UK. Despite this, business level case studies show how important it is for Government and regulators to remove any barriers to the effective deployment of electronic networks

A detailed review of economic literature for this project has revealed reasonable evidence of the impact of Information and Communication Technology (ICT) investment and related organisational change on US productivity and growth. However, there is little clear evidence of the impact of electronic networks within overall technology investment, and also little clear evidence in other countries, including the UK. This may be due to a lack of data, and unclear conclusions from the data that does exist.



The lack of clear evidence does not mean that electronic networks are not having an impact, and business level studies do clearly indicate their potential benefits. If the UK can follow the lead of the US in using ICT to create organisational change in both the public and private sectors, the contribution of electronic networks to the economy should become more evident over time.

Action from Government and the regulator is therefore important to ensure that the development, availability and usage of electronic networks are encouraged, and are in no way inhibited, particularly through barriers to competition.

Innovation and new technologies

Innovation in electronic networks over the next decade is expected to result from the evolution of existing networks rather than the creation of new networks, and wired technologies are expected to remain key for data transmission

It is unlikely that entirely new networks with national coverage will be created over the next decade, given the challenge of achieving broad coverage against existing networks. Major innovation is instead likely to occur in applications, services and devices using existing networks.


Although the launch of the 3G mobile communications system is expected to be one of the most significant network developments over the next decade, mobile and wireless networks are not expected to replace wired networks for data transmission. This is because wired technologies generally offer faster data transmission speeds at lower cost than wireless networks, a gap that is likely to remain for the foreseeable future.

Instead, mobile data networks are likely to complement wired networks, not substitute for them. Mobile applications and services are likely to be specifically tailored to the mobile network, and to be somewhat different to those designed for wired networks. Other technologies such as fixed wireless access may find it harder to challenge existing networks on a widespread basis, although they could offer a way to provide high-speed access in rural areas which otherwise would not receive coverage. Wireless networking in homes and offices is expected to increase dramatically, but it will still need a connection to another network in order to access the internet.

There may be changes in other network technologies which lead to significant and unexpected changes in market development over the next decade, and some possible disruptive technologies have been identified. However, these are likely to take a number of years to come to market, and their potential impact is unclear.

Incumbent market power

As a result, it is likely that current incumbent operators of electronic networks will retain elements of market power over the next decade; if this is so, many of the challenges faced by Government and the regulator will be similar in principle to those faced today



Given this evolutionary process of development based on current networks, it is likely that many of the current incumbent operators of electronic networks will retain elements of market power throughout the next decade, in the absence of new competition at the network level.

This means that many of the challenges faced by Government and the regulator over the next decade will be similar in principle to those faced today. In particular, the importance of regulating companies which have Significant Market Power (SMP) will be undiminished.

The role of Government

Government will need to distinguish clearly between competition objectives and wider policy goals, while working within the framework of the new EU directives

Government should support the wider deployment of electronic networks where justified in terms of social and economic impact. Government should also use electronic networks to help deliver efficient public services.

In addition, Government is responsible for setting the remit for the regulator, and is in the process of doing so through the Communications Bill. The remit for the regulator should be focused on ensuring the best outcomes for consumers from competition in electronic networks, in terms of availability, price, quality, reliability, innovation and efficient use of scarce resources. Where competition does not exist, the remit should include effective protection of consumer interests.

The new EU directives provide a clear framework for the development of regulatory policy, and provide a helpful level of clarity around the extent and nature of regulation which will be appropriate for the next decade.

It will be important to ensure that any trade-offs between regulatory and public policy objectives are dealt with explicitly by the Government and not by the regulator. This will avoid a lack of clarity in regulatory approach, which could otherwise threaten confidence in the sector.


Specific examples of such trade-offs include policy on the extent of a Universal Service Obligation (USO), or in the policy towards spectrum management. These issues are already covered in the Communications Bill, which gives Ministers powers to direct OFCOM in these areas.

The role of the regulator

The regulator will need to continue removing barriers to competition, and simulating the effects of competition where it does not exist

Given this view of market development, a number of challenges have been identified for the regulator:

- How to deal with market structure issues, including SMP;

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- How to balance infrastructure competition against service competition;
 - How to encourage innovation and market growth, while ensuring network resilience; and
 - How to manage the evolution of regulation, and ensure its proportionality.

The electronic networks sector combines highly competitive markets with markets in which there is much less competition. As a result, the core ongoing role of the regulator is to remove barriers to competition, and to simulate the effects of competition where it does not exist. This report recommends that OFCOM should favour a “macro level” approach incorporating systems and processes that will deliver appropriate behaviour.


The regulator needs to take a balanced approach in dealing with SMP. It should aim to lift regulation in markets which are becoming competitive, but to ensure effective and focused regulation where the nature of the markets makes competition unlikely. Such regulation should ensure that companies with SMP demonstrate operating and financial transparency, and provide fair and reasonable access to networks on non-discriminatory terms. Thus, even if some wholesale markets do not become competitive, retail competition should develop further.

The regulator should encourage competition in both infrastructure and services, despite the fact that the immediate prospects for significant investment in infrastructure appear limited given the current mood of the capital markets. To guide its decision making, OFCOM should assess the underlying economics of each form of competition.

A competitive environment can be expected to deliver innovation, as companies try to create competitive advantage through new products and services. When reviewing new and innovative products, the regulator needs to strike a balance between allowing immature markets to develop without interference, and ensuring that competition is able to develop in those new markets over the long-term. In order to create the right incentives for investment in products and services, regulation should not prevent innovators from earning adequate returns, and market forces should be allowed to shape the development of those products and services. However, the regulator may need to intervene as new markets mature, if competition does not develop and the innovator develops market power.

OFCOM should also play a central role alongside the Government to ensure the resilience of networks to disruptive shocks. These can arise from a number of sources, including technical failure, physical attack or accidental damage, electronic attack and system overload. OFCOM should ensure that its economic regulation allows for sufficient investment to deliver this reliability and resilience, and that it imposes appropriate obligations on operators to ensure system resilience.

A potentially great threat to network resilience could arise from the business failure of operators, since this could lead to the permanent closure of parts of the network, as opposed to temporary disruption. Unlike other types of disruptive shock, the incentive for the troubled operator to ensure continuity of supply will rapidly decline, if efforts to maintain the network as a going concern do not succeed.



DTI has recently led a consultation on this issue to try to identify any changes required to the regulatory framework, but has concluded that there is not a strong enough case for changes to the current regulatory framework. Responses to the consultation highlighted the ultimate cost to the consumer of all the options identified. DTI will nevertheless continue to work with operators and users to encourage the maintenance of adequate contingency plans against the possibility of any future operator failure.

Finally, the regulator should ensure proportionality in the type and extent of regulation used, and in the speed with which it is applied. OFCOM should adopt a highly systematic approach, based around evidence gathered in the market review process, and following the guidelines set out by the Better Regulation Task Force and endorsed by Government.

Implementation

Both OFCOM and Government will have a role to play in implementation

This report is presented to the Government as a contribution to the debate. However, the majority of the recommendations will be for OFCOM to take forward when it assumes its powers, and to report on in its annual report. DTI will be responsible for taking forward some of the recommendations directly.

DTI will also be responsible for collating and publishing any responses to the report, which should be submitted to ElectronicNetworks@cabinet-office.x.gsi.gov.uk by 28 February 2003.



1. INTRODUCTION

Summary

Electronic networks are currently undergoing significant change, driven by technological, social and commercial trends. The UK regulatory environment is also changing, in particular with the creation of a single regulator, the Office of Communications (OFCOM). In this context, the Strategy Unit was asked to carry out a project with three main objectives:

- To consider the importance of electronic networks, including the development of broadband, to the UK's productivity and long-run economic growth;
- To review the likely range of technology and market developments over the next decade, and the challenges they raise for Government and the regulator; and
- To take a strategic view of the Government's objectives in the development of electronic networks over the next decade, with a particular focus on the regulatory goals and approaches.

The project was carried out by a multi-disciplinary team, comprising a mix of civil servants and secondees from outside Whitehall.

This chapter sets out the context and scope of the report, and some definitions used in the report (section 1.1). It then goes on to explain the process by which the project was carried out, and the way in which the report is structured (section 1.2).

1.1 Context, scope and definitions

1.1.1 Project context

Electronic networks have long been a focus for policy-makers. However, the last decade has been one of particular change, with new developments such as the growth of mobile networks and the introduction of narrowband and broadband internet. The pace of change is

expected to be just as great over the next decade, and as a result, the reach, cost, and quality of electronic networks is becoming even more important not only for the economy, but also for public services and society more generally.

Technological developments are a key driver of changes in electronic networks

Change in electronic networks has been driven by significant technology developments in recent years, including:

- **xDSL**¹ technology providing fast internet connections down traditional telephone lines;
- **Cable** systems combining traditional broadcast entertainment with telephony and high-speed internet access;
- **Satellite** technology evolving to offer high-speed internet access in any location, including remote regions;
- **Mobile** telephony moving beyond voice communication to offer data transmission and mobile internet access;
- **Wireless** technologies starting to change the dependence on wired infrastructure for connections in homes and offices; and
- **Interactive digital television (iDTV)** providing consumers with entertainment and communication through a familiar access device.

Further technological developments – such as faster variants of the xDSL technologies, optical fibre to the kerb or home, and wireless local access networks – can be expected over the next decade, subject to demand and cost. In addition, further convergence between these technologies and the content and services available over them seems inevitable, although the exact form it will take is unpredictable.

All these changes are leading to a wide range of **different options for connectivity** –

depending on what businesses and individuals want that connectivity for, and on the content and added-value services that are available.

A number of other factors are also impacting on electronic networks

Technology is not the only driver of change in electronic networks, and other factors have helped shape the current environment. These factors can create change as powerfully as developments in technology, but by their very nature as social and commercial trends they are hard to predict. Examples include:

- The move towards a **knowledge economy**, where information is increasingly a resource that can be freely traded;
- Proliferation of **consumer choice** in technology, applications and services, sometimes leading to the evolution of such unexpected market developments as the Short Message Service (SMS) phenomenon;
- Increased concern about **privacy** and protection of the individual in information-rich societies;
- Heightened **commercial pressure**, notably for finite resources such as the radio spectrum; and
- The impact of the **planning system** and public perceptions, especially with regard to mobile phone masts and other high profile installations.

There have also been significant changes in the nature of the telecommunications and content industries in recent years, caused both by market pressures, and by regulatory action to improve the level of competition:

¹ DSL stands for Digital Subscriber Line; xDSL implies the family of DSL technologies, including Asymmetric DSL, Symmetric DSL, High-Speed DSL etc. Further information can be found in the Glossary of Terms on the project website www.strategy.gov.uk/2002/electronic/main.shtml



- There has been a major expansion in the **range of players** involved, with new entrants such as infrastructure providers, internet service providers and web portals challenging incumbent telecoms companies and content providers;
- **Regulatory priorities** have shifted to take into account local loop unbundling, the development of wholesale markets, and the challenge of regulating converged businesses; and
- Looking to the future, the setting-up of a new “Office of Communications” (**OFCOM**), the influence of European legal frameworks and the new Communications Bill will all help to define and shape UK markets over the next decade.

1.1.2 Project scope

This project has focused on the regulatory environment

The Government has a number of objectives for the development of electronic networks, including:

- Supporting economic growth and meeting social goals through the wider deployment of electronic networks; and
- Using electronic networks to help deliver efficient public services.

In addition, it is Government’s responsibility to set the remit for the sectoral regulator, which will be focused on:

- Ensuring the best outcomes for consumers from competition in terms of availability,

Box 1.1: OFCOM – the Office of Communications

OFCOM will replace the following five UK regulators:

The **Office of Telecommunications** (Ofcom) regulates the telecommunications industry. The Director General’s duties include: promoting the interests of customers; maintaining and promoting effective competition; and ensuring that telecommunications services are provided to meet all reasonable demands.

The **Independent Television Commission** (ITC) licences and regulates commercially funded television. The ITC operates in the interest of viewers and its tasks include: issuing licences for commercial TV companies to broadcast in and from the UK; setting standards for programme content and advertising; monitoring broadcasters’ output to ensure that it meets those standards and applying penalties if it does not; ensuring that viewers can receive television services on fair and competitive terms.

The **Broadcasting Standards Commission** (BSC) is responsible for standards and fairness in broadcasting. It covers all television and radio, both terrestrial and satellite. It has three main tasks: to produce codes of conduct relating to standards and fairness; to consider and adjudicate on complaints; and to monitor, research and report on standards and fairness in broadcasting.

The **Radiocommunications Agency** is responsible for the management of most radio spectrum in the UK, including international representation, commissioning research, allocating spectrum and licensing its use, and keeping the radio spectrum “clean”.

The **Radio Authority** licences and regulates independent radio. It plans frequencies, awards licences, regulates programming and radio advertising, and supervises the radio ownership system.

price, quality, reliability, innovation and efficient use of scarce resources; and

- Where there is little prospect of competition, effective protection of consumer interests through regulation.

A great deal of work is underway across Government to support these objectives, in particular through the creation of OFCOM, which should be operational by the end of 2003. The foundations for the new regulator were laid in a White Paper² published in December 2000 and in the Office of Communications Act 2002.³ The Communications Bill (discussed in more detail later) sets out the specific remit of OFCOM. Box 1.1 describes the five existing regulators that are being brought together to create OFCOM.

Of course, simply creating a new regulatory body will not necessarily deliver a coherent response to future challenges. OFCOM will need to develop its own culture, structure and philosophy, so that it becomes much more than simply a collection of separate regulators under a single Board. In addition, OFCOM will need to develop a long-term strategy for all the areas within its remit.

Given the extent of change in electronic networks at present, this is a good opportunity for Government to take stock of the overall regulatory approach, consider the lessons from recent experience and ensure it has a clear view of the issues that need to be addressed over the next decade. In the light of this opportunity, the Prime Minister's Strategy Unit was asked to undertake a project with three main objectives:

- To consider the importance of electronic networks, including the development of broadband, to the UK's productivity and long-run economic growth;
- To review the likely range of technology and market developments over the next decade,

and the challenges they raise for Government and the regulator; and

- To take a strategic view of the Government's objectives in the development of electronic networks over the next decade, with a particular focus on the regulatory goals and approaches.

The project has drawn on comparative regulatory experience in the UK and abroad, and has worked closely with other Government departments and the sector regulators. Given the particular focus on regulatory challenges, the project has not considered in detail a number of issues:

- Non-regulatory measures – including the possible use of fiscal instruments – and the development and regulation of digital content. However, research papers on these issues are available on the project website;
- Media ownership or plurality;
- The organisational or operational structure of OFCOM; and
- Specific technical and operational issues such as spectrum management (except in broad terms), licensing / general authorisation, and numbering.

1.1.3 Definitions of terms⁴

For the purposes of the project, **electronic networks** are defined as including all the different networks in the UK that offer connectivity - so that information (voice, data, video etc.) can be transmitted to and from multiple points, including a return path from the end user to the originator. This includes traditional telephone and cable networks, data networks for internet traffic, mobile phone networks, wireless data networks and interactive television, but it excludes traditional broadcast television, non-interactive digital television and

² *A New Future for Communications* (DTI, DCMS, December 2000), www.communicationswhitepaper.gov.uk

³ Office of Communications Act 2002, www.hmso.gov.uk/acts2002/20020011.htm

⁴ Further definitions and a glossary of key terms are available on the project website



broadcast radio, since these technologies do not offer a direct return path for the end user.

Both **residential and business consumers** are included in this definition as end users. Currently, many UK businesses connect to the internet using a leased line or ISDN, but an increasing number of businesses are using ADSL or cable modems. Businesses place different priorities to residential users on network features such as speed, cost, reliability and security. There are also differences in the priorities of small and large businesses, and in the particular needs of public sector consumers.

Also included within the scope of the project are different **access devices**, inasmuch as they drive or require electronic networks to serve them. Currently, most internet access in the UK is made through PCs, and the electronic networks that serve them are a key part of the project. However, mobile handsets, games consoles and iDTV are increasingly expected to play a role as network access devices.

While consumers will ultimately focus on the **content and services** delivered by electronic networks, the project has considered content not for its intrinsic value, but for the impact that it has on the adoption of different technologies. This is particularly relevant for Government-sponsored content, such as education and healthcare.

1.2 Project process and report structure

1.2.1 Project process

The project was carried out by a multi-disciplinary team,⁵ comprising a mix of civil servants and secondees from outside Whitehall. The project had three phases:

- An extended scoping phase, during which the team worked closely with Government departments, the existing regulatory bodies and leading players in the industry to identify the main issues for the project.
- A data-gathering and investigation phase, drawing on a large number of stakeholders, including regulators, the industry, users of electronic networks, academics and international colleagues. The team also received a number of submissions, many of which were published on the project website.
- An analytical phase, during which the team reviewed the data and information that it had gathered, and produced this report, in addition to a number of research papers dealing with specific issues. Assistance was obtained from an Experts Group, drawn from a wide range of stakeholder groups.

The team benefited from the expertise of an Advisory Group, made up of representatives from HM Treasury, Department of Trade and Industry (DTI), Department for Culture, Media and Sport (DCMS) and the Prime Minister's Policy Unit, along with the E-Envoy and the Director-General of Telecommunications. The Advisory Group was chaired by the project Sponsor Minister, Stephen Timms, the Minister of State for e-Commerce and Competitiveness.⁶ The input and assistance of the Advisory Group was a crucial part of the project. The group was, however, advisory, and this report does not necessarily reflect the views of all group members.

1.2.2 Structure of the report

This report is structured as follows:

- Chapter 2 sets out the roles for Government and the regulator;

⁵ Membership of the project team, Advisory Group and Experts Group is detailed on the project website

⁶ Stephen Timms took up this post following a restructuring of Ministerial responsibilities in May 2002. Prior to this restructuring, Douglas Alexander was Minister for e-Commerce and Competitiveness, and was Sponsor Minister for the project



- Chapter 3 reviews the available evidence on the economic and social impact of electronic networks, and the implications for Government and the regulator;
- Chapter 4 assesses possible technological and market trends over the next decade, and identifies key challenges for Government and OFCOM;
- Chapter 5 analyses each of these challenges, and suggests ways in which Government and OFCOM could tackle them; and
- Chapter 6 concludes, and considers how this report could be taken forward by Government and OFCOM.

There are also a number of annexes and research papers available on the Strategy Unit website. Some of these provide further detail on the processes behind the preparation of this report; others expand on the analysis set out in the report.

2. THE ROLE OF GOVERNMENT AND REGULATORS IN ELECTRONIC NETWORKS

Summary

Electronic networks are increasingly integrated into society and the economy. This means that they can play a major role in helping to deliver the Government's public policy objectives. Fast, secure, reliable, resilient and widely available electronic networks should help to deliver a beneficial future, consistent with the aim of making the UK "a world leader in the new knowledge economy".

Within this framework, the remit for the regulator should be focused on ensuring the best outcomes for consumers from competition in electronic networks, in terms of availability, price, quality, reliability, innovation and efficient use of scarce resources. Where competition does not exist, the remit should include effective protection of consumer interests. The main barriers to competition are the existence of market power, and the presence of information asymmetries and externalities, which can help to preserve market power and inhibit competition.

OFCOM will need to tackle these barriers and fulfil its wider regulatory remit in a way that minimises the burden on affected stakeholders, and that avoids regulatory failure. OFCOM's remit is set out in the Communications Bill, and will be heavily influenced by the EU regulatory framework.

However, competition and traditional economic regulation on their own will not necessarily deliver the wider public policy objectives related to electronic networks. This is why there is also a need for action from all parts of Government, using a wide range of non-regulatory levers. Action will be needed by the Devolved Administrations, regional and local bodies, as well as from central Government.

There will undoubtedly be interactions between regulatory activity and objectives, and wider public policy activity and objectives. Sometimes this interaction will be complementary, but at other times conflict could arise. The key to tackling the interaction is to ensure that the regulator and the rest of Government have clearly defined remits. The Communications Bill already anticipates this approach, specifically by allowing Ministers to decide on the policy on the extent of the Universal Service Obligation, and the optimal use of radio spectrum.



This chapter explains how electronic networks can have a role in the delivery of Government's high-level policy objectives, and sets out what Government is doing in response (section 2.1). It highlights the role of the regulator in addressing market failure, creating a competitive environment, and simulating the effects of competition (section 2.2). It draws a distinction between regulatory objectives, and wider Government policy – the latter will largely be dealt with via non-regulatory levers, but there will be interactions that need to be managed (section 2.3).

2.1 Government objectives for electronic networks

Electronic networks are increasingly integrated into society and the economy

Electronic networks are increasingly integrated into society and the economy. The development of electronic networks will therefore be important in enabling companies and households to behave more efficiently and

effectively. In addition, given increased globalisation, the UK is likely to benefit from having a competitive telecommunications industry. Box 2.1 shows how electronic networks relate to each of the Government's high-level policy objectives.

This means that electronic networks have a key role to play in building our future

Since electronic networks can help deliver public policy objectives, Government will therefore want to see the development of electronic networks that are:

- Fast, so that data can be transmitted quickly and easily;
- Secure, so that data access is restricted to those who have a right to see it;
- Reliable, so that connections are predictable;
- Resilient, so that unexpected “shocks” do not cause networks to crash; and
- Widely available, so that the benefits of fast, secure, reliable and resilient networks are accessible to all who want to use them.

Box 2.1: Links between electronic networks and Government's policy objectives

Electronic networks can help to deliver each of the Government's high level objectives, as set out in the 2002 Budget Report published by HM Treasury:

- **Maintaining macroeconomic stability**, by delivering essential services to financial institutions and enabling the rapid and accurate exchange of information;
- **Meeting the productivity challenge**, by enabling companies to adopt new ways of working that can increase the quantity and quality of their output;
- **Increasing employment opportunity for all**, by enabling electronic network-based learning and by matching people's skills to the companies that need them;
- **Ensuring fairness for families and communities**, by delivering electronic network-based services that would not otherwise be accessible;
- **Delivering high quality public services**, by acting as a medium for the delivery and management of public services that would be less effectively and more expensively delivered by other means; and
- **Protecting the environment**, by facilitating the transfer of data in place of the transfer of people or goods.



If these outcomes are achieved, the benefits for the UK could be considerable:

- Businesses and other organisations (including the public sector) could implement organisational change based on effective use of electronic networks, potentially boosting productivity and international competitiveness;
- Government could make quality public services available on-line, so delivering more effective service at lower cost;
- Users could trade electronically with confidence, thus saving considerably on transaction costs;
- Individuals could access information, goods and services not previously available to them;
- The UK could be seen as an attractive location for foreign companies, bringing inward investment, job creation and improved national competitiveness; and
- The UK could be seen as an attractive location for telecommunications companies, helping to precipitate new innovations for the future.

Government has an e-Agenda to help deliver its vision for the future

The Government has declared its intention “to ensure the UK is a world leader in the new knowledge economy”.⁷ The Government has three core objectives:

- To make the UK the best and safest environment in the world for e-commerce by 2002;⁸
- To ensure that everyone who wants it has access to the internet by 2005;⁹ and

- To make 100% of Government services available electronically by 2005.¹⁰

Further objectives have been set for specific technologies, for example:

- To ensure that the UK has the most extensive and competitive broadband market in the G7 by 2005;¹¹
- To provide broadband internet access to every primary and secondary school in the UK by 2006, as well as connections to every GP surgery, hospital, primary care trust and health authority, and across the entire criminal justice system;¹² and
- To have the most competitive and dynamic market for digital television in the G7, as measured by take up, choice and cost.¹³

It is important to understand what the market will deliver, and what will require intervention

Although the role of electronic networks in delivering public policy objectives is reasonably clear, the role of Government and the regulator in ensuring the development of suitable electronic networks is much less clear-cut. The Government needs to consider the extent to which the market will deliver Government’s objectives, and the appropriate form of intervention if it will not do so. The next two sections consider these questions firstly from the perspective of the regulator, and secondly from the perspective of Government more generally.

⁷ Stated in the UK Online Strategy, available at www.e-envoy.gov.uk

⁸ UK Online Annual Report 2001 (Office of the e-Envoy, November 2001). This policy has been assessed in the report “World’s most effective policies for the e-Economy”, November 2002, available at www.e-envoy.gov.uk


⁹ Prime Minister’s speech at the Knowledge 2000 conference, 7 March 2000

¹⁰ Government to speed up introduction of online services, No. 10 press notice, 30 March 2000

¹¹ UK Online: The Broadband Future (February 2001)

¹² Prime Minister’s speech at the e-Summit, November 2002

¹³ Opportunity for all in a world of change White Paper (Cm 5052), February 2001



2.2 Competitive markets and the role of the regulator

2.2.1 Market failure

Progress has been made in introducing competitive markets in electronic networks

Both theory and practice demonstrate that competitive markets generally deliver desirable outcomes, in terms of lower prices, greater choice, better quality and increased innovation. There are a small number of circumstances in which competition may not be optimal, the main example of which is the existence of a “natural monopoly”, for example in the provision of some network utilities, e.g. national electricity, gas and railway infrastructures. However, telecoms infrastructure is often less expensive and can be built more easily than other forms of infrastructure, and telecoms networks can be highly differentiated in terms of speed and capacity. So there are strong arguments to suggest that few, if any, elements of the telecoms network are natural monopolies. Hence competitive markets can be seen as a basic pre-requisite for the development of electronic networks.

Prior to 1984, British Telecom (BT) was a nationalised industry, and it enjoyed a statutory natural monopoly across the whole of its activities. But the UK was one of the first countries in the world to privatise its incumbent telecoms provider, and to begin the process of market liberalisation. Since the Telecommunications Act 1984,¹⁴ considerable progress has been made in introducing competition to many telecoms market segments.¹⁵ At the same time, technological change has created complexities that could not have been envisaged at the start of the liberalisation process.

¹⁴ Available from HMSO, www.hmso.gov.uk

¹⁵ Oftel has information on around 50 different market segments in the provision of fixed line telecoms services. Around 15% of these are already deemed to be effectively competitive, and around 25% are deemed to be prospectively competitive. The remainder show no signs of emerging competition. Information on these markets is available from www.oftel.gov.uk. Annex A on the project website also reviews in more detail the progress that has been made in improving the performance of UK telecoms

But the presence of market failures means that competition will not develop on its own

The progress that has been made towards competition has only happened as a result of 18 years of effective regulatory intervention, without which it is unlikely that electronic networks markets would have moved towards competition. The reason for this is the presence of a number of “market failures” or “barriers”, which work together to prevent competition from taking place.

The most significant barrier to competition is incumbent market power, and in each of the major markets considered in this report there are one or more incumbents in possession of market power:

- BT had a statutory monopoly in the provision of fixed-line telephony to the UK until 1984, and still has the only ubiquitous nationwide network;
- In mobile, when the market was first created in 1985, there was initially a duopoly consisting of Vodafone and Cellnet (now O2), both of which are still deemed to have market power by Oftel; and
- BSkyB’s position in the wider digital and pay TV markets provide it with a considerable advantage in offering truly interactive services.

All these incumbents possess a number of attributes which might be expected to perpetuate their market power. Taking the case of BT for example, it has:

- Vertical integration between network and service operations;
- Ownership of the only ubiquitous nationwide network;



- Extensive customer relationships (20 million residential lines and 9 million business lines);
- Powerful retail brand;
- Advantages of scale and experience; and
- Unique possession of information.

Irrespective of the source, any company in possession of market power has the potential to inhibit the development of competition. This may be due to deliberate action by the company with market power, or it may simply be a natural outcome of the characteristics of the market, given the way in which the market was created. Either way, regulatory intervention will be required if competition is to develop.

Information asymmetries can reinforce incumbent market power

Electronic networks are usually technically complex, involving large amounts of infrastructure of varying ages, with a multiplicity of inter-connections between different network elements. Information about

these networks and their inter-connections is often rather limited. Even if the information is available, it is very likely to be held predominantly by the incumbent in the market.

The unique possession of information is a source of market power, and can in particular be used to perpetuate market power. When other companies are attempting to compete in certain network elements or in service provision, they typically need information that only the incumbent can provide. Similarly, when regulators are trying to encourage competition, they will also be reliant on information provided by the incumbent – for example, in ensuring that prices are reflective of costs.

By way of example, as described in Box 2.2, the local loop unbundling (LLU) process illustrates the need to ensure that relevant information is passed on to competitors and to the regulator, when the need arises. There is undoubtedly a difficult balancing act required, and incumbents will want to protect commercially sensitive

Box 2.2: Information asymmetries and local loop unbundling

Local loop unbundling (LLU) is the name given to the process by which incumbent telephone companies are forced to open up to competition the part of their network known as the local loop – the link between customers and the local exchange.

The process started in the UK in 1999, and an EU Directive subsequently required that all EU Member States should have implemented LLU by January 2001. However, as with much of Europe – and the rest of the world – the LLU process in the UK has been dogged by difficulties, and although all of the building blocks have been in place for some time, take-up has been slow.

There are several reasons for this, including the weakness of the capital markets, concerns about the underlying economics of LLU, particularly for residential customers, and unrealistic business plans from some of the early LLU operators. But one reason was undoubtedly linked to asymmetries of information.

The scale of interest in LLU throughout 2000 was much higher than had been anticipated, and all LLU operators were dependent on BT for the information they needed to proceed with unbundling. At the same time, the regulator was being called on to make a series of decisions, and these again were dependent on information that only BT could provide. In hindsight, it seems clear that the resulting information asymmetry was a major contributor to the delays and problems with the LLU process.



information, but this ought to be manageable, with the regulator acting as “the honest broker”.

The third barrier to competition is the presence of network externalities

The markets associated with electronic networks are also characterised by “network externalities”. These arise when individuals or businesses make decisions which ignore the impact of their decision (positive or negative) on others. In electronic networks, there are two types of network externality that are a cause for concern as a possible means of maintaining market power:

- Wherever several networks are connected, *decisions taken by one network operator will impact on other interconnected networks.*
- If users benefit from interaction with other users, *the addition of new users will bring benefits to existing users, and will potentially encourage other non-users to join the network.*

Taken together, these externalities imply that companies with extensive networks and high market share could in principle drive other companies out of the market, if they refused to provide inter-connection onto their network. If this happened, users of the smaller networks would quickly realise that they would benefit

more by moving onto the larger network, and enjoying greater connectivity. Over time, the smaller networks would shrink and disappear, removing any competition. Hence there is a role for the regulator to require that non-discriminatory inter-connection is provided to all who require it.

2.2.2 Regulatory role and objectives

The presence of market failure establishes the role and objectives of the regulator

Given these market failures in electronic networks, regulation is needed to:

- Overcome market failures and barriers to entry, in order to encourage higher levels of competition in all relevant markets; and
- Simulate the beneficial effects of competition, until competition is established.

OFCOM is being created to fulfil these roles, which are reflected in the Communications Bill, described in Box 2.3. OFCOM will have a number of duties including the regulation of broadcast content, but its primary duties in relation to electronic networks are expected to be:

Box 2.3: The Communications Bill

The Communications Bill sets out the powers that OFCOM will exercise. A draft of the Bill was published in May 2002, and the Parliamentary Joint Scrutiny Committee published its report in August 2002. The Bill was introduced to the House of Commons on 19 November 2002. Completion of the Bill is crucial to the overall timetable for OFCOM, since the new regulatory body cannot take any powers from the existing regulators until after the Bill becomes an Act of Parliament.

Wherever possible, the Bill aims to avoid being overly-prescriptive of how OFCOM will enact its regulatory powers. There are likely to be arguments put forward for the addition of a wide range of detailed provisions. But maintaining flexibility in the text will be important for maximising the Bill’s effectiveness over the long-term. This is a reflection of the need to strike the right balance between certainty in regulatory principles, and flexibility in application, so as to respond appropriately to technological and market change.



- To further the interests of consumers in relevant markets, where appropriate by promoting competition; and
- To secure the optimal use for wireless telegraphy of the electro-magnetic spectrum.¹⁶

These roles and duties are all relatively typical of “economic regulation”, which is always centred around the promotion and simulation of a competitive environment (with the exception of spectrum, where OFCOM’s duties include both managing the spectrum and licensing the companies that use it). Similar approaches have been taken by other economic regulators.¹⁷ In the light of these other examples, the duties proposed for OFCOM appear to be reasonable and appropriate. The specific activities that will be required include, where appropriate:

- Regulating prices charged to competitors and consumers, ensuring value for money where competitive pressures do not exist;
- Regulating the terms of interaction with competitors, ensuring they are non-discriminatory to enable new entry and an increase in choice;
- Regulating service level agreements and guarantees, such that quality of service exceeds a minimum level; and
- Encouraging investment and innovation, particularly by promoting competition, in order to improve choice and value for money.

A key challenge will be the need to avoid “regulatory failure”

A key challenge for OFCOM will be to avoid “regulatory failure”, which can occur when the benefits of regulation do not justify its costs. It can be avoided by removing regulations when the costs exceed the benefits, and by minimising costs when intervention is worthwhile. However, it is also important to avoid regulatory failure caused by not taking effective regulatory action where necessary.

This approach to regulation has been written into the Communications Bill, which puts the onus on OFCOM to deliver light touch regulation – by not imposing burdens that are unnecessary, and by removing existing regulations that are no longer needed.¹⁸ The Bill reflects in turn the EU regulatory framework, which is one of the major international influences on regulation of electronic networks in the UK. These international influences are described in Box 2.4.¹⁹ Crucially, the EU regulatory framework restricts the majority of regulatory activity to those instances where a company is shown to be in possession of “Significant Market Power” (SMP).

In addition, OFCOM will need to carry out its activities in the light of a number of recent reports into the role and functions of the economic regulators as a whole.²⁰ Key amongst these is the requirement²¹ for OFCOM to take into account the “principles of good regulation” established by the Better Regulation Task Force (BRTF),²² namely:

¹⁶ Taken from Part 1, Section 3 of the Communications Bill introduced to the House of Commons on 19 November 2002, available at www.communicationsbill.gov.uk/


¹⁷ See Annex C on the project website

¹⁸ Part 1 Section 5 of the Communications Bill

¹⁹ Further detail is set out in Annex B on the project website

²⁰ For example “Economic Regulators”, Better Regulation Task Force (2001); “External Efficiency Review of Utility Regulators”, WS Atkins/HM Treasury (February 2001); “Pipes and Wires”, National Audit Office (2002)

²¹ Part 1 Section 3 of the Communications Bill



Box 2.4: International influences on regulation of electronic networks in the UK

The international regulatory environment sets parameters for telecoms regulation in the UK. Four organisations significantly influence the approach which can be taken:

- The **European Union** shapes telecommunications law and policy in Europe. A series of new EU Directives on electronic communications dictate the regulatory approach for National Regulatory Authorities, with the aim of developing a common market for networks and services throughout Europe, and must be implemented by member states by July 2003;
- The **European Conference of Post and Telecommunications Administrations** promotes co-operation between member administrations and bodies responsible for telecoms policy and regulation. Its activities include harmonisation of licensing conditions, spectrum management and numbering;
- The **World Trade Organisation** administers the General Agreement on Trade in Services, which includes an Annex on Telecommunications and a Protocol regarding basic telecommunications. The WTO provides a global forum for trade negotiations and dispute resolution; and
- The **International Telecommunications Union** is an agency of the United Nations which promotes the efficient operation of telecommunications facilities, and promotes and offers technical assistance to developing countries. Through the ITU, member states agree binding spectrum allocations.

The international environment will shape the policy solutions available to the UK regulator and Government over the next decade, and working within international institutions will in itself present a set of challenges.

- Transparency;
- Accountability;
- Proportionality;
- Consistency; and
- Targeting.

One type of regulatory failure that can be overlooked is a long-term failure, in which companies become dependent on regulation for their financial viability. This can seriously hamper any attempts to reduce the regulatory burden over time. This type of regulatory failure can be avoided by ensuring that the competition created is, as far as can be foreseen, sustainable, and can be supported by underlying market conditions.

2.3 Public policy and the wider Government interest

2.3.1 The limitations of competitive markets and economic regulation

Competitive markets are not necessarily sufficient for the delivery of public policy objectives

Despite the advantages that competitive markets can bring, they are not necessarily sufficient on their own for the delivery of Government's wider policy objectives, and could even hinder the delivery of some of the wider objectives. For example:

- Businesses and households will only take up electronic networks to the extent that they receive benefits exceeding their costs. But if



electronic networks deliver economic benefits over and above those taken into account by the user (in other words, external benefits), then public policy could target higher levels of take-up than the market would deliver, if the benefits of intervention outweighed the costs.²³

- In a competitive market, operators will normally deploy electronic networks only where they are economically viable. But public policy may require that these networks be extended more widely – for example, to poorer or more remote communities.
- Unless wider public policy has put in place the right incentives for limiting environmental damage, the environmental benefits of replacing commuting with teleworking will not always be taken into account by users of electronic networks, and nor will be the environmental costs of rolling out the networks. Government and regulators are best placed to make these trade-offs.
- Some services available via electronic networks are ones that individuals ought to have access to, even if they do not actively seek it, if they are valued more highly by Government than by individuals (e.g. health and education).²⁴
- DTI has overall policy responsibility and an industry sponsorship role in relation to information and communication technologies (ICT). This includes responsibility for “Broadband Britain”.
- The Office of the E-Envoy (OeE), based in the Cabinet Office, has the role of leading the “drive to get the UK online, to ensure that the country, its citizens and its businesses derive maximum benefit from the knowledge economy”.
- DCMS has policy responsibility for some of the issues relating to the content provided over electronic networks.
- HM Treasury has responsibility for the general economic framework and for setting the tax regime.
- The Office of the Deputy Prime Minister has responsibility for implementing local e-Government.
- DEFRA has policy responsibility for enhancing opportunity and tackling social exclusion in rural areas, by increasing productivity in the least performing rural areas, and improving the accessibility of services. This includes working with other departments to enhance access to and uptake of ICT, and the electronic delivery of public services in rural communities.²⁵

This creates a role for Government intervention, over and above economic regulation

In each of these cases, competitive markets and economic regulation may not deliver all Government’s wider public policy objectives. This means that there will need to be additional intervention, involving a number of different parts of Government:

- Individual Government Departments – most notably the Departments for Education and Skills (DfES) and Health (DoH) – have responsibility for providing electronic content for public services, and for facilitating the implementation of broadband infrastructure.

There will also be a role for local authorities and Regional Development Agencies (RDAs), to

²³ Chapter 3 discusses the evidence for these wider economic benefits

²⁴ Economists refer to these as “merit goods”

²⁵ DEFRA’s overall aim is sustainable development. DEFRA has produced a prospectus “Working for the Essentials of Life” which explains the direction and range of its work in the near future and is available at <http://www.defra.gov.uk/corporate/prospectus/>. Further detail on the Government’s rural policy is set out in the Rural White Paper, “A Fair Deal for Rural England” (November 2000) and progress reports on www.defra.gov.uk/wildlife-countryside/ruralwp/index.htm. DEFRA’s role on rural policy includes promoting rural issues in policy development and implementation across Government (“rural proofing”)

encourage and where necessary help operators to extend the reach of electronic networks. Government has recognised this regional perspective by announcing a new network of dedicated regional broadband advisors to be co-ordinated by DTI, with the aim of increasing both availability and take-up of broadband in the regions.²⁶

In addition, the RDAs in the North West and South West are involved in projects that will use EU Objective 1 money to fund broadband roll-out in Merseyside and Cornwall.²⁷ A similar scheme is under way in Wales, highlighting the role of the Devolved Administrations – which is described in more detail in Box 2.5.

In addition to these direct Government activities, Government also has regular contact with a wide range of stakeholder groups including:

- The Broadband Stakeholders Group – an independent advisory group designed to help develop Government’s broadband thinking;
- The Digital TV Stakeholders Group – an independent forum for those involved in the future of digital television in the UK;
- Content bodies such as the Digital Content Forum, the Broadband Content Coalition and the Internet Watch Foundation; and
- The National Consumer Council.

Box 2.5: The role of the Devolved Administrations

Telecommunications regulation is a reserved power. However, variations in population density and economic development between the areas within the UK mean that involvement of the Devolved Administrations (DAs) is important for achieving Government objectives. Issues for consideration include:

- Remote areas in the devolved areas (as well as other parts of the UK) may have only one infrastructure provider, and so it is important that an incumbent is effectively regulated.
- Differences in population density and economic development need to be met by policy objectives on roll-out of broadband internet access.
- Northern Ireland has telecommunications issues unique within the UK due to its land border with the Republic of Ireland. For example, while the UK and Republic of Ireland regulators have agreed special rates for cross-border voice traffic, full international rates are charged for data traffic.
- Responsibility for economic development is devolved and so, as the economic importance of electronic networks increases further, close co-ordination will be required between Government, the regulator and DAs.

The e-Agendas of the DAs are summarised in the *UK Online Annual Report*,²⁸ and the approach to ensure the interests of the UK nations and regions are represented in OFCOM is set out in the policy narrative to the Communications Bill.²⁹

²⁶ Further information is available in the DTI Press Notice that announced this initiative on 26 June 2002, available via www.dti.gov.uk

²⁷ The Merseyside bid is due to be assessed later this year. The ACT-NOW scheme in Cornwall has already seen infrastructure in investment that enabled BT to ADSL-enable six exchanges, with another six exchanges to follow

²⁸ *UK Online Annual Report 2002*, Office of the e-Envoy, November 2002

²⁹ Policy Narrative section 4.41, available at www.communicationsbill.gov.uk/policy_narrative/550805.html



Box 2.6 Non-regulatory levers

Clearly regulation is only one of the ways that Government can address the development of electronic networks. There are also many non-regulatory levers (NRLs) that Government can use, including:

- Fiscal measures – loans or equity finance, tax credits or other incentives;
- Public procurement;
- Education and awareness raising activities; and
- Facilitation and co-ordination within the market.

The “UK Online Broadband Strategy”³⁰ contains a list of the NRLs currently being used across Government, some of which are designed to increase demand for broadband, and some to increase the supply of broadband.

The Strategy Unit has carried out a review of the NRLs potentially available to Government, and compared this to the levers which are currently being used in the UK. As part of this work a comparison of NRLs being used in other countries was used to identify potential gaps in the current strategy. The review concludes that most of the available levers are already being addressed by Government and other groups. Details of this review and its conclusions are available in the “Research Paper on Non-Regulatory Levers” available on the Strategy Unit website.

2.3.2 Interaction between regulatory and non-regulatory intervention

Regulatory and public policy objectives may sometimes be in conflict

The non-regulatory interventions employed by different elements of Government are discussed briefly in Box 2.6.

In practice it is not possible to draw a clear distinction between regulatory objectives and wider public policy objectives, since regulatory intervention will impact on wider public policy objectives, and non-regulatory Government intervention will affect the development of competition and the delivery of quality, choice and value for money. Indeed, non-regulatory and regulatory interventions may sometimes be in conflict.

Lack of clarity at the interface could be very damaging

The most important issue for this project is how these potential conflicts should be resolved in setting regulatory objectives, and in OFCOM’s ongoing activities. Economic regulators are used to dealing with potential trade-offs,³¹ and conflicts can be dealt with on a case-by-case basis. But the potential trade-offs between regulatory and public policy objectives need to be dealt with explicitly up-front. If they are not, the resulting lack of clarity could threaten confidence in the role of the regulator and of Government, discouraging market entry and investment.

The BRTF report “Economic Regulators”³² looked at this issue in the context of Ofgem and the Utilities Act 2000. The BRTF noted that the Act included within Ofgem’s remit social

³⁰ Office of the e-Envoy, December 2001

³¹ As discussed in NAO Report “Pipes and Wires” (April 2002)

³² July 2001, www.brtf.gov.uk/taskforce/reports/entry%20pages/econregentry.htm



(e.g. having regard to those with low incomes or in rural areas) and environmental objectives, as well as traditional competition objectives. The BRTF argued that this resulted in a blurring of responsibilities between Government and the regulator, reducing accountability. The report recommended that regulators should have a role in the delivery of wider objectives, but should not be asked to design the objectives.

This report offers no comment on the Ofgem example. But **this report recommends that in the context of OFCOM the BRTF conclusions should be taken fully into account, and a clear distinction should be maintained between the roles of Government and the regulator.**

Regulation of electronic networks is extremely complex, and as this report highlights, will pose considerable challenges for OFCOM to deal with. Given this, it would be unhelpful and potentially damaging to give OFCOM a direct role in setting objectives that go outside the basic remit of such a regulator. Hence Government should be responsible for making overarching social and environmental policy decisions, which OFCOM should then be responsible for implementing.

In practice, this approach is already anticipated in the Communications Bill:

- Ministers will have control over the definition of the Universal Service Obligation, through which Government can implement its approach to social issues such as special arrangements for low income customers, customers with disabilities, and customers in remote parts of the country.
- OFCOM will be required to have regard to the vulnerability of children and of others whose circumstances appear to OFCOM to put them in need of special protection, the needs of persons with disabilities, of the elderly and those on low incomes, the desirability of preventing crime and disorder, the different interests of persons in different parts of the UK, and the different interests of those living in rural and urban areas.
- Many of the environmental issues relating to telecoms (e.g. the installation of mobile phone masts, the laying of cables in streets etc.) fall within the framework of the planning regime and related legislation such as the Street Works Act. The “Electronic Communications Code” provided for in the Bill in essence sets out simplified planning arrangements for operators installing and maintaining communications equipment. All these matters will remain under the control of Ministers, and OFCOM’s role will be limited to application of the Code to individual communications providers and enforcement of certain aspects.
- The Bill also provides for Ministers to give general or specific directions to OFCOM about their spectrum management functions. This is because spectrum policy dictates the use of a finite national resource over which a degree of Ministerial control is desirable. This power of direction will be subject to the safeguards of consultation and Parliamentary approval.

Should further social or environmental issues arise which are not covered by this approach, and which it would be appropriate for Government to determine, Ministers would need additional legislative powers, which should be subject to Parliamentary scrutiny.

3. ECONOMIC AND SOCIAL IMPACTS OF ELECTRONIC NETWORKS

Summary

There is reasonable evidence from the US that ICT investment has had a positive impact on productivity and growth. However, evidence of the specific impact of electronic networks is less clear, as is evidence of the impact of ICT investment in other countries, including the UK.

The lack of clear evidence does not mean that electronic networks are not having an impact. Business level case studies carried out for this project show how important it is for Government and regulators to remove any barriers to the effective deployment of electronic networks. These studies show that electronic networks can have a major impact on businesses, consumers and Government, but that the extent of this impact will depend on some supporting factors:

- Investment in learning;
- Strategies to reduce the cost of organisational change;
- Measures that enhance the perceived safety of networks; and
- Extent of technological sophistication.

Analysis of the social impact of electronic networks focuses on the “digital divide”. Different issues apply to narrowband and broadband connections:

- Narrowband internet connections are available throughout the country, thanks to the Universal Service Obligation (USO) on telephone services. But there is clear evidence of a divide in the levels of take-up between different groups in society.
- Concerns about broadband focus on geographical availability. Fixed-line broadband is available to 66% of the population, and there is reason to believe that certain groups in society are less likely to have access to broadband than others.

The existence of a digital divide has a number of implications. The main issues for the regulator are the need to maintain competition in the provision of narrowband services, and the possible role that it will be asked to play in helping to deliver wider coverage of broadband.

Action from Government and the regulator is therefore important to ensure that the development, availability and usage of electronic networks are encouraged, and are in no way inhibited, particularly through barriers to competition.

This chapter highlights the potential differentiation in electronic networks, and the implications this has for different types of impact on the economy and on society (section 3.1). It then reports on the findings of two pieces of research commissioned by the Strategy Unit, both of which analyse the impact of electronic networks on productivity and growth (section 3.2). It then considers the evidence available on the social impacts of electronic networks, looking in particular at the so-called “digital divide” (section 3.3). Finally, it reflects on the importance of regulation in the light of these economic and social impacts (section 3.4).

3.1 Capabilities of electronic networks

The rationale for Government intervention has been discussed in Chapter 2, in terms of market failures and the realisation of public policy goals that would not be achieved through competitive markets. However, the scale and nature of this intervention will depend on the economic and social impacts of electronic networks in the UK. This chapter assesses the evidence of such impacts.

Electronic networks can deliver a highly differentiated range of services

Although electronic networks do share some similarities with other networks, they also have some characteristics that are unique.³³ The main reason for this is that telecoms networks offer differentiated services, in marked contrast to most other networks, which offer a single undifferentiated service (“water”, “gas”, “electricity”).

At the most basic level, electronic networks can offer voice communications, and with a relatively small number of adjustments can offer

associated services such as the “1571” answering service, and basic narrowband access to the internet. However, a significant addition of technology is needed to enable high-speed access to the internet. The higher the speed required, the more extensive is the required technology. If mobile voice telephony / data services are required, an entirely different network is needed.

This has implications for the issues that Government needs to address

This implies that Government needs to consider:

- The capabilities of the electronic networks available in the UK, relative to those available in other countries; and
- The capabilities of the electronic networks available to different groups within society, relative to each other.

The first of these will be key in determining how electronic networks improve productivity and economic growth relative to other countries. The second will be key in determining issues such as the extent of the so-called “digital divide” between different groups in society and between different areas of the UK. It is the role of electronic networks in each of these areas that occupies the remainder of this chapter.

3.2 Economic impact

There is no doubt that electronic networks have made a considerable difference to the way in which companies and households organise their activities. From the telephone to broadband internet, and from the telegraph to 3G mobile phones, each successive development in electronic networks has delivered its own changes. But although the differences in activity

³³ See Annex C on the project website for detailed analysis of the similarities and differences



are obvious, the impact on productivity and on economic growth is much less clear-cut.

The Strategy Unit commissioned two separate pieces of work on the links between electronic networks and the general economy, drawing expertise from the UK's leading academic institutions working in this area:

- The first piece of work asked London Business School (LBS) to review the evidence of the impact of Information and Communication Technology (ICT) on productivity and growth, and to draw conclusions for the likely economic impact of electronic networks.³⁴
- The second piece of work asked London School of Economics (LSE) to review micro-level case study material from the UK and Europe, in order to identify what factors influence the ability of companies and households to make effective use of electronic networks – and so which factors will enable electronic networks to have a positive impact on productivity and growth.³⁵

The LBS report identifies some impact from ICT on productivity and growth

The LBS report analyses the existing economic literature that tries to identify the impact of ICT on productivity and growth. ICT includes electronic networks, but also other elements such as other hardware, software and semiconductors. There are three main routes by which ICT could improve productivity and growth:

- Increased investment in ICT throughout the economy can stimulate ICT-producing sectors, which may in turn impact macro-economic statistics. The net impact may be limited, if the growth of the ICT-producing sectors simply offsets a decline in other sectors. However, a net positive effect will arise if the ICT-producing sectors generate

higher returns on investment than other sectors, or if a country can develop a competitive advantage in these sectors.

- Increased ICT investment can result in capital deepening, and increased labour productivity. The overall impact on the economy will depend on whether the cost of the investment is offset by the increase in labour productivity.
- Increased investment in ICT can also be a sign of technological progress not reflected in simple capital deepening. This is the most difficult impact to measure, but arguably the most important in the long-run. It reflects the role that ICT can play as an enabler for further organisational change.

There is reasonable evidence from the US that ICT has had a positive impact on productivity and growth, at least from the mid-1990's onwards. The evidence for other OECD countries – including the UK – is much less clear-cut, though some positive effects can be detected. And of course the limited evidence does not mean that there is no actual effect, but rather that it cannot be identified from the data.

What does seem to be clear is that the impacts in other countries have been much smaller than in the US. A number of possible explanations have been put forward:

- It may be that the effects in the US are largely cyclical, and do not reflect genuine changes resulting from ICT. Recent data does suggest some support for this, but this will not be clear until data is available for longer time periods.
- The US may have been quicker to develop and take up new ICT investment, and hence may have enjoyed the benefits earlier than other countries. This would be especially likely if the benefits to early movers are

³⁴ Affuso, Luisa and Waverman, Leonard, "The Impact of Electronic Infrastructure on Economic Growth and Productivity – A Report for the Performance and Innovation Unit", London Business School (4 February 2002). Available on the project website

³⁵ Mansell, Robin and Nikolychuk, Lynne, "The Economic Importance of Electronic Networks: Assessing the Micro-Level Evidence Base", London School of Economics and Political Science (9 August 2002). Available on the project website

greater than those to later movers, or if (as suggested by some of the literature) there are non-linearities in the impacts of ICT investment, with the major impacts delayed until a critical mass of investment is achieved.

- The US may be best placed to exploit the potential benefits of ICT investment, due to the flexibilities of the US labour market, the efficiencies of US capital markets, the economies of scale in a country the size of the US, or to the ability of the US to acquire the new skills and the organisational change that seem crucial to the effective use of ICT.

The impacts are spread over a number of different sectors

Even if there is a discernible impact from ICT investment on the economy as a whole, there is considerable debate as to the number and range of sectors within which ICT is important. For example, are the effects limited to the ICT-producing sectors themselves, or just to the service sector, or throughout the economy?

The LBS report highlights a number of ways in which ICT could benefit different sectors of the economy:

- Reductions in transaction costs;
- Improvements in (internal and external) management efficiency;
- Better information, giving better stock control and “just in time” production;
- Easier price comparisons, encouraging competition;
- Increased choice and convenience; and
- Improved customer relations.

Examples of these effects have been identified across a range of industries, including manufacturing, retail, financial services, health care, Government and education. Some of the major users and beneficiaries of ICT are among the world’s leading companies. But it is not

clear whether a direct correlation can be identified between the most successful companies, and the effective use of ICT.

It is difficult to draw out specific impacts from electronic networks

The LBS report concludes that the identification of specific impacts from electronic networks – as opposed to ICT more generally – is extremely difficult, and any estimates should be treated with caution. The data is limited in quantity and quality. And there are concerns about the growth accounting methodologies traditionally used, since these may miss the technological progress enabled by ICT.

In the light of these difficulties, one approach is to consider the impacts of electronic networks and other forms of ICT investment on a much wider range of economic indicators than just productivity and growth. The aim of this approach is to understand how ICT can change the ways in which businesses and households interact. Within Government, OeE and the Office for National Statistics (ONS) are working on an ongoing programme to build up the database of information necessary for an analysis. And the iSociety programme from The Work Foundation has begun to consider what we can conclude from the available data.³⁶

But we can begin to identify characteristics that will help and hinder the effective use of electronic networks

Another approach was adopted in the work carried out for the Strategy Unit by LSE. The LSE report considers the micro-level evidence on the characteristics that are likely to hinder or enable the diffusion and effective use of electronic networks. The report looks separately at the different types of use that may be made of electronic networks, involving any combination of consumers, businesses and Governments.

³⁶ Coyle, Diane and Quah, Danny, “Getting the measure of the new economy”, iSociety (29 May 2002)



The LSE report identifies four associated factors that need to exist in order for electronic networks to improve efficiency:

- Investment in learning – developing the skills and competencies needed to make effective use of electronic networks;
- Strategies to reduce the cost of organisational change – helping introduce the new behaviours that are enabled by electronic networks;
- Measures that enhance the perceived safety of networks – improving the security of electronic networks and the transactions that use them; and
- Extent of technological sophistication – ensuring that the level of technology available is sufficient to deliver the performance that is required.

The relative importance of each of these factors, and the way in which they impact on the

effective use of electronic networks, varies considerably by type of user and type of usage. Box 3.1 draws from the LSE report and sets out some of the key determinants of the effective use of electronic networks.

Summing up the main messages from this analysis, the LSE report states that, “*the impacts of use [of electronic networks] in terms of perceived effectiveness and efficiency depend on social, economic, political, cultural and organisational issues*”. This wide range of influences makes it difficult to assess with any confidence what impact electronic networks are likely to have on the economy as a whole. However, the potential effect is clearly considerable, and it is important that there are no barriers preventing this potential from being achieved.

Hence the LSE report concludes that the most important goal should be to shift businesses, consumers and Government further up the

Box 3.1: Key determinants of the effective use of electronic networks

<i>Use</i>	<i>Key determinants of success</i>
Business-to-Business e-commerce, for example in supply chain management	<ul style="list-style-type: none"> ● Development of appropriate skills among individual employees; ● Acceptance of the need for organisational change; ● Management of cost (especially among SMEs).
Government-to-Government e-governance, for example in policy co-ordination and delivery	<ul style="list-style-type: none"> ● Awareness and acceptance of the benefits of organisational change; ● Availability of highly secure electronic environments
Business-to-Consumer e-commerce, for example marketing and sales	<ul style="list-style-type: none"> ● Recognition and dissemination of user benefits; ● Provision of a secure and private electronic trading environment; ● Development of effective and widespread user interfaces.
Consumer-to-Government transactions, for example tax procedures	<ul style="list-style-type: none"> ● Recognition and dissemination of consumer benefits; ● Reduction of the costs of transition onto new ways of accessing Government information and services; ● Provision of secure and private transacting environments.

“e-adoption ladder”, in particular through “learning by doing”. In other words, the diffusion of electronic networks will to some extent be self-reinforcing, once sufficient numbers of users have experienced and learned the benefits that their use can bring. Successful diffusion therefore rests on the achievement of that “critical mass” of effective users.

The presence of “bandwagon effects” make learning even more important

A recent study carried out for Oftel and the Office of the E-Envoy by SPR reinforces the importance of learning, by noting the evidence for “bandwagon effects” in the take-up of new technologies such as broadband.³⁷ Bandwagon effects arise through the development of a “virtuous circle” in product development – the addition of more users of a technology generates new developments in the technology, which in turn encourages more users, and so forth. Bandwagon effects have been seen in the take-up of recent technologies such as mobile phones and home PCs.

In order to generate the positive feedback loop that then creates the bandwagon, it is essential firstly that a critical mass can be achieved, but secondly that users push at the boundaries of what the technology can do, so that this sends the right signals back to the developers of the technology. There is clearly a role for the regulator to ensure that the market operates smoothly, and allows the right signals to be sent. The SPR report explores the wider range of policy options that Government might choose to implement.

There are a number of implications for Government – and for the regulator

The LSE report focuses on the extent to which regulation impacts the effective use of electronic networks. Consistent with the findings on the determinants of success and failure, the LSE report concludes that the main

role for Government should be to encourage a higher level of skills, competencies and awareness in relation to the effective use of electronic networks. There are two aspects to this:

- Greater skills and competencies in the use of ICT equipment; and
- Greater awareness and understanding of the benefits of making effective use of electronic networks, and the costs of transition that must be incurred.

These are most likely to be achieved through non-regulatory levers (see Box 2.6). The LSE report also recommends that Government should build on its existing data collection for monitoring the impact of electronic networks at the micro-level – including the current work by OeE and ONS – so that it can investigate in more detail the way in which electronic networks are changing patterns of consumption, and how these changes are influenced by cultural, social, economic and geographic factors.

However, OFCOM will be uniquely placed to take a view of the diffusion and usage of electronic networks, and it would be sensible to make use of this knowledge. Hence **this report recommends that OFCOM should liaise with appropriate elements of Government, and should provide factual and objective information on the diffusion and usage of electronic networks that Government can use at its own discretion in the development of policy.**

Of more direct relevance is the recommendation by LSE that the regulator should focus on encouraging competitive entry in all relevant markets, by “*promoting universal access to public networks, and limiting discriminatory and unfair restrictions on network access and usage.*” This is broadly consistent

³⁷ Haring, John, Rohlf, Jeffrey H and Shooshan, Harry M, “And now... but first: Propelling the Broadband Bandwagon”, Strategic Policy Research (2002 – forthcoming)



with the role mapped out for the regulator earlier in this report, to ensure that operators with Significant Market Power offer non-discriminatory access to their networks.

3.3 Social impact

The use of electronic networks can have a significant social impact

The discussion in section 3.2 highlighted the ways in which electronic networks and ICT can benefit companies and households. If certain groups of companies and households do not have access to electronic networks, they are likely to miss out on any economic benefits that may exist, which could have a wide range of implications:

- It may be that some companies have slower productivity and growth improvements than their competitors – for example, smaller companies may lose out to larger companies;
- Certain regions – for example, rural areas – may lose out to other regions and be unable to attract inward investment; and

- At the national level, if an economy is failing to exploit its resources in every region or category, then it is failing to maximise its overall potential. Indeed, there can be major downsides to dependence on a small number of companies in a small number of locations – such as skills shortages, rising property costs, transport congestion, etc.

Increased household connections to electronic networks could have a number of benefits, for example:

- Advancing social inclusion throughout the UK – increasing the number of connections can help to ensure that everyone has access to the benefits of the internet such as convenience, information, competitive prices and access to e-Government;
- Enabling a “critical mass” in the take-up of new technologies – without this critical mass, and the achievement of a bandwagon effect, companies and public sector organisations may not achieve the full benefits of switching to electronic systems;

Figure 3.1: Reasons for not using the internet³⁸

Reasons	% of respondents, July 2002
Lack of interest	44
No computer access	25
No need	23
Lack of confidence/skills	20
Do not want to use it	11
Feel too old	8
Cannot afford it	7
No time	7
Have not got around to it yet	6
Poor opinion of the internet	1
Health problems make it difficult	1
Other	2

³⁸ Adults who have never used the internet, ONS, July 2002. Percentages do not add up to 100% as respondents may have given more than one answer



- Enabling companies and other organisations to gain the full benefit of teleworking, by achieving a critical mass of teleworkers so companies can significantly rationalise their central workspace environment; and
- Embedding skills and enabling lifelong learning – regular use of and experience with electronic networks could be crucial to the development of skills in future generations of workers.

3.3.1 Narrowband digital divide

There is clear evidence of a narrowband digital divide

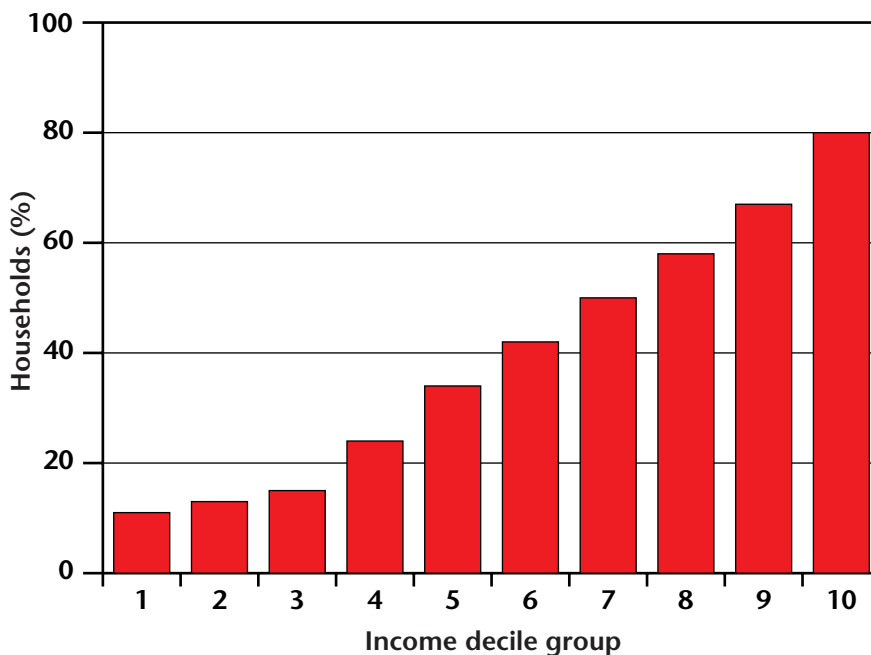
Given these social impacts, it is important for Government to consider the access available within the UK. A “digital divide” occurs whenever there is differential access to electronic networks (and the services provided over them) available to different groups in society. There is clear evidence of several

different forms of digital divide in the UK, and these can be tracked on a number of socio-demographic metrics, including income, age, gender and location. Given the predominance of narrowband connections in the UK at present, most information about the digital divide relates to residential access to narrowband connections.

Because narrowband internet access is available on the basic telephone network, and because there is a Universal Service Obligation (USO) on that network, narrowband internet access is in principle available throughout the UK. In addition, the cable network provides internet access to more than half of all households. However, there are a number of potential barriers that may cause a digital divide. For example:

- The cost of devices such as PCs required to access narrowband internet;
- A lack of skills needed to use access devices and the internet;

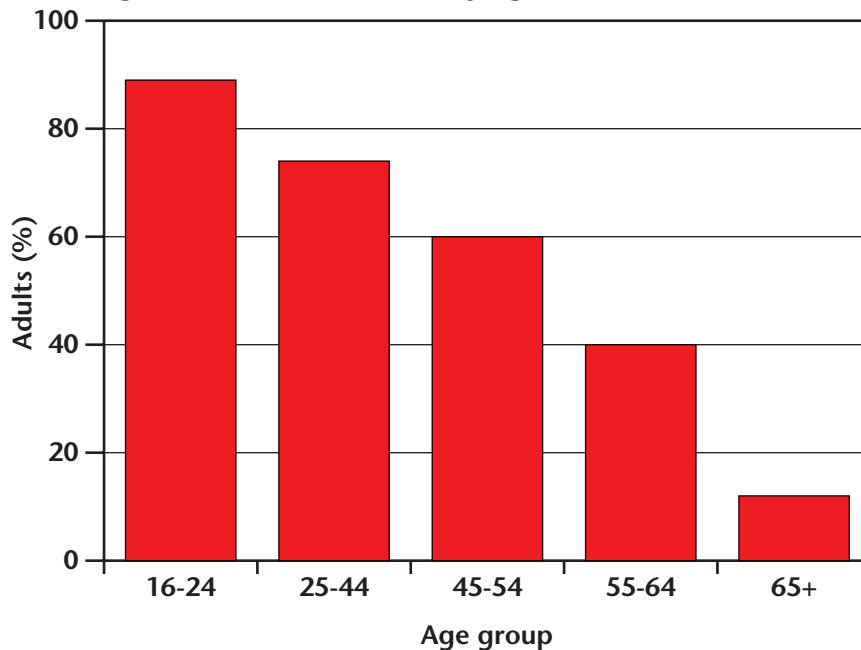
Figure 3.2 Internet access by income decile group, 2001-2002³⁹



³⁹ Home access to the internet by gross income decile group, ONS, July 2002



Figure 3.3 Internet access by age, 2001-02⁴⁰



- A lack of awareness about the benefits of access to the internet; and
- Disabilities, which make access difficult to achieve.

A recent survey suggests that the major reason why people do not use the internet is that they have no interest or no need to do so (Figure 3.1). This may be through choice, or it may suggest a gap in awareness of what the internet has to offer.

What is not clear is the correlation between “lack of interest” and these other metrics. And despite the survey data, current statistics on internet take-up show that the extent of the digital divide is already stark, and on some metrics is widening further:

- Income: the latest ONS data shows a difference of almost 70 percentage points in internet take-up between lowest and highest income deciles (Figure 3.2). This gap has increased from 40 percentage points in 1999, almost entirely due to increased take-up in the highest income decile.

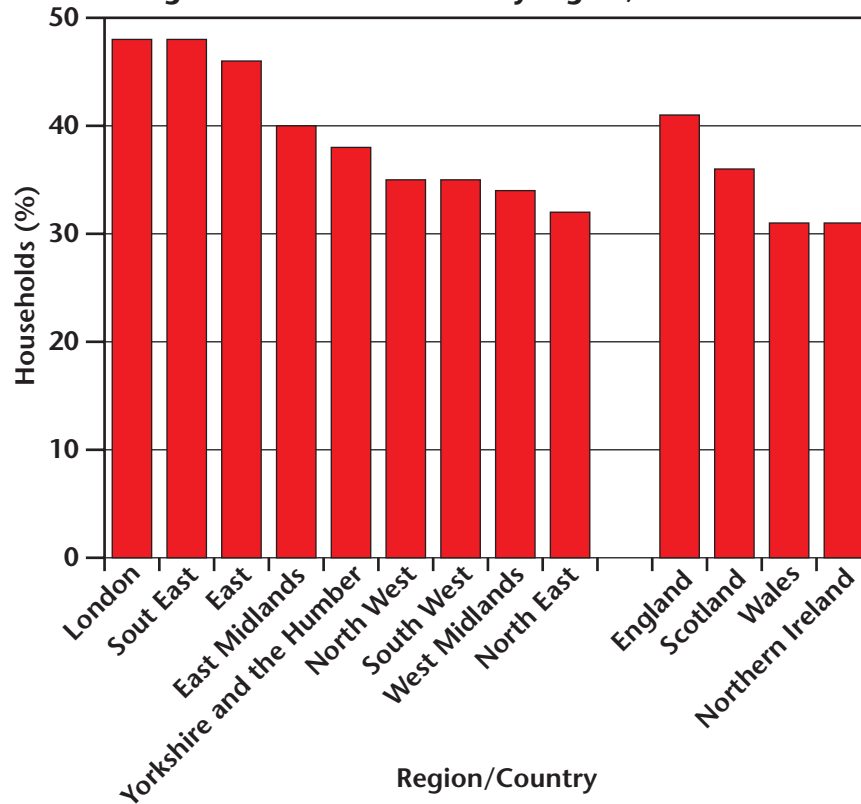
- Age: there is a difference of over 70 percentage points between 16-24 year olds and over 65s who have experienced the internet (Figure 3.3). This is up from a 65 percentage point differential in 2001, almost entirely due to increased usage by the younger age group.
- Gender: the historic gap between usage by men and women has narrowed, falling from 9 percentage points in 2001 to 3 percentage points in 2002.
- Geography: there are significant variations in internet take-up in the UK, particularly between London and Northern Ireland, Wales and Scotland. (Figure 3.4).

3.3.2 Broadband

For broadband, the main concern is geographic coverage

In contrast to narrowband internet access, provision of fixed-line broadband access requires an upgrade to the basic telephone or

⁴⁰ Proportion of men and women who have accessed the internet at some time, ONS, July 2002

Figure 3.4 Internet access by region, 2001-02⁴¹

cable networks. Companies will make these upgrades only where the benefits they expect to earn will outweigh the costs. Broadband can also be made available through satellite or fixed wireless technologies, but these options are currently more expensive than fixed-line broadband, and have other drawbacks discussed in more detail in Chapter 4.

Hence the main concern about the social impact of broadband is in relation to its geographic coverage, and the extent to which this may discriminate against certain groups in society. For example, companies are likely to conclude that the benefits of roll-out will be lower in less affluent areas, and that costs of roll-out are likely to be higher in more remote areas.

Figure 3.5 shows the current coverage of the different broadband technologies. In total, 66% of the population currently has access to a

'mass market' broadband solution (i.e. one targeted at residential or small business customers).⁴²

Figure 3.6 presents this data by region, highlighting the large differences between geographical areas.

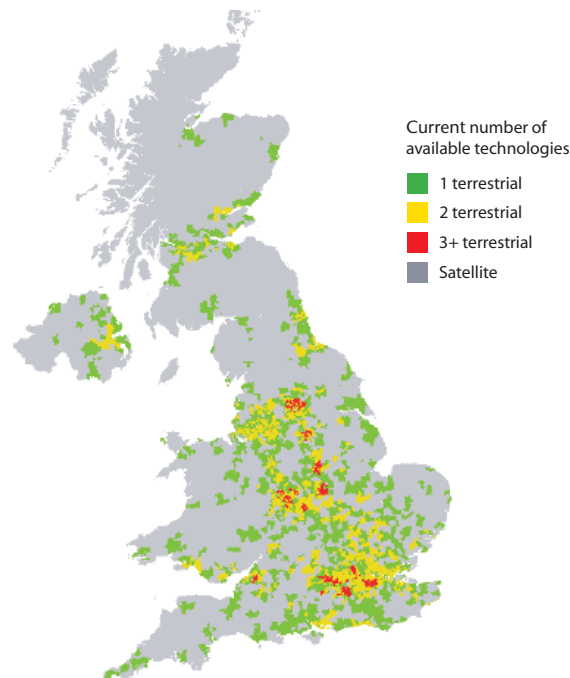
The current limitation on broadband coverage is also impacted by the technical requirements of ADSL and cable modems. ADSL requires exchanges to be enabled in order to provide customers in that area with broadband access. Even then, only customers within a 5km radius of the exchange can use ADSL due to degradation in transmission over longer distances. Cable modems require that the cable network has been built out to an area, and that the cable network has been upgraded to a digital, two-way network. Between 80% and 90% of homes passed by cable are broadband

⁴¹ Households with home access to the internet, ONS, July 2002

⁴² Coverage of DSL in Internet and Broadband Brief, Oftel, July 2002. Assumes that all areas are covered by cable are also covered by DSL because economics of broadband are attractive to operators



Figure 3.5 Broadband coverage in the UK, Q3 2002⁴³



enabled, summing to a total of around 10 million homes, although there is a high overlap between ADSL and cable-enabled areas.⁴⁴ Coverage of broadband is likely to increase further as consumer demand grows and costs fall, particularly as less expensive DSL equipment is introduced which means that more exchanges become viable for upgrading.

Despite the current limitations in coverage, there has been a sharp increase in the number of broadband connections in the UK during 2002. In October 2001 there were only 180,000 broadband users, but by October 2002 this had risen to 1.1m, with more than 20,000 new connections being made each week.⁴⁵

3.3.3 Implications for Government and the regulator

There are implications for both regulatory and wider public policy

In March 2000 the Prime Minister made a commitment that all those who want it should have internet access by 2005. An important conclusion from the statistics above is that relatively few people say they do not use the internet because they cannot afford the cost of access. Regulatory measures might play a role in pushing down costs, but for most other factors, non-regulatory measures might to play a more significant role.

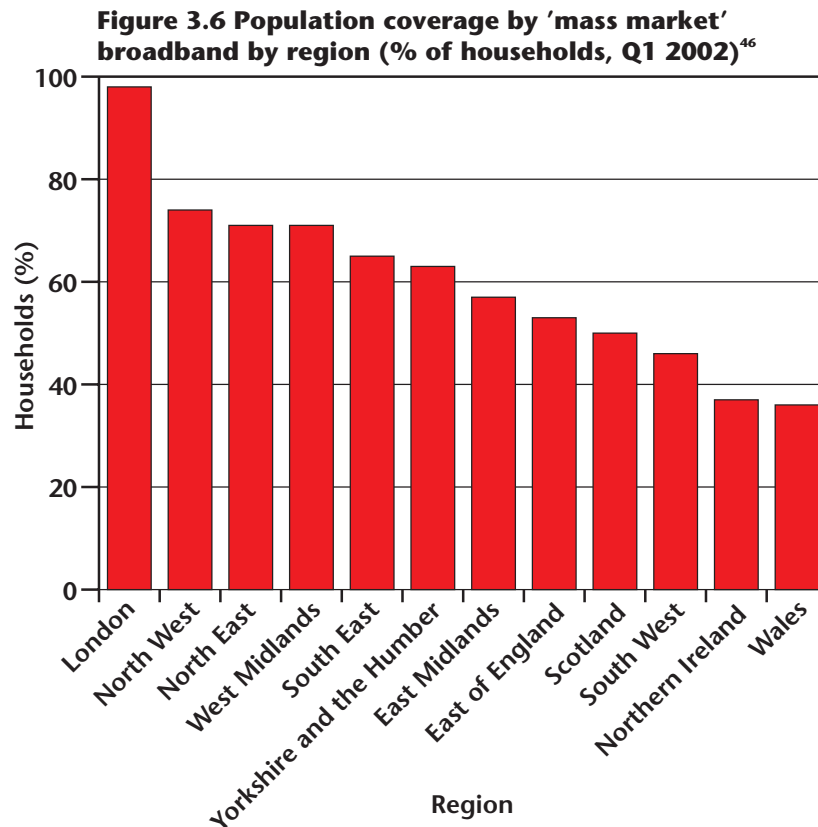
Hence in terms of the *narrowband* digital divide, the key role for Government policy should be to address the hurdles to take-up of narrowband internet access. Both regulatory and non-regulatory levers will have a role to play:

- **Regulatory levers:** ensure that the market for narrowband internet access remains competitive. However, given that dial-up is ubiquitous and only 7% of non-internet users claim that the cost of access is the hurdle, the focus needs to be on the use of non-regulatory levers rather than regulation.

⁴³ UK Broadband Status Report Update, Analysys, September 2002

⁴⁴ Data taken from Oftel's Internet and Broadband Status Report, July 2002 and from information passed on to the Strategy Unit by the relevant companies; population and household data is taken from the Office of National Statistics, 2002

⁴⁵ UK Online Annual Report, 2002 (Office of the e-Envoy, November 2002)



- **Non-regulatory levers:** as set out in the "Research paper on non-regulatory levers"; there are a large number of initiatives already underway in a number of areas to drive towards the 2005 goal, including work on content, marketing and communications, access and skills, and branding.

Many of the policy implications for broadband are the same as for narrowband, since they revolve around ensuring suitable skills, access to resources and so on. However, an important difference is around the coverage of broadband, which is not an issue for narrowband due to the telephony USO. This has led to a debate about the role of Government in enabling wider coverage of broadband, and whether there is a case for a USO for broadband provision. This issue is covered in more detail in Chapter 5.

3.4 Why regulation of electronic networks matters

Effective competition will be a key enabler for economic and social benefits from electronic networks

More than anything else, this chapter has revealed the lack of clear evidence on the economic and social impacts of electronic networks. There is limited evidence to suggest that electronic networks are having a significant role in boosting productivity and growth in the UK, although there is some evidence of the impact of ICT on the US economy.

Despite this lack of clarity in the evidence, the increasing integration of electronic networks into society, and particularly the social and organisational changes which are possible through access to broadband applications and

⁴⁶ UK Broadband Status Report Update, Analysys, March 2002; 'mass market' broadband covers DSL, cable and FWA networks



services, makes it important that the development, availability and usage of high speed networks are in no way inhibited. While many of the potential barriers to network development will be dealt with through non-regulatory levers, regulation also has a key role to play.

While this report is clear that the role of the regulator should not include explicit decisions on environmental and social policy goals, the potential benefits of electronic networks adds a real imperative to the regulator's role in promoting competition, and simulating the effects of competition where market failures persist. This makes it essential that the regulator should be prepared for the challenges of the next decade, and for the way in which it will need to respond. Chapters 4 and 5 consider these issues in turn.

4. WHAT ARE THE LIKELY CHALLENGES FOR GOVERNMENT AND THE REGULATOR OVER THE NEXT DECADE?

Summary

This chapter reviews the likely changes in technology, market structure and competition over the next decade, and the challenges they raise for Government and the regulator. Key conclusions are that:

- Innovation in electronic networks over the next decade is expected to result primarily from the evolution of existing networks, rather than the creation of new networks.
- Major innovation is instead likely to occur in applications, services and devices using existing networks.
- Although the launch of the 3G mobile communications system is expected to be one of the most significant network developments over the next decade, wired technologies are expected to remain key for data transmission.
- This is because wired technologies generally offer faster data transmission speeds at lower cost than wireless networks, a gap that is likely to remain for the foreseeable future.
- Instead, mobile data networks are expected to complement wired networks, not substitute for them. Mobile applications and services are likely to be tailored to the mobile network, and to be somewhat different to those designed for wired networks.
- Wireless networking in homes and offices is expected to increase dramatically, but it will still need a connection to another network in order to access the internet.
- Other technologies such as fixed wireless access may find specific applications, but may find it harder to challenge existing networks on a widespread basis.
- There may be changes in other technologies which lead to unexpected changes in market development over the next decade. However, these are likely to take a number of years to come to market, and their potential impact is unclear.



As a result, it is likely that current incumbent operators of electronic networks will retain elements of market power over the next decade. If this is so, many of the challenges faced by the Government and regulator will be similar in principle to those faced today.

Hence the main challenges for the regulator identified in this report are:

- Dealing with market power;
- Striking the balance between infrastructure and service competition;
- Encouraging innovation and removing barriers to emerging markets; and
- Ensuring proportionality of regulation.

In addition, Government will face some challenges in which it will need to involve the regulator:

- Finding the optimal balance in spectrum regulation; and
- Achieving wider coverage of broadband.

This chapter reviews the likely changes in technology, market structure and competition over the next decade, and the challenges they will create for Government and OFCOM. It highlights the fact that although technologies and markets will continue to evolve at a significant pace, the challenges facing the regulator are likely to remain similar in principle to those faced today (section 4.1). This conclusion is explained and expanded in the rest of the chapter, which sets out the developments that seem likely to occur across electronic networks, and the resulting challenges for Government and the regulator (section 4.2).

4.1 Overview

Innovation in electronic networks is expected to result from the evolution of existing networks

The project team has carried out a series of research interviews with senior industry and Government figures. On the basis of these interviews, the team has concluded that, while there will be considerable innovation in electronic networks over the next decade, **innovation is expected to result primarily from the evolution of existing networks rather than the creation of new networks.** It is unlikely that entirely new networks with national coverage will be created over the next decade, given the challenge of achieving broad coverage against existing networks. Major innovation is more likely to occur in the applications, services and devices which use those networks.



Box 4.1: Technologies which could disrupt market development over the next decade

- **Power-line technology** is currently being trialed in several countries, including a trial being run in Scotland by Scottish Hydro-Electric.⁴⁷ Power-line technology promises to transmit data over the electricity grid, with equipment in homes or offices to isolate and decode the data from the electric current. It can, in theory, provide connections of up to 4Mbps, but some technical problems remain before commercial deployment is possible. If power-line technology can be developed for market, it could have very significant implications for broadband coverage, particularly given near universal access to electricity networks.⁴⁸
- **Ultrawideband** offers high bandwidth transmission speeds (100Mbps and up), initially for short range (less than 10m) connections. It is designed to connect to computers or electronic devices such as handheld devices and digital cameras in a similar way to the existing “Bluetooth” technology. It is not expected to be commercially available before 2005.⁴⁹ UWB is likely to act as a disruptive technology for high speed internet access only if its range can be considerably increased. Nonetheless, its development could create challenges for spectrum management, since it does not operate in a single frequency band, but spreads over many adjacent frequencies.

Without a radical (and currently unforeseen) shift in technologies, developments in wired data transmission are likely to be based on the next generation of current xDSL and cable technology, building on today’s “broadband” technologies, which will increasingly be used for transmission of entertainment services such as video on demand to consumers. Mobile phone services will be based on next generation 3G services, building on today’s 2G and 2.5G technologies. It is of course possible that there will be changes in other technologies which lead to a significant and unexpected disruption in market development over the next decade, and some examples are discussed in Box 4.1. However, these are likely to take a number of years to come to market, and their potential impact is unclear.

Wired technologies are expected to remain key for data transmission

Although the launch of the 3G mobile data system is expected to be one of the most significant network developments over the next decade, the team has also concluded that **wired technologies are expected to remain key for data transmission**. The main driver of this conclusion is that wired technologies generally offer faster data transmission speeds at lower cost than wireless networks,⁵⁰ a gap that is likely to remain for the foreseeable future.

Instead, mobile data networks are likely to complement wired networks, not substitute for them. The 3G mobile phone networks are expected to be a valuable system for mobile telephony and data access, but given their relatively low data speed,⁵¹ restricted coverage

⁴⁷ www.hydro.co.uk/broadband/

⁴⁸ www.planetanalog.com, 11 July 2002

⁴⁹ WLAN technical information, BECTa, 2002

⁵⁰ For example, BT Openworld currently offers unlimited ADSL internet access at £29.99 per month, at speeds of up to 512kbps. For the same price, Orange offers a data package limited to 15Mb downloaded per month, at speeds of up to 28kbps; other mobile operators have similar tariffs

⁵¹ Current projections are that 3G networks will, at launch, offer data connectivity at 64-384 kbps (OfTel internet and broadband brief, July 2002). This compares with speeds of 512 kbps currently available on ADSL, and up to 1024 kbps on some parts of the cable network



at time of launch and expected cost, applications and services are likely to be specifically tailored to the mobile network, and to be somewhat different to those designed for wired networks. Consumers are likely to use mobile devices when out of the home or office to access relevant content and services, but this usage may be very different from usage at home or in the office. Clearly speed and quality of 3G service will improve as time goes by, but given the starting position of 3G it is unlikely to displace wired technologies for stationary data access. Mobile voice telephony is however expected to substitute increasingly for fixed voice telephony.⁵²

Wireless networking in homes and offices (such as WiFi) is expected to increase dramatically, but, as discussed later, it will still need a connection to another network in order to access the internet.

Whilst satellite could have an important role to play in covering gaps in cable and DSL coverage, it is unlikely to compete with wired technologies on a national basis given the relatively high cost of end-user equipment, a finite limit on the amount of transmission capacity, and restrictions on the speed and capacity of the return path, whether via a telephone line or the satellite itself.

Interactive television could develop into a mass-market technology over the next decade, although the types of content and services accessed through the television are likely to be somewhat different from those accessed through the PC. This is partly due to the technical limitations of interactive television (lower resolution display than a PC, limited capacity for data storage, and limited capacity for advanced functions such as word processing, editing digital photos etc.), and partly due to the role of the television as a communal entertainment device, as opposed to the PC as a more solitary information device.

Other technologies such as fixed wireless access may find it harder to challenge existing networks on a widespread basis, particularly where ADSL and cable modem services already exist. While it is feasible that some dense urban areas will have multiple networks over the next 10 years, on a national basis it is not expected that fixed wireless access will be ubiquitous and mass market. However, fixed wireless access could offer a way to provide high-speed access in rural areas which otherwise would not receive coverage.

As a result, regulatory challenges will be similar to those faced today

As a result of this evolutionary process of development based on current networks, it is likely that current incumbent operators of electronic networks will retain elements of market power over the next decade; if this is so, **many of the challenges faced by the Government and regulator will be similar in principle to those faced today.**

The regulator has an important role to play in ensuring interconnectivity between networks, so that products and services are freely available across a range of networks, and smaller operators are not prevented from connecting to larger networks through technical or operating barriers. Hence in particular the importance of regulating companies which have Significant Market Power will be undiminished.

Technology and content will change over time

This is not to say that technological changes are unimportant. As has already been noted, changes in electronic networks have been driven by significant technology shifts in recent years, and this trend is likely to continue. The cross-cutting nature of technological change is particularly significant, since a change in one area can profoundly affect the kinds of access devices, content and applications available to end users.

⁵² Ofcom already identifies 6% homes in the UK which do not have a fixed voice connection, and rely entirely on mobile voice telephony. This trend is likely to grow as younger consumers enter the market for household voice telephony



Box 4.2 Developments in digital content

The development of the UK's digital content industry is important for two reasons. First, lack of broadband content might be inhibiting the take-up of broadband services in the UK, since in the absence of compelling content or a "killer-application", consumers might not see the value of upgrading from narrowband. High quality content from premium brands, particularly in music and film, could lead to increased broadband usage, and broadband could offer a cost-effective distribution mechanism for these premium brands. Second, broadband might present the UK with an opportunity to create a leading digital content industry.

Broadband is expected to increase usage of content that is already available on the internet. However, for certain types of content, broadband also offers a step change in available functionality and user experience, mainly by significantly reducing time for data to download (thereby enabling new applications, such as video on demand) and by increasing the possible interactivity (which, for instance, makes multi-player gaming possible).

Education and all forms of associated content have been identified as one of the key potential drivers of demand, particularly in the early stages of broadband growth. In the short-term, Government content could also have a key role to play in bridging the current gap in broadband content. Games are also likely to help bridge the content gap, since they are ideally suited to broadband access given their interactivity and the network benefits of being online. Once broadband take-up has reached sufficient levels with the help of these "bridges", other content providers will then have the incentive to adapt or create specific broadband content.

Peer-to-peer (P2P) content distribution becomes more feasible with broadband than narrowband. The Napster phenomenon shows how P2P can quickly become pervasive, but also shows how great a challenge it is to protect intellectual property online. Attempts to find technological solutions to piracy (encryption, watermarks etc.) have so far failed to achieve a universal or dependable standard.

The Strategy Unit has carried out a review of the actions being taken by Government to support the development of broadband content. The review concludes that most of the issues around the development of digital content are well known, and are already being addressed by Government and other groups. Details of this review and its conclusions are available in the "Research Paper on Digital Content" available on the Strategy Unit website.

This chapter focuses mainly on technological and market changes in the networks which provide connectivity to end users. However, developments in networks will go hand-in-hand with developments in content. Some of the resulting issues around the development of digital content are discussed in more detail in Box 4.2.

4.2 Changes in technology and market structure

4.2.1 Overview of networks

This section considers the electronic networks which provide connectivity to end users, allowing them to access content and services. Networks are distinct from access devices such as PCs, games consoles, mobile phones and set top boxes, which are the devices which end-users require in order to access the networks.



Networks can be categorised into 4 broad groups:

- Wired networks: xDSL, cable, leased line;
- Mobile networks: 2G, 2.5G, 3G;
- Other wireless networks: fixed wireless access, satellite, wireless local area networks (notably “WiFi”); and
- Interactive Digital TV (iDTV).

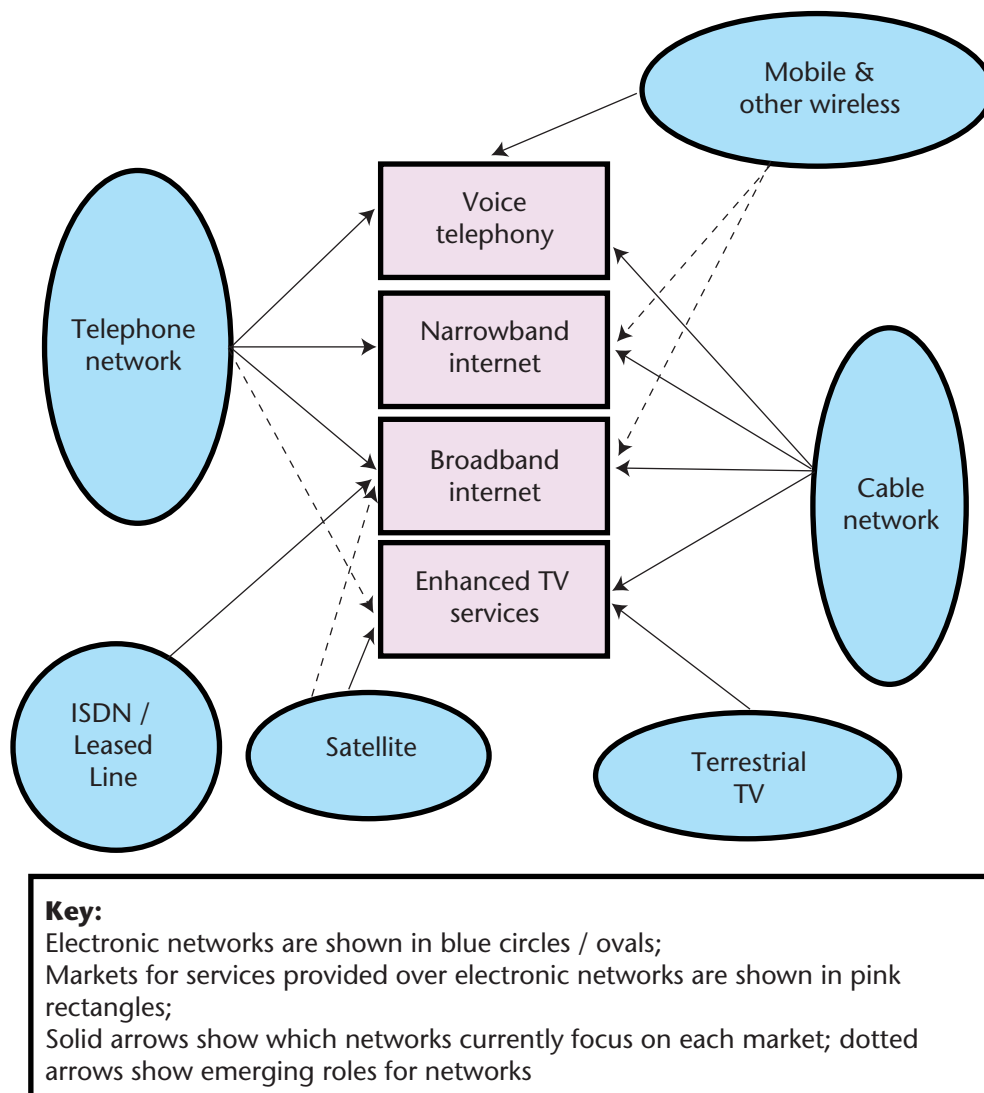
Although this categorisation holds for most analysis, it is not precise. For example:

- WiFi (the marketing name for the 802.11b

technology) could be used either as an internal network to transmit signals from a wired connection within a home or business; or it could be used as an external access network, allowing residential and business users to connect to the internet without their own wired connection (e.g. in a coffee shop or airport).

- iDTV relies on a wired return path (usually a telephone line or a cable connection) and so has some similarities with wired networks, but it has been treated as a separate network because it is clearly a distinct channel to users.

Figure 4.1: Main electronic networks and services





- There is a significant degree of inter-reliance between these networks, all of which rely to a greater or lesser extent on interconnection and data transfer over other networks.

Figure 4.1 shows the main electronic networks and the services that they are expected to provide.

4.2.2 Wired networks

This decade will see the next generation of xDSL and cable technologies

Wired technologies are used to provide a wide range of services which can broadly be categorised into voice, narrowband data and broadband data services. As described above, the most significant technological developments in wired connectivity over the

Box 4.3: Grid computing

New technologies are beginning to allow the clustering of a wide variety of geographically distributed resources, such as supercomputers, storage systems, data sources and other devices, that can then be used as a unified resource. This concept is popularly termed “Grid” computing. While the existing internet is designed to share information, the Grid is designed to share processing power, and to link distributed pools of knowledge. Most of the interaction would be directly between computers, which would automatically collaborate to solve complex problems in fields such as particle physics, bio-medicine and environmental forecasting.

Grid computing is a developing field at present. Much of the software and “middleware” required to run such an ad hoc network has not been formalised, and most Grid applications are currently rooted in academic research. A key challenge is to agree protocols and frameworks within which to organise data and workflows, in order to allow computers to collaborate directly with each other.

Although there are no commercial Grid applications running at present, a similar concept to Grid computing is already in use by large companies that require considerable processing power. Businesses such as GM, BMW, Charles Schwab and GlaxoSmithKline are all trialing systems which link distributed computing resources. However, such systems are currently run on internal networks and do not leverage processing power in the wider network.

There have already been some Grid-type applications in the consumer market, of which the best-known are philanthropic research programmes such as “SETI@home”, which use the spare computing power of dormant PCs to tackle popular research issues. Peer-to-peer applications such as Napster are also similar in principle to Grid computing, since they rely on the network effect of many PCs collaborating to share information. However, both of these examples are extremely simple by comparison to the broader vision for Grid computing, and the work required to move to full Grid computing is significant.

The long-term implications of Grid computing remain open to debate. It could open up the possibility of customers leasing computing power from hosted grids, saving money by paying only for the IT they need. However, whether a residential or small business customer will ever need access to such massive resources is unclear. It is also likely that Grid computing will drive demand for higher bandwidth if it becomes widely adopted, although at present this is likely to be limited to high-speed academic networks such as super-JANET.

One of the key hurdles to further development of grid computing is likely to be concern about security and privacy. There have been attempts to overcome these problems by issuing authenticated users with electronic certificates, but it is still not clear that users will want to advertise their computing resources. There is also as yet no consensus on how users will be charged for bandwidth and computing resources used.



next decade are expected to be in the provision of higher bandwidth using next-generation xDSL and cable technologies. Demand for higher bandwidth will be driven by a wide range of data services, including transmission of entertainment, peer-to-peer content, business data and possibly, in the long run, grid computing, which is discussed in more detail in Box 4.3.

Current ADSL and cable modem technologies typically provide downstream data rates of 512kbps. Although this represents a significant advance over narrowband speeds, it is still not fast enough to provide high quality full motion video. Compression technologies are constantly improving, but nevertheless speeds of up to 2 Mbps are likely to be needed for video transmission. These speeds are easily possible through next generation xDSL and cable modems, but could require costly upgrades to existing infrastructure. In particular, they might need the deployment of fibre optic cables much closer to end users than at present, with “very high speed” or vDSL needing “fibre to the kerb” within 500m of end users. If video entertainment becomes one of the leading broadband applications, such investment may become necessary.

The great advantage of fibre optic cable is that its capacity can be exponentially increased through the use of electronics, which does not require laying further fibre or digging up trenches. Consequently, it is relatively “future proof” technology. Fibre optic cable is currently used in the backbone of the communications network in the UK, and is used extensively to provide links to businesses in areas such as the City of London. If vDSL technology is implemented, this could see fibre to the kerb in residential areas as well.

A possible future development is the extension of the fibre optic network right up to the home.

However, the cost of laying fibre-to-the-home is very significant (although much of the cost is notably in digging ducts to lay the fibre rather than in the fibre itself⁵³). Thus, although viable in high-density areas (such as apartment blocks, as in Sweden,⁵⁴ or new housing estates), this report does not foresee fibre-to-the-home being provided by the market on a significant scale in the UK during the next decade.

Over the next decade there is also likely to be a continued shift towards the use of Internet Protocol (IP) in all networks, given its advantages of simple transmission and ease of use. One of the developments which is forecast is “Voice over IP”, which is already becoming common for businesses, and may slowly start to replace traditional residential circuit-switched voice services. IP is also expected to become increasingly common in cable and satellite broadcast networks, allowing for greater functionality and interactivity of broadcast content. The implication of this switch to IP is that services which were traditionally available on one network only may become available on other networks. This change will also be driven by the development of devices to access networks, as discussed in Box 4.4.

Market structure will continue to provide regulatory challenges for the wired world

However, these changes in technology are not likely alone to lead to a change in market structure. If anything, the investment, technical skills and scale required to deploy next generation xDSL and cable will favour the existing incumbents, particularly BT given its position as the vertically integrated telephony incumbent and the largest player in fixed line telecoms.

Future development of market structure will depend on a balance of pressures:

⁵³ According to Corning, a manufacturer of fibre optic cable, the actual cost of fibre represents only 3% of the cost of laying a fibre network

⁵⁴ Stokab, a company owned by the municipality of Stockholm, has laid a fibre ring around Stockholm which is available to other service providers. B2, a new entrant, has used this fibre ring to build connections into a number of apartment blocks which can access the internet at Ethernet speeds



Box 4.4: Access devices

Access devices allow end users to connect to electronic networks and enjoy the range of content and services available. The four main access devices currently in use in the UK are PCs, games consoles, set-top boxes and mobile phone handsets. As more content becomes available in IP format, the content and services available over these devices is likely to converge still further.

The PC is expected to remain the most important access device for accessing electronic networks over the next decade, due to its wide functionality and adaptability. Games consoles will also develop further as network access devices, initially allowing gamers to play against each other across networks, and to access value-added gaming services. Games consoles could also take a broader role in downloading and managing other entertainment content such as music and videos, as well as offering email and web browsing, but are unlikely to compete with PCs for the full breadth of available functions such as word processing or spreadsheets. This is due to the relatively poor resolution of TV displays versus PCs, and the role of the games console as an entertainment device.

Set-top boxes already allow some of the functionality traditionally associated with the PC, such as e-mail and internet browsing, as well as newer services such as pay-per view television. There is likely to be further convergence of traditional broadcast with on-demand entertainment services, particularly video on demand. However, like games consoles, set-top boxes are unlikely to compete with PCs for the full breadth of available functions.

Mobile phone handsets will become increasingly important access devices, particularly as 3G services are implemented, and as the organiser functions of Personal Digital Assistants (PDAs) become integrated into phone handsets. Improvements in screen size and quality, as well as improved applications and services available via mobile phone handsets, are expected to drive use of mobile network access, although the exact impact of 3G remains to be seen.

- On the one hand, competition can be expected to increase as a result of further new entry, growth by existing entrants, and the ongoing effect of regulation;
- On the other hand, with no fundamental changes to the nature of the industry, and advantages of scale and operations to incumbents, there is little reason to expect that incumbent market power (particularly of BT) in many markets will be challenged.

If the former effect is more significant, market forces should act to improve performance, and the regulator's job will be focused on helping competition to develop. If the latter effect is more significant, then there is unlikely to be much change from current performance, and

the regulator will have to pay more attention to the regulation of SMP.

There are clearly reasons to expect both effects. For example, during the mid-1990's, Oftel's focus in fixed-line telecoms was on the encouragement of infrastructure competition to BT's network. A number of network operators took up the challenge, so that there is now competition in a number of areas, most notably in cable, high-speed leased lines and trunk networks. But the approach of the last few years – at least in fixed-line telecoms – has been to promote service competition alongside infrastructure competition. And the recent downturn in fortunes among many telecoms companies has seen a slowdown in new infrastructure build.



The financial well-being of the telecoms sector will be another important driver of market developments

More generally, the impact of wider economic conditions on the telecoms sector is a major cause of uncertainty for the future. In the short-term, the state of the capital markets is severely impacting all players in the telecoms sector. If this situation improves, it should lead to an increase in competition and hence an improvement in performance over the longer-term. But if there are further business failures in the sector,⁵⁵ these impacts are likely to overwhelm the efforts of regulation, and levels of both competition and performance could deteriorate rather than get better. While business failure is a natural characteristic of a market economy, at the extreme, this could mean a permanent (rather than cyclical) reduction in levels of competition, particularly if ease of entry to the market is time sensitive.

What seems clear is that BT will retain Significant Market Power in some markets

Irrespective of the extent to which further competition develops, and despite the uncertainty created by unpredictable external influences, some elements of the current industry structure seem likely to remain in place. For example, BT's local loop infrastructure provides it with SMP in the wholesale markets for residential and business voice telephony. The cable networks provide an alternative to BT in 50% of homes, and some new housing estates and business parks are taking their telecoms loops from companies other than BT. But there is little further investment in these competing loops at present.

Hence BT can be expected to retain SMP for residential and business access (at least at a

wholesale level⁵⁶), as well as in other telecoms segments. As stated in Chapter 2, around 15% of the market segments in which BT operates are currently ruled to be effectively competitive, meaning that it possesses market power in all other markets. This situation should change over the next few years, if the prospectively competitive markets continue to move towards effective competition. But this will still leave BT dominant in the remainder of the market segments in which it operates. Moreover, because BT has the only ubiquitous nationwide network, there are likely to remain few or no telecoms products⁵⁷ that do not at least need to incorporate interconnection agreements or some other contractual relationship with BT.

The implications of this will pose many challenges for OFCOM

What this will mean is that the regulator is likely to be faced with similar sorts of challenges over the next ten years as OfTel is dealing with today. In particular, BT's ongoing SMP across a range of horizontally and vertically related market segments will require OFCOM to have a clear view of how it intends to deal with the issue of **Significant Market Power**, and the potential associated issues of **cross leverage and vertical leverage of SMP from one market (or market segment) to another**.⁵⁸

Not only does BT's market power present a problem in established markets, but it also does so – perhaps to an even greater extent – in new markets. A significant example is provided by xDSL broadband, where BT is active both in the provision of the necessary infrastructure (where barriers to entry are relatively high), and in the relevant retail markets (where barriers to entry are much lower). Since this is a developing

⁵⁵ Of course, even if a company goes bankrupt, its infrastructure could still be a valuable asset, and could be taken over by another company. But the prospects for this would themselves be dependent on economic conditions, the level of investment required to maintain the infrastructure, and the prospects for a new owner to create a viable business

⁵⁶ Competition may develop further at the retail level, in particular as a result of the new Wholesale Line Rental product, which allows resellers to offer services over a local loop rented from BT

⁵⁷ With obvious exceptions such as within-company networks

⁵⁸ Cross leverage occurs when a company uses its SMP in one market to gain market power in a horizontally related market. Vertical leverage occurs when a company uses its SMP in one market to gain market power in a vertically related market



market, Oftel initially tried to adopt a light touch to regulate this situation. However, the difficulties that have arisen in the pursuit of a competitive broadband market (notably Local Loop Unbundling) have led to a much more intrusive level of micro-regulation.

This experience highlights that a key challenge for OFCOM will be understanding how best to **encourage innovation and remove barriers to emerging markets**, such as markets for xDSL technologies. These markets are characterised by very limited information, particularly on cost structures, and by the fact that regulation can severely distort development of the market. OFCOM will also have to judge the developments in the market to ensure that its economic regulation allows for sufficient investment to deliver **network resilience**.

Levels of infrastructure and service competition will be drivers of key market outcomes

As discussed above, the development of infrastructure competition is tied closely to the impact of wider economic conditions on the telecoms sector. Given its lower capital requirements, service competition should be less susceptible to the state of the capital markets than infrastructure competition, though it will be susceptible to underlying patterns of consumer demand.

Service competition can be expected to improve across all markets, particularly those that are relatively mature. This will be partly as a result of existing infrastructure competition, and partly as a result of regulatory developments such as “One Bill Carrier Pre-Selection” and “Wholesale Line Rental” for voice telephony.⁵⁹

Developments in prices, product availability and service quality can be expected to follow developments in infrastructure competition. Without significant increases in infrastructure competition, the onus will remain on the

regulator to review in detail the prices set by BT for its wholesale products, in order to establish that they are based on estimates of costs. Because of the information asymmetries already discussed, this is likely to remain a difficult task.

Hence, another question to be addressed by OFCOM is **the appropriate balance it should seek to achieve between encouraging further infrastructure competition, and focusing instead on the promotion of service competition**.

As competition emerges, OFCOM will need to react accordingly

Where competition does develop over time, market forces will begin to deliver efficient outcomes and benefits for consumers. This will reduce the need for sector-specific regulation justified by the existence of market power. It should therefore become possible to migrate markets away from *ex ante* sectoral regulation to *ex post* competition regulation.

But the speed at which this transition occurs, and the extent to which sector-specific powers can be removed, require careful management. With considerable vertical integration in the fixed line market, a segment-by-segment approach could miss the possibility of leverage of SMP from one market to another – either horizontally or vertically which could raise concerns that the general provisions of competition law will continue to prove insufficient for some time to come. One of the challenges that OFCOM will face will therefore be **how to manage the evolution of regulation from sectoral to competition regulation, and how to ensure proportionality of regulation**.

Hence the main regulatory challenges over the next decade for wired networks will be:

- How to deal with issues of market structure such as SMP, cross leverage and vertical leverage of market power;

⁵⁹ See for example www.oftel.co.uk/publications/pricing/2002/pcr0102.htm



- How to encourage innovation and remove barriers to emerging markets, while ensuring network resilience;
- How to balance infrastructure versus service competition; and
- How to manage the evolution of regulation in terms of sectoral versus competition regulation, and how to ensure proportionality of regulation.

4.2.3 Mobile

Mobile data experienced a slow start in the UK

The mobile phone technology currently in mainstream use in the UK and throughout

Europe is second generation technology (2G), otherwise known as “GSM”. A separate technology allowing users to access data and information from their mobile handsets has been developed, known as WAP (wireless application protocol). All UK mobile operators provide a WAP service that runs on the 2G network, with a data transmission rate of 9.6kbps. Although there was considerable excitement about WAP before its launch, in practice take-up and usage have been low owing to the poor customer experience. Frustrations stem from the need to go through a dial-up process each time a user wants to connect, slow download speeds, high costs, and the disappointment of trying to view

Box 4.5: i-mode

i-mode was introduced in Japan by NTT DoCoMo in February 1999, offering the same 9.6kbps data rates as WAP. By October 2001, it had more than 28m subscribers, many of them young people, on average spending 20% longer online than other mobile users. i-mode is also relatively open to third party sites, with 500 content provider sites and 8,000 more sites accessible.⁶⁰ DoCoMo offers a number of micro-payment services through i-mode, where users can make purchases from third parties that are charged to their mobile phone bill.

There are a number of reasons why i-mode has been so much more successful than WAP:⁶¹

- i-mode uses an *always-on packet switching technology*. The user therefore does not have to endure the long waits for connection that they do on the switched circuit GSM European network.
- i-mode also uses a *simplified version of HTML* for data descriptions, while WAP uses languages that are not compatible with HTML.
- The i-mode *hand-sets have larger displays* than those in the US and Europe. Many i-mode handsets also display grey scale or 256 colours. As a result, viewing internet sites is much easier and more satisfactory.
- An i-mode *user pays only for data transferred*, and a typical premium i-mode service costs 60p to £2 for unlimited access. A WAP user on the other hand pays for time online, and up to 60p each time he accesses a premium service.
- The *structure of the i-mode value chain* also makes entry more attractive for content and service providers, who pay 9% of total revenue in service fees. Until relatively recently, some European operators have been taking up to 90% of service revenue. As a result, a large number of content providers in Japan have created content specifically for use on mobile, while similar developments have not taken place in Europe.

⁶⁰ 2G and 3G in Japan, White Paper by asp global, November 2001

⁶¹ McKinsey Quarterly, Number 2, 2001



internet pages on a small mobile phone screen which may not support graphics.

By contrast, the equivalent technology used in Japan known as “i-mode” has been a great success, as described in Box 4.5. By October 2001, it had more than 28m subscribers, on average spending 20% longer online than other mobile users.

But 2.5G and 3G mobile are expected to overcome some of the limitations of current technologies

The next generation of mobile technology (2.5G, or “GPRS”) has recently been released in the UK. While the voice functions on 2.5G are essentially unchanged from 2G, it offers several improvements over WAP for data transmission. It addresses the problems of slow connections and download speeds through the use of “always on” switching technology, which offers higher data rates of 28kbps. Users are also charged based on the data downloaded rather than time online.⁶² Third generation mobile technology (3G or UMTS) has already been launched in Japan and is being prepared for launch in several countries, including the UK, at present. It is also an “always-on” technology, although it offers considerably higher data speeds than 2.5G, expected to be up to 384kbps for users who are stationary or slow moving, and 64-144kbps for fast moving users.⁶³

The core uses of 3G technology are currently hard to predict. Some analysts believe that possible uses may include location-based marketing and route services, mobile payment facilities, digital signatures and integrated personal information management systems such as calendars and address books. Others believe that the ability to take and send photographs from a mobile phone will be the most

significant impact of 3G, although this can already be done with 2.5G technology.

The five successful bidders in the auction of radio spectrum for 3G in the UK – including the four 2G incumbents, and a new entrant, Hutchison 3G⁶⁴ – announced plans to launch in 2002/3, although the exact timing and extent of launch is still unclear. Their licence conditions require them to roll out to 80% of the population by 2007. The European Commission is currently reviewing whether operators can be allowed to share parts of their networks, including base stations, antennas and other network components, as a way of saving cost and expediting the launch of 3G.⁶⁵

Although new market entry will increase competition in the market, it will also create complications for regulation

Of the four current mobile networks in the UK, Vodafone and O2 are deemed to possess SMP, which has led Ofcom to impose various regulations. But with the sector now ruled by Ofcom to be prospectively competitive, Ofcom is seeking to reduce the level of regulation where possible, in line with the principle of proportionality.

One development that is likely to have a direct impact on this process over the next few years is the entry of Hutchison 3G into the market. When T-Mobile and Orange entered the mobile market in the early 1990s, the competitive reaction of the incumbents was to drop prices, and this has played a significant role in moving the sector towards competition.

It is therefore a possibility that the regulator will see mobile market moving towards effective competition through market dynamics, which may remove the need for SMP obligations on providers. This will raise the question for the regulator of how to manage the evolution of

⁶² e is for everything?, Parliamentary Office of Science and Technology, Report 170, December 2001

⁶³ Ofcom internet and broadband brief, July 2002

⁶⁴ Owned by Hutchison Whampoa, KPN Mobile and NTT DoCoMo

⁶⁵ news.bbc.co.uk/1/hi/business/2217689.stm



regulation in terms of **sectoral versus competition regulation** and how to ensure proportionality of regulation.

Given the changes expected when 3G is launched, the regulator will need to consider how to **encourage innovation and remove barriers to emerging markets**. New services will evolve, possibly with new entrants, and it will be important to ensure that regulation does not in any way impede this development.

Because access to spectrum is a barrier to entry into the mobile market, the approach towards spectrum management will be key

Further competition to the mobile market may also come from new wireless technologies such as wireless LANs in certain hotspots. These technologies may also be used in conjunction with mobile technologies to increase coverage and data rates. A key determinant of this growth will be the nature of the **spectrum management strategy** that is adopted by Government and implemented by OFCOM. The more market-based the spectrum management strategy, the more likely it is to create an environment in which technological and market innovation is able to take place, and which overcomes access to spectrum as a barrier to entry in the mobile market.

Hence the main regulatory challenges over the next decade for mobile networks will be:

- How to manage the evolution of regulation in terms of sectoral versus competition regulation, and the proportionality of regulation; and
- How to encourage innovation and remove barriers to emerging markets.

In addition, Government will face the challenge of:

- Determining the optimal approach that OFCOM should be asked to take to the regulation of spectrum.

⁶⁶ Sometimes referred to as 'Public FWA'; see www.radio.gov.uk

⁶⁷ See www.yourcommunications.co.uk/ibgnews/news_archive/epress_01_hosting.html

⁶⁸ Tele2 is trading under the name Liberty Broadband – see www.libertybroadband.co.uk/

4.2.4 Other wireless

There are several other wireless technologies which can be used for high speed data access

Other wireless technologies which can be used for high speed data access are:

- Fixed wireless access;
- Satellite; and
- Wireless local area networks such as WiFi (802.11b).

Fixed wireless access (FWA) uses radio signals to provide high speed internet access for homes or businesses without the need for a telephone or cable connection. FWA operates via a small antenna at the end-user's building, which receives data from a central transmitter. The central transmitter is connected to the internet either via a high-capacity wireline, or a further wireless link.

A number of frequencies have been identified for FWA in the UK, including 28GHz and 40GHz, with small numbers of licences granted at a number of lower frequencies (including 3.4, 3.6-4.2 and 10GHz).⁶⁶ Licences for FWA spectrum at 28GHz were offered in the UK in November 2000. However, only 16 of the 42 available licences were sold, and the remainder of the licences are currently being auctioned. The Radiocommunications Agency is currently consulting on use of the 40GHz band. Companies currently offering FWA services include Your Communications (at 28GHz)⁶⁷ and Tele2 (at 3.6-4.2GHz).⁶⁸

The main advantage of FWA is that it creates an alternative form of network access without the need to dig up the streets to lay wires or cables. Therefore FWA is a potential competitor to BT and the cable companies in the local loop. However, the economics of FWA work best in dense urban areas, where many users can be served by a single central transmitter, and these



are precisely the areas where wired networks are most likely already to be in existence.

“Mesh radio” is a variant of FWA that aims to have a greater reach than systems using a central transmitter. Mesh radio allows the antennas at each customer site to link to other customer sites – thus each customer’s antenna acts as both a receiver and transmitter. This means that, in theory, an extensive and resilient network can be created from many individual antennas, rather than using a single central transmitter. The result should be cheaper infrastructure that is able to grow organically, with a reduced requirement for a powerful central transmitter. Mesh radio can be implemented in any frequency band.

Free-space optics (FSO) systems are similar in principle to FWA, except that they use laser beams for the links between antennas. FSO systems offer extremely high speeds (622Mbps or more) and simple installation, and operate in an unlicensed frequency. However, they can suffer from interference from atmospheric conditions such as fog or rain, and have a limited range (up to 2km) due to dispersion of the beam.⁶⁹

Satellite can also be used to provide high-speed data services. The great advantage of satellite is that it provides a very broad “footprint” of coverage, without the cost of building local access infrastructure which terrestrial systems require. The “return path” for satellite services is generally via a phone line, although it is possible to have satellite return path. This means that satellite services can often be accessed in remote regions where xDSL or cable are not available.

However, satellite is currently an expensive option by comparison with xDSL or cable access. Since there is a finite limit to the capacity of each transmitter on a satellite, the satellite cost per user is likely to remain

relatively high over time. The equipment required to receive satellite signals is also significantly more expensive than the equivalent for xDSL or cable. In addition, the “latency” or time delay in transmission resulting from a 22,000 mile round-trip to and from the satellite can be unacceptable for some uses, notably gaming and voice over IP.

Wireless LANs (WLANs) allow local networks of computers to exchange data or other information wirelessly. WLANs can be used to provide internal networking within a home or business, but they can also provide external access to the internet for a user who is within the coverage area. They have two main components:

- An access point or base station that is connected to the internet; and
- A wireless card in a computer or other access device.

The main WLAN standard in use around the world is 802.11b, which is also known as “WiFi”. It provides transfer rates of around 4–7 Mbps at distances of up to 100m from the access point or base station.⁷⁰ The 802.11b technology operates in the 2.4GHz spectrum, which is now licence exempt in the UK. Until recently companies were prohibited for using this spectrum for commercial gain in the UK, which meant that businesses were barred from selling access to the web through 802.11b systems.

Now that requirement has been lifted, the UK could see the introduction of WLANs in the same scale as in the US, where WLANs are already in relatively widespread use by customers in airports, hotels and cafes, as well as through private and community networks. BT announced the launch of its first WLANs in June 2002, and plans to have 400 public access points by June 2003.⁷¹ T-Mobile has similarly launched pilot “hotspots” in partnership with

⁶⁹ NetworkMagazine.com, 3 May 2002

⁷⁰ WLAN – technical information, BECTa, 2002

⁷¹ BT Press release, 24 June 2002, www.btplc.com/Mediacentre/Agencynewsreleases/2002/an63.htm



Starbucks.⁷² However, it is worth noting that any WLAN still requires a connection (currently likely to be wired) to another network in order to access the internet, in the same way that a cordless telephone used in the home still needs a conventional phone line. So WLANs are a complementary technology to other networks, and not a true substitute for them.

The recent Cave Review of Radio Spectrum Management⁷³ highlighted the important role that such licence-exempt spectrum can play in encouraging new services, since it provides “significant flexibility for users, which in turn creates demand for innovative application of radio technology within these bands”. The potential drawback of this approach is that congestion can occur, but this can be addressed by a combination of market forces and regulation, including action by manufacturers to “improve the resilience of radio equipment to interference” and by regulators to “restrict the propagation of signals through power limits”.

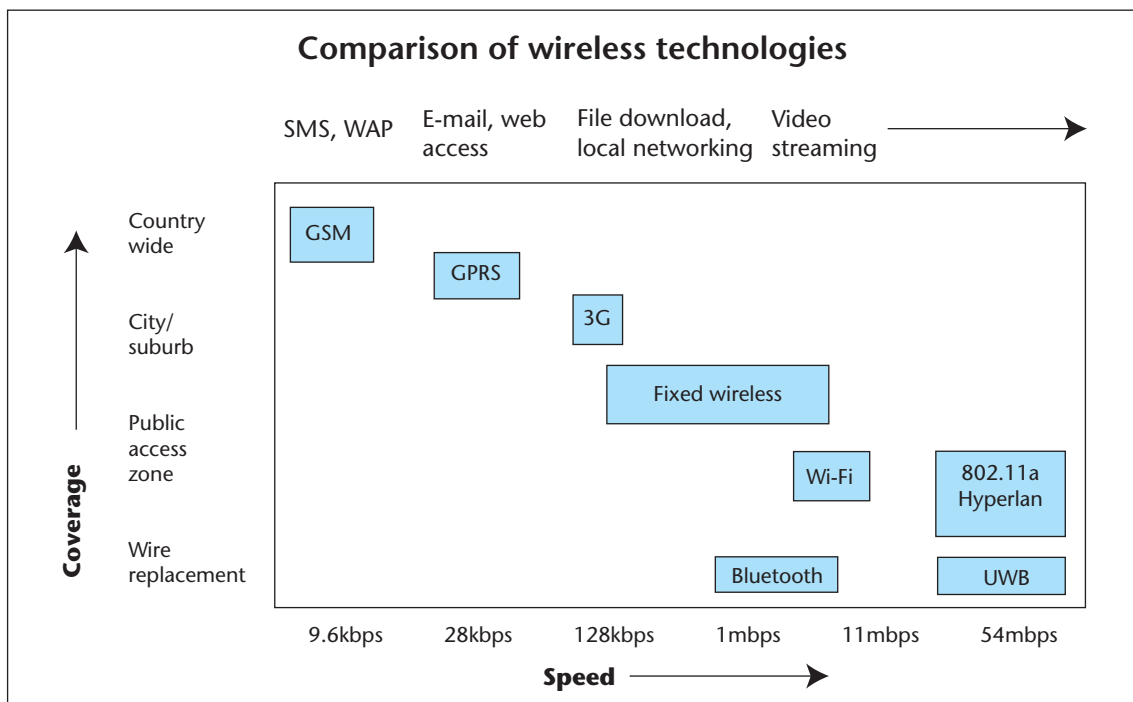
An effective spectrum management strategy will be key to innovation in wireless technologies

This experience highlights the broader issue that Government – and hence OFCOM – will face as a result of developments in fixed wireless technologies: the need for a **spectrum management strategy** that encourages innovation, while at the same time minimising interference and operating within international constraints for spectrum usage.

Significant innovation is expected in combining the use of different wireless technologies

There are several possible implications of these technical developments on the market and on use of technology. For example WLAN technology may be used to increase the bandwidth of 3G mobile in hotspot areas. On the other hand, WLANs may in fact challenge the take-up of 3G. Technology providers are currently working on developing technology that allows users to move seamlessly between

Figure 4.2: Expected bandwidth and range of selected wireless technologies⁷⁴



⁷² Details at www.t-mobile.co.uk/Dispatcher?menuid=phones_wb_hsl

⁷³ Discussed in more detail in section 5.7.1

⁷⁴ Adapted from Re:think!, “I want my Wi-Fi”, BECTa, “Wireless Local Area Networks”



different services until these uncertainties have been resolved. Figure 4.2 sets out the current range of wireless technologies.

The considerable innovation expected to take place in all wireless technologies raises issues for regulation. In order to ensure the optimal rate of innovation and competition in these markets, OFCOM will need to regulate in a way that promotes **innovation and removes barriers to emerging markets**.

Hence the main regulatory challenges over the next decade for fixed wireless networks will be:

- How to encourage innovation and remove barriers to emerging markets.

In addition, Government will face the challenge of:

- Determining the optimal approach that OFCOM should be asked to take to the regulation of spectrum.

4.2.5 Interactive TV

Interactive television allows users to access content and services through their television set. It requires a return path from the television to a service provider, down which the user requests information and services that are then transmitted back to the user. Interactive TV can be provided over a number of different networks, including satellite, terrestrial broadcast, cable and ADSL.

It is worth noting that digital TV is not the same as interactive TV. Digital TV uses compressed digital signals to offer more channels or better quality sound and video, but it does not necessarily have a return path and so is not necessarily interactive.

Interactive TV uses a range of technologies, and provides a range of services

One of the main services which interactive TV can provide is Video On Demand (VOD), where

users select exactly what they want to watch from a menu of available programmes. Since they have direct connections to individual homes, cable and xDSL are advantaged in this area versus satellite and terrestrial broadcast. The use of Personal Video Recorders and Near-Video On Demand to record or transmit programmes for viewing at the user's convenience may offer a reasonable substitute, but these technologies are not technically interactive TV, as they do not require a return path.

Interactive television can also provide a range of other functionality, including email, commerce, betting, gaming, polls and embedded interactivity (e.g. playing "Who Wants to be a Millionaire" alongside contestants). Although interactive television can be used to access the internet, initial indications are that its uses will be significantly different from internet access from the PC. The main reason for this is that the television is still seen as an entertainment device and "if viewers are to be persuaded to pick up their remote control, it has to be fun".⁷⁵ Consequently, although applications such as television commerce were, in the early days of the medium, tipped to drive interactive TV revenues, operators now believe that key revenue streams will come from applications such as VOD, games and gambling.

Strong vertical integration in the industry and BSkyB's SMP are concerns for the regulator

The structure of the interactive TV market is characterised by a small number of vertically integrated players. Given that the interactive television market is relatively new and is broadly defined, data on the size of the market or market shares of players is not available. However, data on numbers of digital television subscribers indicates the following:⁷⁶

- **Cable** has a total of 2.0m subscribers – of which 1.3m subscribe to NTL and 0.7m subscribe to Telewest.

⁷⁵ The Economist, 13 April 2002

⁷⁶ Data from ITC, 1 May 2002



- **Satellite** has almost 6m customers using BSkyB's service. As a result, BSkyB is the leading interactive TV player and is considered to have SMP.
- **Terrestrial** had 1.3m subscribers up until the closure of ITV Digital on 1st May, 2002. Freeview, the new digital terrestrial television joint venture from the BBC and BSkyB, launched in Autumn 2002.

The high investment required in infrastructure investment in order to operate in the digital (and hence interactive) TV market acts as a barrier to entry that limits the number of players who can comfortably co-exist. All of the players are characterised by a high degree of vertical integration which is unlikely to change given the substantial advantages of vertical integration in the industry (lower transaction costs, greater clarity for investment decisions, greater control over customer experience). As a result, customers not only buy access to the infrastructure from a specific operator but also buy content, often branded and closely controlled by the operator. This combination of strong vertical integration and BSkyB's SMP poses a challenge for the regulator who needs a clear vision of how to deal with issues of market structure such as **SMP, cross leverage and vertical leverage**.

The regulation of interactive TV in the UK is handled by both Oftel (which regulates access) and ITC (which regulates access for public service broadcasters to infrastructure). Current regulation by Oftel focuses on regulating conditional access systems and access control systems. These are defined as the services required to display a broadcaster's digitally transmitted services to viewers. They include services such as encryption, subscriber authorisation, subscriber management and access to Electronic Programme Guides. Control over such services could create new forms of market power in the future as technology evolves, and as the intelligence embedded

within systems increasingly shapes the user experience.

The approach to regulating open access in interactive TV is likely to evolve in line with regulation of other electronic networks

The approach to date has been that if an operator supplies open access to its network to certain third parties for broadcast or interactive TV, it must make the same access available to any other third party on "fair, reasonable and non-discriminatory" terms. This approach is inconsistent with the approach taken for instance to regulating telecoms networks, where only companies that have SMP are regulated. Consequently, as part of the market review process that will take place in 2002/3, Oftel will consider whether regulation should be changed, such that only SMP operators are regulated.

Although this would eliminate inconsistencies in regulation, it should be noted that it would probably not alter any of the market outcomes in interactive TV in the UK. This is because BSkyB – the only operator likely to be deemed to have SMP – already offers open access.

Hence the main regulatory challenge over the next decade for interactive TV will be:

- How to deal with issues of market structure such as SMP, cross leverage and vertical leverage.

4.2.6 Conclusions

Market structure and technological developments in all electronic networks (wired, mobile, fixed wireless and interactive TV) pose several challenges for the regulator, many of which are common to a number of networks. The challenges facing OFCOM can be summarised as follows:

- How to deal with issues of market structure such as SMP, cross leverage and vertical leverage;



- How to balance infrastructure versus service competition;
- How to encourage innovation and remove barriers to emerging markets, while ensuring network resilience; and
- How to manage the evolution of regulation in terms of sectoral versus competition regulation and how to ensure proportionality of regulation.

In addition, Government will need to determine:

- What the optimal approach to the regulation of spectrum is likely to be.

And chapter 3 previously identified the question for Government:

- Whether and how to use regulation or other levers to achieve wider coverage of broadband.

The following chapter sets out the Strategy Unit's recommendations on how to approach these challenges.

5: HOW SHOULD THESE CHALLENGES BE TACKLED IN THE UK?

Summary

Technological and market trends mean that electronic networks will remain in transition throughout the next decade. OFCOM will need to track market signals carefully, and then tailor its regulatory approach accordingly. As well as looking at the issues it faces on an individual basis, OFCOM will need to fit these issues into an over-arching strategic framework. This chapter considers the regulatory challenges faced by OFCOM in view of expected market development, and in view of OFCOM's duties to further the interests of consumers.

Considering each of the regulatory challenges in turn:

- The new EU framework provides a good basis for a consistent but versatile approach to **SMP and leverage of market power**. This report recommends that OFCOM should favour a “macro level” approach incorporating systems and processes that will deliver appropriate behaviour.
- This report recommends that the regulator should encourage both **infrastructure and service competition**, despite the fact that the immediate prospects for significant investment in infrastructure appear limited given the current mood of the capital markets. To guide its decision making, OFCOM should assess the underlying economics of each form of competition.
- A competitive environment can be expected to deliver **innovation**. The regulator needs to strike a balance between allowing immature markets to develop without interference, and ensuring that competition is able to develop in those new markets over the long-term. Regulation should not prevent innovators from earning adequate returns, and market forces should be allowed to shape the

development of those products and services. However, the regulator may need to intervene as new markets mature if competition does not develop.

- OFCOM should also ensure that its economic regulation allows for sufficient investment to deliver **network resilience**, and that it imposes appropriate obligations on operators to ensure such resilience.
- This report recommends that OFCOM should adopt a highly systematic approach to ensuring **proportionality** of regulation, based around evidence gathered in the market review process, and following the guidelines set out by the BRTF and endorsed by Government.

In addition, Government will also need to determine OFCOM's role in two areas:

- Effective management of the **radio spectrum** will be a key input to the success of wireless technologies. This report endorses the Government's response to the Cave Review, and recommends that OFCOM should continue to work with Government in the implementation of market-based approaches.
- Provision of necessary services to all those who need them is part of OFCOM's remit to serve the public interest. But this report recommends that there is as yet no case for a **universal service obligation** for broadband.

This chapter starts by noting the mixed messages that arise from expected developments in electronic networks (section 5.1). In the light of these messages, the chapter suggests a strategic framework within which OFCOM could consider its regulatory approach (section 5.2). The remainder of the chapter discusses the challenges that OFCOM will face in its regulation of electronic networks: dealing with market power (section 5.3); balancing

infrastructure and service competition (section 5.4); encouraging innovation and removing barriers to emerging markets, while ensuring network resilience (section 5.5); and ensuring proportionality of regulation (section 5.6). The chapter closes by looking at the two areas where Government will need to determine OFCOM's role: spectrum regulation and the case for wider coverage of broadband (section 5.7).



5.1 A decade of transition

Technological and market trends will result in a period of transition

The preceding analysis of technological and market trends has shown that the next decade will be a period of transition, maintaining the pace of change that has been seen over the last decade. The introduction and more widespread adoption of new technologies will change the environment in which we define, use and regulate electronic networks. At the same time, new players will enter communications markets, changing the current status of those markets and hence changing the role of the regulator.

Looking further ahead, developments such as grid computing could change the very nature of electronic networks from the way we think of them today. And such is the dynamism inherent in electronic networks that by the end of the next decade it is likely that another set of new developments will be emerging.

OFCOM will need to track developments carefully

This period of transition will pose considerable challenges for OFCOM over the next decade. In particular, OFCOM will need to track carefully the technological and market developments that take place, and will need to review its regulatory regime, to ensure that regulation remains proportionate and well-targeted.

When it assesses the trends in technologies and the market, OFCOM will be able to form a view on drivers such as convergence, levels of competition, and the emergence of new markets. Because the next decade will be transitional, the signals that OFCOM will pick up might be somewhat contradictory in nature:

- Convergence between the services available over *different* networks will create cross-network competition, and so tend to erode the market power enjoyed by companies with SMP on any *individual* network. For example, mobile voice telephony is already

acting as a substitute for fixed-line voice telephony in some niches, imposing competitive pressure on BT.

- At the same time, different networks will generally remain complements rather than substitutes. In other words, most people will want to use mobile devices *in addition to* their fixed line internet connections, rather than *instead of* those other forms of connectivity. This will tend to perpetuate the market power of companies with SMP on any individual network.
- In fixed-line telecommunications, almost half of all market segments are expected to be competitive within the next few years, and by the end of the decade, this number could have risen still further. But looked at differently, BT will still have market power in around half of all market segments.
- In mobile telephony, there will soon be five network operators in the UK, each of which will be providing services. There will also be a number of other service providers purchasing airtime from the network operators. But again, looked at from the opposite perspective, there is no threat of entry from additional network operators, and in theory, the current mobile market has many of the characteristics of oligopoly.⁷⁷
- Across many of the different networks – fixed-line, mobile, interactive TV – there will continue to be considerable vertical integration, as for example through BSkyB's ownership of its satellite network and its provision of content via that network. This means that even if individual segments appear to become competitive, the regulator will need to be aware of the possibility of vertical (or cross) leverage of SMP from other segments.

In order for OFCOM to interpret these signals correctly, it will be important to have an overarching strategic framework. The next section describes one such framework.

⁷⁷ Oligopoly arises when there are a small number of companies operating in a market, and their interdependence creates market power

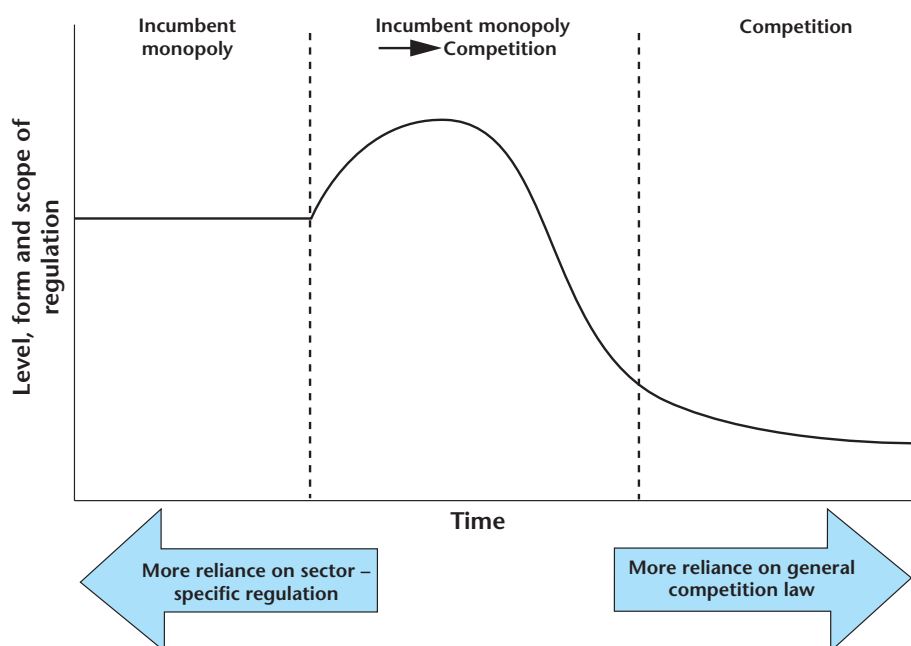
5.2 A strategic framework for the regulation of electronic networks

A strategic framework for regulation needs to be dynamic and flexible

Any framework for regulation of evolving electronic networks needs to be one that is dynamic, and able to encompass innovation and change in the market. Figure 5.1 suggests one way of looking at this, showing that:

- Most markets in electronic networks start (or started) with a high degree of market power resting with the incumbent (left hand section of the figure). In these circumstances, the focus of regulation is on the prevention of abuses of market power, and on simulating the beneficial impacts of competition. This is the primary focus of section 5.3 of this chapter.
- In most markets competition will develop over time. However, it is equally likely that the development of competition will not happen without regulatory intervention to open up the market (central section of the figure). Ironically, this may require a short to medium term increase in regulation, in order to deliver competition in the longer term. Section 5.3 contains some discussion of this form of regulatory intervention; section 5.4 focuses on the need to encourage competition in both infrastructure and services, while remaining technology neutral; and section 5.6 looks at the way in which the regulator needs to ensure proportionality in the type and extent of regulation, and in the speed within which it is imposed.
- In due course it may be possible to achieve a competitive market (right-hand section of the figure). This is likely to be accompanied by a reduction in the amount of sector-specific regulation, with the focus switching to a reliance on general competition law. Section 5.6 looks at this switch of focus.

Figure 5.1 The state of the market and the role of sector-specific regulation and general competition law⁷⁸



⁷⁸ Figure adapted from "Europe's Network Industries; Conflicting Priorities", edited by Romesh Vaitilingam, Centre for Economic Policy Research (1998)



Additional regulatory roles arise from duties to further consumer interest

Even when competitive markets have been achieved, there are likely to remain a number of other roles for the regulator. These will relate to the regulator's duty to further the interests of consumers, which it seeks to achieve primarily through improvements in availability, quality, choice and value for money. Competition will help to deliver each of these, but in addition:

- The regulator needs to create a climate of innovation through a balanced approach to new and emerging markets. This issue is discussed in section 5.5.
- The regulator will also need to secure the reliability and resilience of electronic

networks, having regard to performance under both normal and abnormal conditions. This issue is also discussed in section 5.5.

And OFCOM will have a role in the two cross-cutting challenges for Government

Finally, Government will need to determine the role to be played by OFCOM in helping to meet the two cross-cutting challenges identified in Chapter 4:

- How to achieve the appropriate balance in managing the radio spectrum, in the face of several different objectives. OFCOM will take the lead in implementing Government's strategy towards spectrum management, and the issue is discussed in section 5.7.1.

Box 5.1: Content regulation

Convergence of technologies poses significant challenges for the regulation of content. The approach to regulating content has traditionally been to regulate "broadcast" content, but not to regulate "unicast" content where the user specifically requests a certain type of content which is transmitted individually to them (e.g. internet content). The rationale for this is that where users have limited control over the content that they view, they should be protected. Where they have greater control, considerations of freedom of speech and privacy should hold more weight.

Developments in electronic networks are blurring the boundaries between broadcast and unicast content and will continue to do so. On iDTV, for example, a user might click on a link on a page that takes them through to internet type content that is unicasted to them on request. However, the distinction between the two may not be evident to the user. Similarly, video on demand (VOD) is unicast content that is sent to a user on request; however, from a user's perspective, it bears strong resemblance to near-video on demand that is broadcast to the user. As such technologies develop, the challenge for regulators is to devise an appropriate regulatory approach.

The policy narrative to the draft Communications Bill sets out the Government's proposed approach to this issue:⁷⁹

"Government has made clear that it is not the intention for the draft Bill to extend regulation into the Internet. It is not a simple matter to give effect to this policy in statutory form – the draft Bill is designed to do so through the way that 'available for reception by members of the general public' is defined. The definition in the draft Bill has the effect that some services that are currently regulated, notably video-on-demand, would not be licensable in future.

"The draft Bill does, however, grant the Secretary of State the power to amend the definition of what is licensable through secondary legislation to take account of such matters as the expectations of the public about content, and child protection issues, as well as technological change."

⁷⁹ From clauses 8.3.3.2 and 8.3.3.3, www.communicationsbill.gov.uk/policy_narratives/550809.html

- How to balance the requirements of existing and potential customers. This will involve consideration of the case for universal services, and is discussed in section 5.7.2. This aspect of regulation is also particularly relevant to the Government's wider public policy objectives (see Chapter 2).

The regulation of content will sit outside this framework

In addition to the economic regulation that is the focus of this report, OFCOM will also have responsibility for the regulation of the content available over electronic networks. As described in Box 5.1, this is likely to become an increasingly difficult task as networks and access devices converge, and the range of content available over these networks widens.

5.3 Dealing with market power

The EU regulatory framework sets out the approach to dealing with market power

Even though the next decade will be one of considerable transition, it seems clear that OFCOM will continue to be faced with issues of SMP and the potential for cross or vertical leverage of SMP. These issues are likely to arise in existing and new markets alike, including those relating to fixed wire, mobile and interactive TV.

In dealing with SMP, OFCOM's powers will be largely determined by the EU regulatory framework. This framework restricts the majority of regulatory activity to those instances where there is SMP, as identified by the process of market reviews.⁸⁰ But it also sets out the principles to which SMP regulations should adhere, and the boundaries within which they must exist.

In the Communications Bill, the EU regulatory framework is transposed without the addition of

extra detail. This report welcomes that approach – the flexibility inherent in the framework will be essential in dealing with the changes expected to occur over the next decade. At the same time, the framework also provides sufficient certainty for industry, through its clear delineation of circumstances in which different regulations can be imposed, and the clear principles by which regulations should be established.

The Access Directive sets out a list of potential SMP obligations

The Access Directive of the EU regulatory framework lays down a series of obligations that may be imposed on undertakings with SMP. In order to avoid over-regulation, these are presented as a set of maximum obligations that can be applied:

- Transparency – the publication of specified information, such as accounting information, technical specifications, network characteristics, terms and conditions for supply and use;
- Non-discrimination – the provision of equivalent conditions and equivalent circumstances to all undertakings providing equivalent services, especially where there is vertical integration;
- Accounting separation – the publication of separate accounting information for separate elements of the same business, especially in the presence of vertical integration, and to a specification laid down by the regulator;
- Access – the provision of cost oriented access on reasonable terms without undue discrimination or undue preference; and
- Price control – obligations for cost-orientation of prices and for certain cost-accounting methodologies to be used, where otherwise prices might be controlled by the operator to the detriment of end-users.

⁸⁰ The EU has issued a consultation on "Relevant Product and Service Markets within the electronic communications sector susceptible to ex ante regulation", available at europa.eu.int/information_society



Within this framework, OFCOM will have considerable flexibility over exactly what obligations it imposes on companies with SMP, so long as it adheres to guidelines laid out in the Access Directive. Most of these are focused around ensuring that regulation is proportionate and well-targeted – issues also raised by the Better Regulation Task Force, and discussed in more detail in Section 5.6 below.

The EU Directives also set out the extent to which the Commission will be looking for consistent application of the framework across the EU. This report believes that the current degree of harmonisation explicit in the Directives is broadly right. Any attempt to harmonise beyond principles and into details could be extremely counter-productive, given the many differences in circumstances between EU countries.

The Directives also set out the approach to imposing these obligations

When it decides to modify or impose obligations in respect of the Access (or other)

Directive, OFCOM will be required to undertake the following procedures:

- Undertake the appropriate market reviews as part of the rolling programme;
- Identify a problem that is linked to the exercise of SMP;
- Propose and consult on an *ex ante* regulatory obligation allowed for under the EU framework, and appropriate / proportionate to the problem identified;
- If the decision is appealed, contest the appeal before the new Competition Appeals Tribunal; and
- If successful, implement the obligation.

In the absence of an appeal, the time between identifying a competition problem and implementing a new, revised or reinforced obligation is likely to be 6-9 months. However, this could be lengthened considerably if OFCOM's decision was appealed.

International comparison 1 – dealing with market power

Attitudes to the strategic challenges identified by the Strategy Unit have been compared across Australia, Canada, France, Germany, Italy, Japan, Sweden and USA. Details of the comparison are presented in Annex D. Summaries of the conclusions on each of the challenges are presented in boxes throughout this chapter.

In all the countries, SMP will remain one of the most important issues to be handled through regulation over the next decade, in existing and new markets alike. The extent to which SMP is seen as a priority is influenced by market structure and ownership issues. For example, the federal structure of the Canadian state has led to two main incumbents, Bell and Telus. Each company operates as a new entrant in the other's territory, thus tempering lobbying on issues of incumbent position. The level of government ownership of an incumbent also influences the extent to which some governments are prepared to control SMP behaviour.

In all the countries studied, officials agreed that sectoral regulation would have a continuing role over the next decade and the majority agreed with the philosophy of moving towards greater reliance on a macro approach. The majority of EU countries do not have case law as in the UK: transposition of the new EU regulatory framework is thus a major legal challenge and many governments are currently in the process of defining their strategic approach. An evolutionary strategy will be more difficult in countries without case law. Alternatively, Sweden recognised that there would be a period of regulatory uncertainty while their case law develops.

The potential for this to become a lengthy process will raise concerns about speed of regulation. Where possible, the regulator will want to avoid entering into the appeals process. And where appeals occur, the regulator will want them to be amenable to swift resolution. One way of achieving this will be to focus where possible on generic behavioural obligations, rather than on more specific and detailed requirements. The relative merits of these approaches are discussed below. The issue of speed more generally is considered further in section 5.6, which considers speed as one element of “proportionality”.

SMP obligations will have a range of different purposes

Because OFCOM will be required to go through a lengthy process in implementing new regulations, it is sensible that it should aim for an approach that fully meets its objectives, while keeping as small as possible the number of regulatory interventions required. In seeking

to achieve this, OFCOM will need to consider carefully the different types of regulation that will need to be applied in the context of SMP:

- In any segments where there is no prospect of competition for the foreseeable future (e.g. the provision of fixed-line infrastructure to remote areas), there will need to be a permanent backdrop of regulations designed to protect against abuses of market power. These regulations are likely to be considerable in extent, but it should be possible to fix them in place for some considerable period of time (i.e. a number of years).
- In any segments where there is SMP, but where there is some prospect of competition emerging, regulations are likely to be tailored more to encouraging the development of competition and facilitating market entry. These regulations may need to be altered more frequently, to take into account their success (or otherwise) in achieving their aim.

Box 5.2: Leverage of SMP through horizontal or vertical integration

There are a number of means by which SMP in one market (or set of markets) could be levered into other markets. Depending on the precise circumstances, these may either breach competition law or sector-specific regulations (or, of course, both). The mechanisms include the following:

- Cross subsidies or price squeezing;
- Differentiating product availability;
- Differentiating level of service;
- Differentiating availability of information;
- Bundling different products;
- Leverage of customer base;
- Managing profits; and
- Generally obstructive behaviour (“strategic incompetence”).

Theory would certainly suggest that such abuses might be likely, particularly where there are close associative links between markets. Market power can confer a level of profits and other benefits above and beyond those that would be achievable in the face of competition. Hence any company might be expected to want to extend its market power to as many market segments as possible.



However, this will need to be balanced against the desire for certainty among potential new entrants.

- While some SMP regulations will be designed to guard against abuse of market power within a market or market segment, others will be designed to prevent leverage of market power from one market (segment) to another. Box 5.2 explains how such leverage might occur. In general, it might be expected that regulations to prevent leverage of SMP will be most difficult to get right – not least because leverage is often difficult to detect. This could be a particular issue in the internet sector, where the horizontal and vertical hierarchical relations of more traditional industries are blurred, making it hard to define market boundaries.

And there will be a range of different influences on their implementation

In the light of these different aims, and in the context of a fluid environment dictated by technological and market developments largely driven by the private sector, it could prove challenging to develop a regulatory regime that satisfies simultaneously:

- OFCOM's objectives;
- The EU framework;
- The BRTF principles of good regulation; and
- A requirement to reduce the number of regulatory interventions, and the time they take to implement.

This report recommends that OFCOM should focus on systems and processes

What this points to is an approach that seeks to set regulation at a "macro" level, wherever feasible and appropriate, avoiding the need for "micro" level regulation. The difference between macro and micro level regulation is not necessarily the degree of intrusiveness – either might be considered to be intrusive, depending on how it operated. Rather, the difference is that:

- A more macro approach would establish systems and processes that constrain the behaviour of a company with SMP.
- A more micro approach would deal with problems on a case-by-case basis.

Neither approach will be suitable for every eventuality, and OFCOM will need to assess each market on its merits. For example, a macro approach may not work well if there needs to be a certain amount of "learning by doing", as was the case with the unique challenges posed by the LLU process. In such a situation, a micro approach may be needed to establish "what are the right systems to set in place" in a subsequent macro framework. In addition, a macro approach may well need to be backed up by micro-level action, for example in the policing of Chinese Walls (see below).

Notwithstanding these caveats, Ofcom and other regulators are already taking steps to move towards the macro approach where it is appropriate to do so, and **this report recommends that OFCOM should continue to favour a macro-level approach to regulation.** The new EU framework – which enables the regulator to set out in advance requirements on accounting methodologies, publication of information, service level guarantees, etc. – lends itself to this approach. And it is an approach that should make disputes and appeals less likely, and easier to resolve.

Powers in the Access Directive will enable this "macro" approach

A key challenge for the regulator will be to ensure that companies with SMP demonstrate operating and financial transparency, and provide fair and reasonable access to networks on non-discriminatory terms. These issues are specifically addressed in the EU Access Directive, and the obligations within the Directive should be used by OFCOM to create a macro-level approach to the management of SMP, building

on the work of the existing regulators. The advantage of using macro-level approaches to these challenges is that requirements on companies with SMP can be specified in advance, giving clarity and consistency of approach, while simulating the effects of competition where it does not exist. Examples of how this approach could be strengthened, based on the obligations in the Access Directive, are set out below:

- Obligations on accounting separation allow the national regulatory authority to *specify the format and accounting methodology to be used, and to require that all accounting records are provided on request*. A key aim of this is the need to be able to demonstrate non-discrimination. In addition, action to impose price controls may be supported by the *imposition of a cost accounting system* by the national regulatory authority, and the Directive specifically notes that this may be subject to *annual independent audit*.
- Obligations on non-discrimination provide a clear requirement for dominant undertakings to demonstrate that they are offering to competing undertakings the same levels of service as they would offer to their own colleagues, or to any undertaking with SMP. This provides a rationale for *wholesale products to be required alongside the launch of retail products, whenever those retail products are being offered through a company with SMP*. It also provides a rationale for the *wholesale product to be offered with service level guarantees (SLGs, as opposed to the weaker service level agreements (SLAs)) in place*.
- Obligations on price controls require the national regulatory authority to ensure that these controls are *promoting efficient operation*, and to take appropriate action if they are not doing so. This could justify the undertaking of *“efficiency reviews”* of companies with SMP, making recommendations for improvements if it

found that their performance were not up to scratch.

- Obligations on access and interconnection require operators with SMP to offer other operators any technically feasible interconnection product/service on reasonable terms for which reasonable demand exists. The regulator would have a role in *determining any disputes about reasonable access and terms, according to a set of pre-determined guidelines*.
- Obligations on transparency require terms and conditions to be provided in such a way that the national regulatory authority can be sure that non-discrimination obligations are being met. This provides *a clear rationale for information to be published, and for “Chinese Walls” between separate business units to be strictly enforced such that unpublished information is not shared in a discriminatory way*. Such an approach would, among other benefits, enable independent undertakings to talk to one part of a horizontally or vertically integrated company, without fear that sensitive information would be passed on to other parts of the same company.

The advantage of these sorts of measures is that they provide behavioural remedies that are technology neutral, apply across market segments, and are robust over time.

In addition to these powers, OFCOM and the sector as a whole would benefit from the powers envisaged in the Communications Bill to allow third parties to sue operators for breach of obligations, and the regulator to levy fines of up to 10% of turnover in relevant markets. This report welcomes these proposals, as a further means to ensure compliance with regulations, hence reducing the likelihood of time-consuming investigations into possible breaches.



5.4 Balancing infrastructure and service competition

In seeking to move towards a competitive telecommunications sector, OFCOM will need to consider the balance between infrastructure competition – where different networks compete to offer carriage for similar services – and service competition – where different service providers compete over one or more networks.

Much has been done to promote infrastructure and service competition in the UK

Focusing firstly on infrastructure competition, the situation that OFCOM will inherit is somewhat variable. In fixed-line telecoms, although BT is set to remain the sole provider of

a ubiquitous nationwide network for the foreseeable future, it is subject to competition in many individual elements of its network. There will be five companies competing to provide mobile (3G) infrastructure. And BSkyB will continue to face competition from the cable companies for around 50% of households. Moreover, during the next decade, technological changes will tend to encourage cross-network and within-network infrastructure competition.

Turning to the prospects for service competition, two clear trends emerge from the evidence available on fixed-line market segments:

- The level of service competition often mirrors the level of infrastructure competition, with


International comparison 2 – balancing infrastructure and service competition

Most countries studied by the Strategy Unit support the long-term goal of infrastructure competition, believing this also to be a strong contributor to successful service competition. Most regulators agree that few companies are investing in infrastructure in the current economic situation, and hence that service competition will be the way forward in the short to medium term. However, the approach to achieving long-term infrastructure competition varied between countries. All countries have competition in backbone infrastructure, but few have been as successful as the UK in creating last mile competition. Many countries noted that cross-network rivalry was most likely to drive competitive pressures.

Canada and the USA have historically strongly supported infrastructure-based competition, since service competition is thought to lead to lower innovation. However, this is a live debate given the current economic situation. In Canada, consideration is being given to requiring cost-oriented wholesale products, and in the US there is discussion of reducing local loop access requirements for incumbents to give more certain returns and thus incentivise investment in roll-out.

In Sweden and Italy there has been no formal policy preference. While in practice the regulator has favoured service competition, the aim has been to pursue infrastructure/service neutral policies.

In Germany, the policy is to pursue service competition when first opening a monopoly market, and then to move to infrastructure competition. However, in the development of broadband connectivity, the approach in Germany has resulted in little competition in either infrastructure or service provision in the local loop. While DSL roll-out has been successful and in absolute terms there are a high number of unbundled lines in Germany, Deutsche Telekom has the vast majority of the infrastructure and customer contracts.



Box 5.3: The conditions required for infrastructure and / or service competition

The provision of services over electronic networks is generally characterised by:

- Relatively low costs of entry; and
- Potentially high levels of differentiation.

The combination of these two factors should in principle make service competition relatively easy to achieve, especially since – unlike the other utilities – there is no limit to the number of different service providers that can provide services over a single stretch of network.

However, service competition can be held back when there is a single infrastructure provider who is able to set terms for service providers. This may be considered especially likely when the infrastructure provider is vertically integrated with a service provider, and has an incentive to discriminate against other service providers.

Regulatory activity is able to prevent this by setting out rules for the pricing of wholesale products, and the levels of service associated with them. But a more sustainable solution is provided by the development of infrastructure competition. Competing infrastructure providers will seek to win as many services on their infrastructure as possible – and this will be good for service competition as well.

new entry by service providers helped by the existence of alternative infrastructure providers. Competing infrastructure providers tend to reduce wholesale prices to an extent that facilitates entry by service providers.

- Service competition also tends to exist where regulation allows new entrants to carve out niches within which they can compete with incumbents. This is often achieved by the way in which regulatory price controls are established. A good example is national and international business voice telephony.

Infrastructure and service competition are by no means incompatible

To a considerable extent, the promotion of infrastructure competition and service competition will require similar approaches. On the basis of evidence gathered during the market review process, the regulator will be required to put in place appropriate SMP regulations. As discussed in the preceding section, many of these regulations will be aimed at facilitating market entry and encouraging

competition. A focus on regulation at the macro level should be helpful to all types of new entrant. Box 5.3 highlights the fundamental conditions that will be required for infrastructure and / or service competition to occur.

OFCOM will need to be aware of potential trade-offs

There are situations where infrastructure competition and service competition will be impacted in different ways by a particular regulatory choice. For example, regulatory intervention to extend the availability of a wholesale product will tend to promote service competition, but may discourage build of new infrastructure if it is more cost effective for operators to use the wholesale product. A good example of this is the interaction between BT's wholesale xDSL product, and the LLU product which new entrants can also purchase from BT. Given the widespread availability of the wholesale product, and a comparatively low price compared to LLU following regulatory



intervention, the existence of the wholesale product will almost certainly discourage some operators from building their own LLU infrastructure.

OFCOM should not be overly focused on the impact of individual decisions, because it will be the overall balance of regulation – and external economic conditions – that determine the extent to which infrastructure or service competition occur. However, OFCOM does need to be able to take well-informed decisions, where its actions could have even a marginal impact either way, particularly since the immediate prospects for significant investment in infrastructure appear limited given the current mood of the capital markets.

Therefore, **this report recommends that OFCOM should develop a significant strategic capability at its centre, capable of assessing the underlying economics of infrastructure and service competition across the full range of markets for which it is responsible.** OFCOM will need to determine what form its strategic capacity needs to take, in the light of this and other recommendations in this chapter, but in particular should ensure that it has in-depth technical resources available.

Because of the inevitable uncertainties in this sort of analysis, OFCOM should not attempt to use the analysis to justify fundamental shifts in its stance. Rather, it should be used to inform marginal decisions, and to ensure that the competition which develops is, as far as can be foreseen, sustainable. **This report recommends that the overall stance on the type of competition should instead be as neutral as possible, favouring neither infrastructure nor service competition, but seeking to remove barriers to both.** This will build on the approach already adopted by Oftel, and the other recommendations in this chapter have been designed with this in mind.

5.5 Innovation, investment and resilience

5.5.1 Creating a climate of innovation

Differentiation of services makes it important for the regulator to promote innovation

Electronic networks can offer highly differentiated services along a wide variety of different dimensions, including price and price structure, speed of connection, and content and services offered. This degree of differentiation is what makes innovation and the emergence of new markets so important to electronic networks, and hence to the regulator. Because a high degree of differentiation is possible, a competitive market can be expected to deliver innovation, as companies try to create competitive advantage through new products and services.

And the regulator also needs a balanced approach to new and emerging markets

However, new and emerging markets can be problematic for regulators. There is a danger that, by not regulating such markets in cases where an operator has SMP in other markets, the regulator will allow the SMP operator to establish *de facto* market power in the new and emerging market(s). But regulating new and emerging markets can significantly distort the market and result in inefficient outcomes:

- The regulator may be tempted to regulate prices in the new market to ensure that, before competition has taken root, consumers receive a fair deal. However, in order to create the right incentives for investment in products and services, *regulation should not prevent innovators from earning adequate returns*, and market forces should be allowed to shape the development of those products and services.

- Price regulation is also likely to be based on the cost structure of the SMP operator which, as a result of economies of scale, may be lower than that of new entrants. Consequently, price regulation may offer the incumbent a sufficient rate of return to invest in the new market but this *rate of return may not make entry into the market attractive for potential new entrants*.
- In new markets in particular, the regulator is likely to suffer from a *lack of information about the industry cost structure* as a result of limited experience, few comparators, unknown cost of capital and a high degree of uncertainty.

This issue was summed up in a recent paper which stated that “innovation, and hence market growth, is stifled ... by regulation. The exception to this rule is where market failure is pervasive, as for example in the case of monopoly.”⁸¹

In the light of these difficulties, Oftel’s approach has been to avoid regulation of new markets where possible. This is partly a pragmatic response to the lack of information on which to base a regulatory response, and partly a means of encouraging innovation by allowing immature markets to develop without

interference. However, sticking to this approach has inevitably proved difficult.

There is a range of different regulatory approaches available

A range of possible reactions is available to OFCOM to strike this balance. At one extreme, incumbents with SMP will be best encouraged to innovate if they know that the regulator will refrain from regulating new markets for the foreseeable future. At the other extreme, the regulator could prevent any possibility that SMP would be extended into new markets by committing to rigorous price controls. This could sit alongside a requirement that all products are immediately made available to all other competing companies on identical terms.

The right approach is likely to be somewhere between these extremes. As OFCOM tackles this challenge, it will need to tailor its approach to match the source of the innovation, and the extent to which SMP is likely to be an issue. As highlighted above, given the lack of investment in infrastructure at present, service providers are likely to be the main driver of innovation in the short to medium term.

International comparison 3 – innovation and emerging markets

The approach taken in the majority of countries is to avoid regulating emerging markets wherever possible. In effect, this often means allowing time-limited cross-subsidisation of new services. The problems of determining when a market is mature and of dealing with cross leverage were generally recognised. The general philosophy has been to concentrate on wider strategies, for example on promoting competition, regulating incumbents and encouraging investment in research and development, to provide an environment which will support innovation. The USA in particular noted that the preferred approach was to allow the market to operate and only get involved if there are bottleneck issues.

The situation is different in Japan, where the government works closely with the incumbent both in terms of R&D investment and decisions on research priorities, and ensuring that regulation does not impede innovation in identified areas.

⁸¹ Cubbin, John and Currie, David, “Regulatory Creep and Regulatory Withdrawal”, City University (May 2002), www.staff.city.ac.uk/~sm340/Research/RegCreep.pdf



This report therefore recommends that OFCOM should encourage the following:

- **Competition between service providers: to create an effective and innovative service market;**
- **Clear market signals: especially for price and level of demand, while remaining technology neutral, so as not to “pick winners”; and**
- **Non-exclusive co-ordination between companies: to allow infrastructure and service providers to liaise effectively together. OFCOM would need to ensure this was non-discriminatory and transparent, and did not breach Chinese Walls. This could be done, for example, through facilitating industry forums.**

OFCOM should adopt an evidence-based approach

But in general terms, given the importance of innovation in electronic networks, **this report recommends that OFCOM should continue Oftel’s principle of always encouraging innovation when making marginal decisions.**

The decision-making process should also be as well-informed as possible, without trying to “second guess” the market and hence skewing its development in particular directions. **This report also recommends that OFCOM’s “strategic capacity” (discussed in preceding sections) should be involved in anticipating the types of innovation that are likely to arise, and briefing the OFCOM Board accordingly.**

Innovators should be allowed to earn adequate returns on their investment

Provided that this behavioural regulation is designed effectively, there should be no need to impose aggressive regulation of prices. Instead, OFCOM will have to consider carefully the point at which it may be appropriate to

intervene as a market matures, if competition does not develop and the innovator begins to develop Significant Market Power. The point at which this intervention may become necessary will depend on the extent of the innovation, the risk incurred by the innovator, and the likelihood of competition developing in the future.

In any event, innovators should be allowed to earn adequate returns in order to create the right incentives for investment in products and services. **This report recommends that if OFCOM decides that it is appropriate to regulate prices as a market matures, the price regulation should explicitly take into account the investment made by the innovating company to bring the new product to market.** Such an approach would reinforce the level of confidence perceived by potential innovators.

Alongside this approach, OFCOM will need to consider the impact of the innovation on alternative infrastructure providers, who may have a different cost base. A careful balance will have to be struck. But OFCOM may have to accept that the lower cost base of one infrastructure provider could be a genuine competitive advantage. It would be extremely inefficient to try to negate this through regulation.

5.5.2 Investment and resilience

OFCOM will need to monitor investment for network resilience

Alongside the issue of innovation, OFCOM will also need to deal with the issue of investment in the network to ensure its resilience, in the form of maintenance, replacement and upgrading. OFCOM needs to make sure that its economic regulation explicitly takes into account all the reasonable costs that operators need to incur in their networks to provide core network resilience. Oftel’s cost modelling already includes these costs, and OFCOM should monitor required levels of investment

and ensure that they are adequately reflected in future regulatory analysis.

OFCOM will have a role to play in ensuring resilience to disruptive shocks

OFCOM should also continue the strategic role that Oftel has played in working alongside other parts of Government in ensuring the resilience of electronic networks to disruptive shocks. These can arise from a number of sources, including:

- Technical failure;
- Physical attack or accidental damage;
- Electronic attack; and
- System overload.

Each of these has the potential to cause significant temporary disruption, and every effort should be made to protect against them. However, in a competitive telecoms market there will be a strong incentive on operators to guard against these issues and resolve them swiftly. In parallel, OFCOM should ensure that its economic regulation allows for sufficient investment to deliver this reliability and resilience, and that it imposes appropriate obligations on operators to ensure system resilience.

Oftel has recently published its guidelines on Essential Requirements obligation on operators. These are designed to ensure continuity of services and network integrity. These obligations are dictated by the EU directives, and hence only apply to fixed voice telephony and not mobile or internet services. However, Oftel believes that these guidelines (which were developed with industry representatives, DTI and NISCC) represent an appropriate level of regulation in this area.

This report recommends that OFCOM should also continue the strategic role that Oftel has played in working with DTI, the Civil Contingencies Secretariat

(CCS), the National Infrastructure Security Co-ordination Centre (NISCC) and the industry, to ensure that appropriate measures are being taken to ensure the resilience of networks to disruptive shocks.

A potentially greater threat to network resilience could arise from the business failure of operators, since this could lead to the permanent closure of parts of the network, as opposed to temporary disruption. Unlike other types of disruptive shock, the incentive for the troubled operator to ensure continuity of supply will rapidly decline, if efforts to maintain the network as a going concern do not succeed. DTI has recently led a consultation exercise⁸² on the scope for changes to the existing regulatory system to ensure continuity of service. This was concerned with the effects on consumers of telecoms operator failure. DTI identified five possible options for change:

- Creating an obligation on administrators of licenced telecoms operators to maintain a service for whatever reasonable time is necessary to allow alternative services to be put in place, on a basis that would allow this obligation to take priority over claims of creditors.
- Amending the Universal Service Obligation on BT to specify a time limit for the provision of a telecoms service [to seek speedier reconnection of service if another operator failed].
- Establishing an ATOL-type scheme [similar to the travel industry] to fund the continuing provision of telecoms services when companies go into administration or receivership for an interim period until an alternative supply is provided.
- Joint liability across the industry.
- Appointing a supplier of last resort.

⁸² www.dti.gov.uk/cii/docs/atlantic.pdf



However, DTI has concluded that there is not a strong enough case for changes to the current regulatory framework. Responses to the consultation highlighted the ultimate cost to the consumer of all the options identified. DTI will nevertheless continue to work with operators and users to encourage the maintenance of adequate contingency plans against the possibility of any future operator failure.

Despite this, the potential risk of business failure remains as a threat to network resilience. As a result, **this report recommends that OFCOM and DTI should continue to monitor the state of the telecoms sector closely, and should develop contingency plans on a case by case basis to mitigate the consequences of business failures if they appear likely.**

5.6 Proportionality of regulation

OFCOM brings together sector-specific and competition law powers

The Communications Bill envisages that OFCOM will be responsible for the exercise of both *sector-specific regulatory powers* and of *general competition law powers* within the communications sector.⁸³ The former are generally of an *ex ante* nature, and aim to prevent the anti-competitive practices that could otherwise occur. The latter are generally *ex post* in nature, coming into effect after an anti-competitive activity has taken place. Box 5.4 explains what these powers will be, and how they will compare to the current arrangements.

Box 5.4: Competition law powers and UK telecommunications

Oftel already has concurrent powers with the Office of Fair Trading (OFT)⁸⁴ in respect of the Competition Act 1998, and a similar arrangement will apply to OFCOM. Oftel exercises its power to launch investigations under the Act, most notably in respect of Section 18, which states that:

“Subject to [exemptions set out elsewhere in the Act], any conduct on the part of one or more undertakings which amounts to the abuse of a dominant position in a market is prohibited if it may affect trade within the UK.”

Such investigations are usually tightly focused on specific markets or market segments. If an abuse is found, then the regulatory authority is able to give *“such directions as [are considered] appropriate to bring the infringement to an end”*. The authority is also able to levy a fine of up to 10% of the company’s turnover in the relevant markets during the last three complete financial years.

The Enterprise Act gives Oftel the power to make “market investigation references” to the Competition Commission⁸⁵ in relation to the telecoms sector. The Communications Bill proposes that these powers should in future be exercised by OFCOM, covering the communications sector as a whole. Under the market investigations regime, the Competition Commission will be able to take remedial action where it determines that the structure of a market, or the conduct of suppliers or customers in a market, prevents, restricts or distorts competition in connection with the supply of goods or services in a UK market.

⁸³ General competition law powers will be concurrent with OFT

⁸⁴ www.oft.gov.uk. The OFT undertakes regular reviews of different markets and industries, and will intervene if it finds evidence of anti-competitive behaviour. It is also possible for companies or individuals to request investigations into a company that is accused of such behaviour

⁸⁵ www.competition-commission.org.uk. The Competition Commission carries out inquiries into matters referred to it by the OFT or by the utility regulators (including the regulators that will be combined to form OFCOM – see below). It also acts as the appeals body for decisions taken by those authorities in respect of the Competition Act 1998

The role of each will depend on the state of the market

Depending on the state of the market, the regulator may wish to use sector-specific and general competition law powers alongside each other. Or it may be more appropriate to seek to replace sector specific powers over time, as the level of competition increases. It presents a challenge for OFCOM in setting the overall balance of regulation so that it is proportionate to the market situation.

As a general principle, the aim should be to roll-back sector-specific regulation where possible, and to rely more on general competition law as markets and market segments become more competitive. But there is a balance to be struck:

- Regulations are designed to deliver public policy objectives that have been transposed by Government to the relevant regulators.
- But all regulation has a cost, and imposes a burden on those companies affected by the

regulation (both directly and indirectly).

- Hence the level and type of regulation needs to be well-targeted to delivering the relevant policy objectives, and needs to be a proportionate response to the behaviour of the market.

The BRTF report provides clear guidelines on achieving the right regulatory balance

The Better Regulation Task Force (BRTF) has given a clear steer on how this balance should be struck in its recent report on “Economic Regulators”,⁸⁶ which reiterates proportionality as one of the BRTF’s main principles for regulation.⁸⁷ Proportionality needs to apply to the type and extent of regulation imposed (or removed), as well as to the speed at which it is imposed (or removed):

- Type – has the right balance been struck between sector-specific regulation and reliance on general competition law, or between structural and behavioural

International comparison 4 – proportionality of regulation

While there is agreement that regulation should be as light touch as possible, none of the countries studied had an explicit strategy for the development of the regulatory package as a market segment moves towards competitiveness. The concept that a competitive telecoms markets segment should be regulated only through competition powers is not accepted by all: in Canada, while the regulator can forebear from sectoral regulation in certain predefined areas, all telecoms segments remain under the jurisdiction of sectoral legislation. It was generally believed that the trend over the decade would depend greatly on developments in market structure and behaviour, i.e. responding to the market rather than acting as a stimulus for change.

The Canadian National Regulatory Authority (NRA) has had particular success with the use of alternative dispute resolution methods. Two mechanisms can be used. Firstly, in a dispute between two individual companies, the issue can be bought to the NRA who will appoint a mediator from the NRA staff. Secondly, for issues of more general interest, the issue can be raised at a working group. This reliance on informal discussion has led to significant savings in time and money, and faster handling of unresolved disputes as they enter formal proceedings in a more focused and researched state.

The Australian regulatory approach has an increasing dependence on self-regulation. Requirements for self-regulation are set out in legislation, including wide consultation and consideration by the NRA before approving the codes for application.

⁸⁶ “Economic Regulators”, Better Regulation Task Force (July 2001)

⁸⁷ “Principles of Good Regulation”, Better Regulation Task Force (October 2000)



regulation, or between price controls and product availability requirements?

- Extent – in each of these categories, has the right balance been struck in terms of the degree of stringency imposed?
- Speed – are regulations being imposed or removed sufficiently rapidly to reduce transitional costs, but in a sufficiently measured fashion to allow a comprehensive review of the evidence?

The BRTF report also made five new recommendations, three of which are especially relevant to this report:

- Recommendation 1: Regulators' annual business plans should include a clear explanation of how they will prioritise their different objectives. Regulators should also explain how the decisions they take relate to their objectives.
- Recommendation 2: Economic regulators should be required to produce assessments of costs and benefits for proposals with a significant impact on business activity.
- Recommendation 5: Regulators should set out a programme in their annual work plans to review market sectors for lifting price controls and the removal of outdated licence conditions. Companies should be able to challenge failure to complete these programmes.

With the exception of the second element of Recommendation 5, the Government has agreed with these recommendations.⁸⁸ This report fully endorses that agreement in the context of OFCOM's regulation of electronic networks. The BRTF recommendations are consistent with the approach that Oftel has already been taking in its regulation of telecoms markets.⁸⁹ This approach will be further

reinforced by the EU regulatory framework, which focuses sector-specific regulation on those markets where market reviews reveal there to be SMP.⁹⁰ Although the EU approach is consistent with Oftel's current approach, it will deliver greater certainty to industry.

In parallel to the new EU framework, the Communications Bill makes OFCOM publicly accountable – on an annual basis – for ensuring that it is neither imposing burdens that are unnecessary, nor maintaining burdens that have become unnecessary (Part 1, Section 6).

However, this should not be seen as a signal for blanket deregulation, nor necessarily for a move away from sector-specific regulation towards a reliance on general competition law. There is clearly a balance to be struck, and regulation has an important role to play in certain circumstances.

A systematic approach is needed

In order to achieve this balance during a decade of transition, **this report recommends that OFCOM should adopt the following systematic approach to the assessment of its regulatory interventions:**

- **Step 1:** OFCOM needs to undertake the process of market reviews laid down in the EU regulatory framework. These reviews should gather sufficient data not only to determine whether or not there is SMP, but also to carry out a full regulatory impact assessment of any regulations that may be required.
- **Step 2:** Whether or not SMP is found, OFCOM should carry out a regulatory impact assessment, setting out a comprehensive and systematic approach to the assessment and presentation of costs and benefits.⁹¹ This should be based around the guidance published by the Regulatory Impact Unit in

⁸⁸ The Government's response is available at www.cabinet-office.gov.uk/regulation/taskforce2001/regulatorsresponse.htm

⁸⁹ See for example, "Oftel strategy statement: achieving the best deal for telecoms consumers", Oftel (January 2000). The strategy statement sets out Oftel's objective of moving towards competition, co-regulation and self-regulation – and away from regulation

⁹⁰ The main exception is where regulation is designed simply to facilitate the smooth operation of the market, for example in ensuring end-to-end connectivity. See Annex B for more information on the market review process

⁹¹ "Regulatory option appraisal guidelines: assessing the impact of policy proposals" (28 June 2002), available at www.oftel.gov.uk/publications/about_oftel/2002/roa0602.htm



the Cabinet Office,⁹² and used already by Government Departments. Key questions to ask will include:

- Are the current regulations focused on delivering OFCOM's objectives (centred on protecting the consumer and promoting competition)?
- Are the current regulations a proportionate response to the degree of SMP and to the importance of the market?

The assessments should be rigorous, transparent and forward-looking. While market reviews are likely to happen every two years, the pace of change in the industry means that it will be important to consider potential technological and market developments that are expected before the next review, and preferably over the longer term. It will also be important to incorporate flexibility wherever this is allowed by the EU framework.

- **Step 3:** In the light of its analysis, OFCOM will need to consider whether it needs to change the existing pattern of regulation. This decision will need to be taken in the light of the “big picture” – the overall balance of regulation across the sector – and the individual circumstances of specific segments.

The action taken could involve removing or adding regulations, perhaps following the broad classification set out in Box 5.5. In any event, this process should be carried out as quickly as possible, so as not to add onerous burdens on the industry. Being rigorous and evidence based, this approach should actually lead to faster and more proactive regulatory decision making.

5.7 Challenges for Government

5.7.1 Spectrum Management

The next decade will see many challenges arising in spectrum management

The development of new wireless technologies will require a clear strategy for the valuation, use and prioritisation of the radio spectrum. The spectrum is a valuable, finite but non-exhaustible resource, with increasingly complex allocation issues.

In 2000 the DTI and HM Treasury commissioned an independent study from Professor Martin Cave of Warwick Business School, intended to advise on the principles

Box 5.5: A broad classification of regulation available to OFCOM

<p><u>Sector-Specific</u></p> <ul style="list-style-type: none"> ● Retail price controls (RPI-X) or rate of return regulation. ● Wholesale price controls (RPI-X) & service level agreements ● Wholesale price controls (cost plus) & service level agreements ● Requirements to allow interconnection ● Co-regulation with industry ● Alternative dispute resolution (ADR) ● Self-regulation by industry 		<p>Increased likelihood of competition</p>
<p><u>Competition Law</u></p> <ul style="list-style-type: none"> ● Investigation under the Competition Act 1998 ● Referrals to the Competition Commission 		

⁹² “Guide to Regulatory Impact Assessment”, August 2000, available at www.cabinet-office.gov.uk/regulation/2000/riaguide/default.htm



that should govern spectrum management, and to examine what more needs to be done to ensure that all users, including non-commercial users, are focused on using their spectrum in the most efficient way possible. The outcome was the Review of Radio Spectrum Management (the “Cave Review”), published in early 2002.

The Cave Review recommends that the main spectrum management objectives should be:

- Economic efficiency (is spectrum being allocated to those who will make most productive use of it?);
- Technical efficiency (is the spectrum being used as intensively as possible, while adhering to technical interference limits?); and
- Public policy (is the right spectrum being made available for services essential to the public interest?).

It recommends that the wider application of market mechanisms and price signals across the public and private sectors would help to manage the balance between these objectives, driving more productive use of the spectrum overall. At the heart of the recommended framework for spectrum management is the accepted need to generate incentives for efficient spectrum use. The Cave Review recommends that this be achieved by exposing users to the value of their spectrum, using market-set price signals that reflect the opportunity cost of its use.

The proposed framework would build on spectrum management policies already in train, such as the wider use of auctions and the implementation of spectrum trading. The presumption in the review is that these market mechanisms could be regulated largely by reliance on general competition law. Where spectrum needs to be reserved for public policy reasons, and would thus not be allocated by a market mechanism, the review recommends

that prices should be set using market information to provide consistency with the incentives facing private sector users, and to promote efficient public sector use.

The Cave Review recommends that OFCOM should have a distinct objective to maximise the value of benefits derived by UK society from spectrum use. It also recommends a clear dividing line between OFCOM and Ministerial responsibilities, with the Ministerial role focused only on public policy goals. And it recommends that OFCOM should licence spectrum access, but not apparatus.

OFCOM will play a key role in responding to the challenges of spectrum management

A consultation document on the future of spectrum trading was published on 15 July 2002, and the Government’s response to the Cave Review was published on 15 October 2002.⁹³ This report fully endorses the Government’s response, and its proposals in the consultation document. In the light of the response and the consultation document, **this report recommends that OFCOM should work with DTI and HM Treasury to resolve the issues outstanding in the Government’s response.**

5.7.2 Wider coverage of broadband

The key issue is whether to use Government intervention to achieve universal service

Broadband access is currently available to 66% of the population through fixed connections (xDSL or cable) or fixed wireless options, and to the remainder of the population through satellite, although that has drawbacks as discussed in Chapter 4. Coverage is likely to rise, in particular as cheaper equipment makes it viable for BT to enable more exchanges with DSL. Coverage will also be impacted by the affordability of wireless technologies, which could play an important role in extending coverage to remote regions.

⁹³ Available at www.spectrumreview.radio.gov.uk

Given the potential dangers of a broadband digital divide outlined earlier, this raises the question of how to assess the costs and benefits of universal coverage of broadband, and whether to use Government intervention to achieve it. This could involve the use of non-regulatory measures, such as fiscal policy and Government procurement, or regulatory measures, such as imposing a USO.

It will be important for Government to remove any unnecessary regulatory barriers to new investment or new business models. For example, the Communications Bill will allow OFCOM to grant providers of civil infrastructure (e.g. ducts and poles) the same powers as operators. This deregulatory step should encourage sharing of infrastructure, and since over 60% of investment in new networks is basic civil engineering works, this should lower the hurdles for investment in new networks.

There are non-regulatory options for achieving wider coverage

There are two particular non-regulatory initiatives that are currently underway to try to widen coverage of broadband:

- The first of these is the work that DTI, OeE and the Office of Government Commerce (OGC) are carrying out to understand how public sector broadband demand and procurement can be used to encourage broadband providers to upgrade infrastructure in areas not currently served.
- The second non-regulatory initiative is the allocation by DTI of £30m to Regional Development Agencies (RDAs) and Devolved Administrations to assist them in rolling-out broadband, and the new network of dedicated regional broadband advisors, as discussed in Chapter 2.

In addition, central Government, RDAs and Devolved Administrations have a series of initiatives to stimulate demand and supply of broadband.⁹⁴ But although such measures are likely to be effective at achieving wider broadband coverage, they are unlikely to drive universal coverage.

The main regulatory option is the Universal Service Obligation

One possible regulatory approach to wider broadband coverage is action to encourage the roll-out of new technologies. But this is again unlikely to achieve universal coverage as the economics of delivering broadband to certain areas or market segments may still remain unattractive. Nonetheless, it is important that regulation fosters an environment in which alternative technologies can develop.

The main regulatory approach that has been used to deliver universal service in fixed-wire voice telephony is the USO imposed on BT.⁹⁵ The economic rationale for imposing a USO in any market is to ensure that no segments of society are excluded from access to goods/services which are believed to be “essential”. However, the definition of “essential” is open to debate.

Until now, BT (along with Kingston) has been able to shoulder the full responsibility for delivering the USO for voice telephony in the UK. But if the scope of the USO increases, and BT’s market share falls in the face of competition, this may become untenable. At such a time, the regulator may need to consider regulatory mechanisms that ensure a fair allocation of financial responsibility for delivering the USO across all relevant industry players.

The new EU Universal Services Directive extends the scope of the USO to include “functional internet access”. The exact scope of this will need to be determined by the regulator, in

⁹⁴ Both of these initiatives, as well as other non-regulatory approaches, are covered in more detail in the “Working paper on non-regulatory levers” available on the Strategy Unit website

⁹⁵ And on Kingston Communications in the Hull area



consultation with the industry and other stakeholders. The Universal Services Directive also allows Member States to extend the USO to other services such as broadband, but does not allow Governments to require industry to fund these extensions. However, it is likely in any event that a USO for broadband would require a Ministerial decision as part of the Government's wider public policy objectives, and the Directive means it would need to be funded by Government.

In practice, direct Government funding would not be desirable or feasible without compelling evidence

There may be merits in funding support for broadband roll-out in specific areas, as with the regional support described earlier in this section. But in general, public funding for universal coverage is unlikely to be a feasible or desirable option in the UK without compelling evidence of its benefits.

Given the lack of hard economic data to support such funding (as discussed in Chapter 3), the rest of this section analyses the extent to which mandating universal broadband coverage might be justified on social grounds. It considers the impact that broadband is likely to have on different groups of users, including consumers, schools, teleworkers and small businesses.

The potential impacts of broadband are variable in nature

The potential impacts of broadband are variable in nature, but generally do not seem to warrant universal broadband coverage at the current time. Even for media-rich Government services such as NHS Direct, Culture Online and Curriculum Online, universal coverage would only be warranted if it was felt that broadband access to these services was essential, and that even narrowband access would not be a sufficient substitute. This conclusion is based on the following analysis of usage:

- *News and entertainment.* The economic impact of consumers accessing these services via broadband rather than narrowband or other sources is likely to be minimal (except to the extent that greater consumption might benefit domestic content industries), since much of this consumption is carried out during an individual's leisure time.
- *NHS Direct broadband services.* If some segments of society do not have access to these services, they could be excluded from the convenience of medical attention from their homes. However, they would still have access to the same medical facilities that are currently on offer, so lack of access to broadband services should not lead to lack of access to appropriate healthcare.

International comparison 5 – wider coverage of broadband

None of the countries studied have extended their Universal Service Obligation to include broadband. In all the countries, the philosophy is that the market should provide coverage of broadband where it is competitive. There is a wide range both of targets for broadband roll-out, and of non-regulatory levers deployed in support of these targets in areas where roll-out is currently not economically viable (e.g. public sector funding and tax relief). Sweden has made a commitment to provide universal access through a mixture of non-regulatory measures, although a target completion date has not been set. NTT in Japan is rolling out fibre to the home, but this approach seems to have been driven by Government priorities rather than a high level of market demand. National approaches for widening coverage of broadband are considered in detail in the recent Booz Allen Hamilton study commissioned by the OeE.

- *Curriculum Online.*⁹⁶ Over time, lack of high speed access at home could prevent some children from gaining the full benefits of Curriculum Online. However, this could be mitigated if schools have broadband access available in after-school clubs. It will also be important to ensure that narrowband versions of content are also available which allow access to key information.
- *Schools.* The main use for high-speed access by schools will be to access Curriculum Online and other such content. If certain schools do not have high-speed access, this could penalise children in certain areas, especially since recent research by Ofsted states that “improvements in teaching and learning with ICT are evident in those schools that have been connected to broadband services”.⁹⁷ However, tackling this particular issue does not necessarily require a USO, but instead requires a targeted set of actions to ensure that all schools have high-speed access, which could be through many different technologies including leased lines or satellite, as announced by the Prime Minister in November 2002.⁹⁸
- *Teleworking.* The value of teleworking in the economy could potentially be high because of the costs of travel and limitations in mobility caused by disparities in the cost of living. However, these benefits need to be set against the potential costs which may arise from altered requirements for travel and energy.⁹⁹ In addition, face-to-face contact will remain necessary in many circumstances, limiting the extent to which teleworking is desirable. To the extent that the geographical divide in broadband coverage prevents employees from effective teleworking, it may also adversely affect the development of certain regions.

- *Small businesses* are expected to use broadband for several functions, including finance, cross-firm collaboration and training. Businesses outside broadband coverage areas (in particular rural businesses) may therefore be disadvantaged. However, more evidence is required before assessing whether the magnitude of this effect justifies a universal service obligation.

On balance, the benefits do not presently justify the costs of universal coverage

In conclusion, this report recommends that the lack of evidence about the productivity benefits of broadband, and the lack of “essential” broadband services do not presently justify the costs of universal coverage of broadband.

Where there are social arguments in favour of general access to broadband, there are alternative ways for individuals to get that access through community, school and public service providers.

There would also be significant technical limitations with imposing universal coverage at present, since no single operator would be in a position to operate it in a satisfactory fashion. The cable companies do not have the national coverage required; and BT, which does have a ubiquitous copper network, cannot with current technology offer ADSL to homes more than 5km from local exchanges. Hence a hybrid solution would be required, combining different technologies in different regions (including wired and wireless/satellite).

However, **this report also recommends that as the market develops, this conclusion should be reviewed.** In reviewing the conclusion, Government bodies charged with increasing broadband coverage should also consider the selective deployment

⁹⁶ A DfES initiative aimed at promoting choice for schools of digital educational resources through the provision of a portal showcasing available resources and through the provision of “electronic learning credits” – ring fenced funds given directly to schools to be spent on digital curricular resources

⁹⁷ Available at www.ofsted.gov.uk/publications/docs19.pdf

⁹⁸ Prime Minister's speech at the e-Summit, 19 November 2002

⁹⁹ For example, it may turn out that it is less cost-effective to heat and power many individual homes than it is to heat and power one office building



of new technologies to achieve coverage amongst the groups where its economic and social impact is likely to be most substantial, such as schools and small businesses.

In the absence of action to deliver universal coverage, **this report recommends that the key objectives of current regulation should be twofold:**

- To ensure effective competition in the broadband market, and hence that broadband is provided at competitive prices to those within coverage areas; and
- To ensure that regulation takes place in a way that encourages innovation in technologies that may viably provide broadband in less densely populated areas, such as satellite, fixed wireless and 3G mobile.

6 SUMMARY AND IMPLEMENTATION

Summary

This report is presented to the Government as a contribution to the debate. However, the majority of the recommendations will be for OFCOM to take forward when it assumes its powers, and to report on in its annual report. DTI will also be responsible for taking forward some of the recommendations directly, and the Minister of State for e-Commerce and Competitiveness will report to the Ministerial Sub-Committee on Economic Affairs, Productivity and Competitiveness.

DTI will need to work closely with other Government Departments, the Devolved Administrations and regional bodies. Reviews should be held on an annual basis, but there may be a case for a full review in 2005 or 2006, to coincide with the anticipated review of the EU regulatory framework.

DTI will also be responsible for collating and publishing any responses to the report, which should be submitted to ElectronicNetworks@cabinet-office.x.gsi.gov.uk by 28 February 2003.

Both OFCOM and Government will have a role to play in implementation

This report is presented to the Government not as a statement of policy, but as a contribution to the debate. The full set of recommendations arising from the report is set out in Figure 6.1 at the end of this chapter. Given the remit of the report, the recommendations relate predominantly to the new communications regulator, OFCOM. The primary intention of this report is to support the new OFCOM Board in its strategic thinking on the regulation of electronic networks during the next decade. It is expected that OFCOM will want to build on this report in developing its strategy, and that it will include within its annual report a section on long-term strategic issues.

However, there is also a role for Government. DTI will need to be closely involved in the report's implementation. It should have overall responsibility for taking forward the recommendations of this report, and should work closely with OFCOM on matters relevant to OFCOM's responsibilities. It will need to take the lead in all of the recommendations relating to the Communications Bill and to the ongoing development of the EU regulatory framework. DTI will also be responsible for collating and publishing any responses to the report, which should be submitted to ElectronicNetworks@cabinet-office.x.gsi.gov.uk by 28 February 2003.

More specifically, Government has agreed that Ministerial responsibility for implementation will



More specifically, Government has agreed that Ministerial responsibility for implementation will rest with the Minister of State for e-Commerce and Competitiveness, who will report to the Ministerial Sub-Committee on Economic Affairs, Productivity and Competitiveness.

DTI will need to work closely with other central Government Departments and Devolved Administrations that have an interest in the development of the UK's electronic networks, most notably DCMS and HM Treasury. Several parts of Cabinet Office will need to be involved, including the OeE and the Regulatory Impact Unit.

The Devolved Administrations and the regions will need to be kept closely involved

Chapters 2 and 3 of this report have established the potential importance of electronic networks with regard to economic and social progress, and the Government's wider public policy objectives. These issues will be important for the UK as a whole, but also for the Devolved Administrations and the English regions. Some challenges are particularly acute in specific areas, such as the relatively low levels of "mass market" broadband coverage in Scotland, Northern Ireland and Wales. This will make it important that OFCOM takes the Devolved Administrations and regional effects into account in its strategic thinking. And it will mean that the UK Government should liaise with the Devolved Administrations and appropriate regional authorities in analysing the policy issues.

One specific issue that will require attention is the fact that reserved policy on electronic networks will undoubtedly impact on devolved policy areas such as economic development. It is beyond the remit of this report to comment on this in any detail, but it does reinforce the importance of involving the Devolved Administrations in the policy-making process for electronic networks.

The recommendations will need to evolve over the next decade

As noted above, it is anticipated that OFCOM will address its strategic approach to regulation of electronic networks in its annual report. Ministerial scrutiny through the Ministerial Sub-Committee on Economic Affairs, Productivity and Competitiveness will be applied with a similar frequency. But beyond this, there is no specific timetable for the recommendations made in the report. This is because they relate to the approach that the regulator should adopt as it faces up to the challenges of the next decade – they are not tied to specific events. However, one definite milestone will be the European Commission's review of the scope of universal service in 2005, and the full review of the EU regulatory framework expected in 2006. As a result, OFCOM and Government may want to consider the possibility of undertaking a full strategic review in 2005 or 2006.

Figure 6.1: Summary of recommendations made in the report

Section	Recommendation	Comment
2.3.2	In the context of OFCOM the BRTF conclusions should be taken fully into account, and a clear distinction should be maintained between the roles of Government and the regulator.	This recommendation relates specifically to the BRTF recommendations on clarity of objectives for economic regulators. This will require appropriate wording in the Communications Bill, and OFCOM should be expected to comment on its implementation of the BRTF recommendations in its annual report.
3.2	OFCOM should liaise with appropriate elements of Government, and should provide factual and objective information on the diffusion and usage of electronic networks that Government can use at its own discretion in the development of policy.	The focus of this information will be OFCOM's view of the barriers and enablers to effective use of electronic networks. Both the UK Government and the Devolved Administrations will need to be involved.
5.3	OFCOM should continue to favour a macro-level approach to regulation.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report.
5.4	OFCOM should develop a significant strategic capability at its centre, capable of assessing the underlying economics of infrastructure and service competition across the full range of markets for which it is responsible.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report.
5.4	OFCOM's overall stance on the type of competition should be as neutral as possible, favouring neither infrastructure nor service competition, but seeking to remove barriers to both.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report
5.5.1	OFCOM should encourage innovation by encouraging competition between service providers, clear market signals and non-exclusive co-ordination between companies.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report.
5.5.1	Given the importance of innovation in electronic networks, OFCOM should continue Oftel's principle of always encouraging innovation when making marginal decisions.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report.



5.5.1	OFCOM's "strategic capacity" should be involved in anticipating the types of innovation that are likely to arise, and briefing the OFCOM Board accordingly.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report.
5.5.1	If OFCOM decides that it is appropriate to regulate prices as a market matures, the price regulation should explicitly take into account the investment made by the innovating company to bring the new product to market.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report.
5.5.2	OFCOM should also continue the strategic role that Ofcom has played in working with the DTI, the Civil Contingencies Secretariat (CCS), the National Infrastructure Security Co-ordination Centre (NISCC) and the industry, to ensure that appropriate measures are being taken to ensure the resilience of networks to disruptive shocks.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report.
5.5.2	OFCOM and DTI should continue to monitor the state of the telecoms sector closely, and should develop contingency plans on a case by case basis to mitigate the consequences of business failures if they appear likely.	This will be for DTI Ministers to keep under review.
5.6	OFCOM should adopt a systematic approach to the assessment of its regulatory interventions.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report.
5.7.1	OFCOM should work with DTI and HM Treasury to resolve the issues outstanding in the Government's response to the Cave Review.	OFCOM should be expected to comment on its role in implementing this recommendation in its annual report.
5.7.2	The lack of evidence about the productivity benefits of broadband and the lack of "essential" broadband services do not presently justify the cost of universal coverage of broadband.	This will be for DTI Ministers to keep under review.



5.7.2	As the market develops, the conclusion on universal coverage of broadband should be reviewed.	This will be for DTI Ministers to keep under review.
5.7.2	The key objectives of current regulation in the context of broadband coverage should be to ensure competition and to encourage innovation.	OFCOM should be expected to comment on its implementation of this recommendation in its annual report.