



Commission for
Communications Regulation

Consultation Paper

Forward-looking Strategic Review of the Irish Telecoms Sector

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Foreword

We are currently entering a period of significant change in the telecoms sector; new technologies are emerging at an increasingly rapid pace that are likely to change the shape of the industry in the most fundamental ways.

Key trends in IP¹ and the emergence of Next Generation Networks are changing how services are delivered to consumers and how operators interact with one another. ComReg believes that economic, commercial and social conditions are emerging that indicate strong growth in broadband access. New mobile and convergent wireless or 'nomadic' services are developing that can bring together several once separate sections of the industry. Other forms of convergence between different technologies, services, devices, companies, markets and regulations are likely over the period under consideration. Some of these developments will occur under natural market conditions, requiring no additional action to be taken by ComReg (or indeed allowing existing measures to be withdrawn), while in other cases the market may benefit from new regulatory products or measures. In other cases again, consideration may need to be given to a more radical approach if competition is to provide the range, price and quality of services needed by businesses and citizens alike in a 21st Century economy like Ireland's.

All of these potential developments, together or separately, could have significant economic and social impacts in Ireland. This consultation considers potential future developments in the telecoms sector in Ireland over the next 5 years. Its purpose is to help encourage dialogue with industry and telecoms users in Ireland so that we can work together to find the best way forward. This consultation starts the process of developing a strategy, as part of our forthcoming strategy statement, due during the summer of 2005, which we are required to publish under the Communications Regulation Act, 2002. The consultation should be read as a complement to the spectrum management strategy consultation issued in January 2005². This consultation also considers some of the possibilities for the important social role that telecommunications plays and how this too is changing. This is dealt with under a section on universal service obligations which should be read in conjunction with the recent consultation on USO issues³.

It is important for a regulator to consider the possibilities that may emerge in the future to help avoid potential pit-falls. Giving due consideration and preparation to future developments enables us to provide a degree of clarity and certainty to the market with the aim of encouraging investment and innovation.

This consultation document is presented in two parts. The first part looks at the issues involved in establishing a Regulatory Strategy for the telecommunications

¹ Internet Protocol. The technology behind the Internet and common component of the majority of future telecoms systems.

² ComReg Doc. 05/01

³ 'Universal Service Requirements' - ComReg Doc. 05/17

sector between 2005-2010. The second part focuses on a forward-looking analysis of key emerging trends.

We would like to encourage readers to participate in the debate concerning these important developments to help us form a clearer vision of the future and how best to forge ahead with our strategy. Any comments are welcome and will be used to feed into our strategy statement.

Isolde Goggin
Chairperson, Commission for Communications Regulation

Responding to this consultation

ComReg would welcome any comments on this consultation and a number of general questions have been posed throughout to assist respondents in this. These responses will be considered when drafting the Strategy Statement due for publication in the Summer 2005. A dedicated published response to this consultation is not planned. ComReg encourages respondents to submit examples and data where relevant to help illustrate any comments. Please see Annex 2 for further details on responding to this consultation, and in relation to confidentiality and other issues.

PART ONE

Establishing a Regulatory Strategy for the Telecommunications Sector 2005-2010

1 Introduction

As a famous Nobelist once remarked “ Prediction is very difficult, especially if it’s about the future”⁴ This can be particularly true in trying to define the future of an industry as dynamic as telecommunications, where any such predictions are unlikely to be either easy or durable. Equally it is not the role of the regulator to try to second guess what the developments in the market will be. That said however, the decisions and choices that regulators make can often play an important role in influencing the direction a sector will take and their decisions can have both intended and unintended consequences. Ensuring that regulatory interventions, if any, should be as informed as possible is the backdrop to undertaking this strategic review and all inputs will be carefully considered in this context.

In a small open economy such as Ireland’s, a vibrant, modern and competitive telecommunications industry is both a major contributor in its own right as well as being a vital building block in achieving our national ambitions. The continued success of the economy and the prosperity in particular of many of the over 8,500 companies operating here requires that they are able to avail of modern, diverse and competitive telecommunications services and products which are on a par with, or better than, those available in other key competitor locations. This is increasingly important in sectors such as International Traded Services, Financial Services, Software and ICT which can often deliver their respective products or services over a telecommunications network. These types of industries in particular require high quality service provisioning which combines fixed/mobile converged offerings, access/retrieval of content and data and which can facilitate a range of software interfaces.

As well as its economic impact the communications sector and its development also touches almost every aspect of our daily lives. Communicating with friends, making bookings for the cinema or theatre, buying goods or services, healthcare management, the ability to work from home, monitoring of both the young and old, listening to music, watching films, TV or video clips are today increasingly enabled by telecommunications networks, both fixed and mobile.

In many cases the changes and impacts on our lives both socially and corporately have been evolutionary, in others cases, such as the introduction of the World-Wide-Web, the increasing deployment of Broadband or the emergence of 3G, the changes have been both more rapid and more profound.

The importance of telecommunications to the economy, and ensuring that we maintain the level of investment in both networks and services to support it, is now entering a critical new phase in terms of both the fixed and mobile sectors. The increasing importance both technically and economically of the move to packet switched/IP based services and networks will revolutionise the sector and fundamentally change the context within which regulation will apply. The historic focus, for instance, on ensuring competitive access through defining

⁴ Niels Bohr, Awarded the Nobel Prize for physics, 1922.

interconnection rates will potentially no longer be relevant. Traditional calls to friends or customers may increasingly be made over broadband, changing the historical pricing paradigm and revenue flows which have basically sustained the telecommunications sector since its inception in 1876. These developments may have significant implications for regulators going forward, as historically one of the key metrics used in determining ‘successful’ regulation were low prices. However, this alone may not be the most appropriate approach for enabling investment in significant network upgrades, Next Generation Networks (NGNs) or for the development of a sustainable competition model.

In undertaking this review consideration needs to be given to;

- What the strategic objectives and goals of regulation have been to date
- Have these been achieved in terms of the economy, business and consumers?
- What our future objectives should be in a changing world and what steps if any will be necessary to achieve them?
- Given the future goals and objectives, what should the future role/approach of regulators be?

This document seeks to outline the position and context of the above issues. It also gives a ComReg perspective on what progress has been made, the challenges ahead and raises a range of questions both on any observations made and what alternative approaches might be considered.

Apart from the regulatory context which is set out extensively in Section 2, it is also important to recognise the sector as one that is critical to and closely tied with the wider Irish economy.

What progress there has been since liberalisation in terms of the economy generally and for end-users of telecommunication services?

The period since liberalisation has coincided with one the strongest periods of continuous growth for the Irish Economy. Overall growth levels have averaged in excess of 7%, the highest in the EU and one of the highest in the developed world. Specific developments during the period have included;-

a. Overall Growth in the economy

In terms of overall growth since 1996, GDP has more than tripled from c. €58bn to almost €147bn by 2004 (see figure 1.1) Overall employment has grown by almost 500,000 with unemployment levels falling since 1997 from over 10% to 4.4%, today, a level considered by many to be effectively full employment.

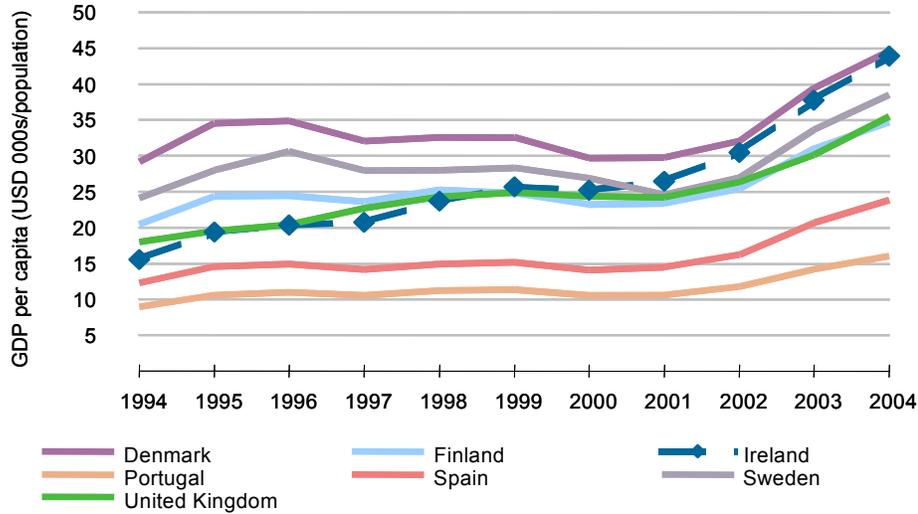


Figure 1.1 GDP per capita

Unemployment, which had decimated communities in the past, has been reduced by the influx of almost 150,000 new migrants coming to Ireland and contributing to the continued growth of the economy

Incomes in Ireland since 1997 have grown by almost 30%. Disposable incomes have grown even more rapidly (see Figure 1.2) due in particular to changes to fiscal policies. The average tax wedge fall to about 25% of earnings, among the lowest levels in the OECD⁵.

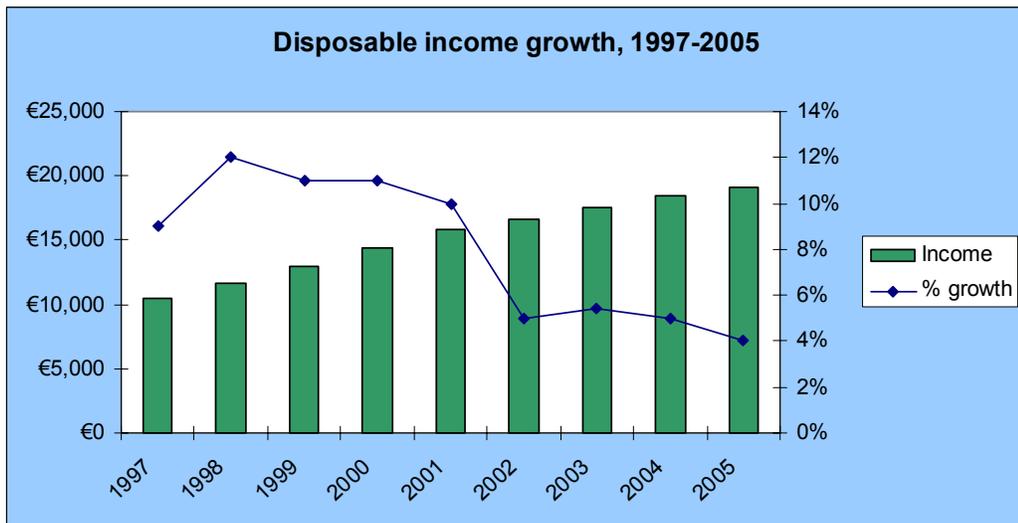


Figure 1.2 Disposable Income growth

⁵ Tax wedge equals income tax plus employee and employer social security contributions less cash benefits as a percentage of labour costs (Source: OECD)

Since joining the Euro, Ireland has also enjoyed a period of consistently low interest rates. The combination of higher disposal incomes, low interest rates, high employment levels and our demographics have underpinned continued growth in consumer expenditure. Overall new house buildings completions since 1997 have for instance exceeded 350,000.

A combination of these factors and a desire for increased convenience and mobility have also acted as a spur for the communications sector. Since liberalisation for instance, despite an over 20% fall in telecommunications prices, overall per capita spend has almost doubled from €547 to €964. This growth reflects in particular significant growth in the use of the mobile phones.

During this period when GDP grew by almost 300%, the revenues of the telecommunications sector as a percentage of GDP fell slightly from 3.62% to 3.29%. However, as can be seen in figure 1.1 per capita GDP in Ireland is among the highest in the EU.

A number of key factors are recognised as having contributed to recent Irish economic growth⁶. These include

- a relatively youthful population and rapidly expanding labour supply
- substantial inward investment
- the strategic deployment of EU Structural and Cohesion Funds
- pursuit of pragmatic and innovative government policies
- a Social Partnership approach to economic development
- an openness to international trade in goods and services, and its openness to new ideas
- an emphasis on education and technological innovation.

Recent growth in the Irish population relative to peer countries (see Figure 1.3 below) indicates a potential for continued growth in telecoms services market. A high level, and growth, of GDP per capita could indicate a potential for Irish consumers to spend more on telecoms services (see Figure 1.5). According to recent forecasts growth in Irish GDP is expected to be 4.2%⁷ this year with continued growth in the medium term⁸. Figure 1.5 summarises these points in comparison to a number of peer countries. Ireland's relatively sparse population density can create challenges for some operators delivering services (see Figure

⁶ Source: 'Ireland – Economic Profile' - http://www.enterprise-ireland.com/NR/rdonlyres/2F0ED6B1-07C9-43E6-8406-C29AD4B52C3C/0/EconomicProfileSept04_new.pdf

⁷ Dept. of Finance, Economic Outlook and Review, August 04, (<http://www.finance.gov.ie/documents/publications/other/ero04.pdf>).

⁸ According to NCB Stockbrokers 'The Irish economy looks set to enjoy growth in the region of 5/6% into the medium term as demographic influences remain very favourable.' (Investment outlook & stock selection, Jan. 05).

1.4). The relatively small size of the market here in comparison to other markets needs also to be considered.

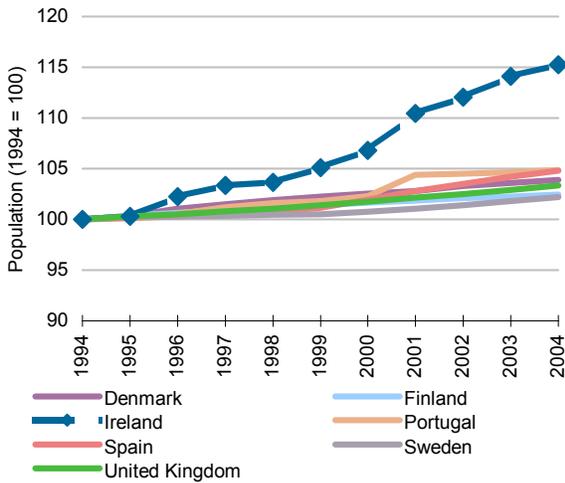


Figure 1.3 – Population growth in Ireland (rebased to 1994 level) [Source: Analysys, EIU]

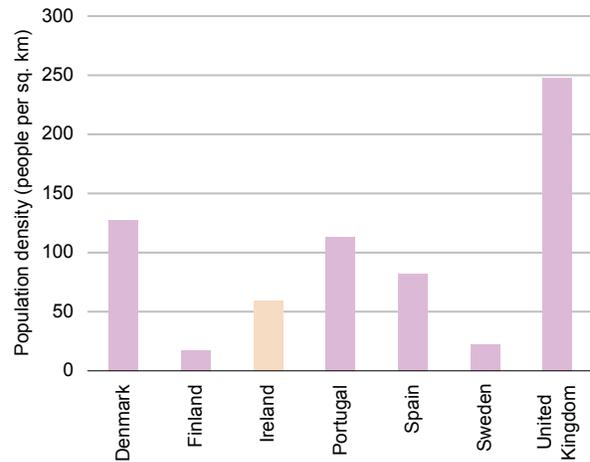


Figure 1.4 - Population density (population estimated for 2004) [Source: Analysys, EIU, CIA World Fact book]

The table below summarises Ireland’s positive position concerning factors that are likely to lead to maximum telecoms service growth. Perhaps the only area of concern is Ireland’s low population density which can prove difficult in terms of broadband rollout. Wireless communications could potentially fulfil a larger role in Ireland to compensate for this difficulty.

	<i>GDP per capita</i>	<i>Average population age</i>	<i>Unemployment</i>	<i>Population density</i>
Denmark	High	Medium	Medium	Medium
Finland	Medium	High	High	Low
Ireland	High	Low	Low	Medium
Portugal	Low	Low	Medium	Medium
Spain	Low	Low	High	Medium
Sweden	High	Medium	Low	Low
United Kingdom	Medium	Medium	Low	High

Figure 1.5 - Country comparison [Source: Analysys]

b. Employment in the sector

Employment in this important sector has since 1996 grown by 25% from 12,000 to 15,000. This however reflects a growth of around 4,000 in the wireless and mobile sector and a net reduction of around 1,000 in the traditional fixed line

business. Overall levels of reduction were actually higher but these have been offset by additions in some of the newer areas of activity such as customer support, marketing and broadband provisioning.

c. Contribution to the economy

In terms of direct contribution the revenues of the sector have more than doubled from €2bn in 1996 to over €4bn in 2004. These figures are again largely driven by growth in the mobile sector of almost €700m. Revenues in the fixed line markets for the same period fell by almost €100m (see Figure 1.6, below).

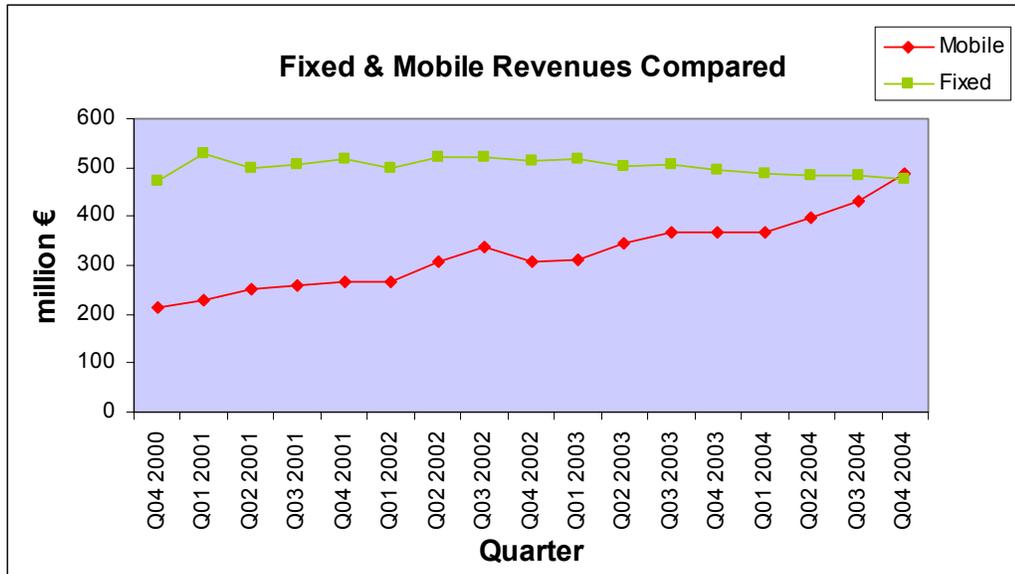


Figure 1.6 Fixed and Mobile Revenues

In terms of its overall impact in the economy this is more difficult to quantify as the CSO combines it with the overall communications bracket. Assessment of the impact that communications can have varies from sector to sector and frequently combines with other elements such as use of PCs or ERP etc to produce overall efficiencies. However the OECD has established that in overall terms the communications sector itself was the largest contributor to labour productivity and was a key strategic asset in a number of OECD countries. Communications has also enabled radical changes in areas for instance such as Customer Relationship Management (CRM) which in turn have lead to more sales or efficiency gains. Research by the OECD indicates that the ICT sector contributes significantly to maintaining sustained economic growth. This contribution can on average range from 0.3% to 0.8% per annum which in the context of overall growth levels of the countries of the European Union can be significant. However for Ireland the impact was even higher with an annual contribution to GDP growth estimated at around 1%. Of the 23 countries surveyed only Finland and Korea had similar levels. Analysis also demonstrates that companies increase their efficiency by deploying ICT, which in turn leads to increased economic growth. In the period from 1996 to 2001 US companies for instance obtained a 1.4% average growth from the use of ICT.

This research also indicates that sectors such as Financial Services, Internationally Traded Services and Software, which have and will continue to play key roles in the growth of the Irish economy, have benefited most significantly from productivity gains enabled by the development of the communications sector.

Brief overview of the current state of the telecoms sector in Ireland

To help prepare this document, Analysys-Mason Consulting carried out an analysis of previous trends and key events in the Irish telecommunications market going back over the past 10 years (detailed time-lines highlighting milestones can be found in Annex 1). This analysis is used to help identify trends and traits that may be specific to the Irish market, which can help inform ComReg's thinking when looking to the future. As part of this study Ireland was compared with a number of European peer countries⁹. Key elements of the analysis are highlighted below and throughout this document.

Recent trends in the Irish market are likely to have a bearing on future developments. Some key trends likely to continue in the near term are outlined below:

- Fixed line penetration has levelled off at about 79% of Irish households¹⁰. This is a common trend in other European countries and appears to be influenced by a range of factors including mobile/fixed substitution. 3G, existing mobile, and VoIP, are also likely to continue to gain voice market share from fixed voice. These issues are considered in section 7 – *The Evolution of Voice Markets*.
- Although growth in mobile users has now levelled off (see Figure 1.7) there is the potential for further growth based on Ireland's relative level of GDP per capita, particularly if mobile prices were to fall, and separately, with takeup of 3G services and applications.
- Broadband penetration is accelerating, and following similar trends in other peer countries (see Figure 1.8) despite a lag of up to two years. Broadband penetration is however likely to be partially limited by PC penetration which is currently at approximately 47% of households (see Figure 1.9). Recent initiatives in alternative wireless broadband access (FWA) could potentially positively affect competition in broadband. Issues related to broadband access and user adoption are considered in sections 8 and 9 on *The Migration to Next Generation Networks and User Access and Content Delivery*.
- Recent increases in service based competition via regulatory products such as CPS and WLR have occurred in line with limited infrastructure-based competition. Continued growth in service based competition is in turn

⁹ Denmark, Finland, Portugal, Spain, Sweden, and the United Kingdom.

¹⁰ See ComReg Trends Report Q4 2004 - http://www.comreg.ie/_fileupload/publications/ComReg04121c.pdf

expected to lead to increases in infrastructure-based competition as the scale of the activities grow and as consumers seek more complex and differentiated products and services. This will continue to affect eircom's voice revenues. Wholesale products are now reaching a point where alternative operators (e.g. Smart Telecom), can bundle traditional voice, access and broadband products into a single retail offering which might significantly affect competition in Irish markets and stimulate broadband adoption.

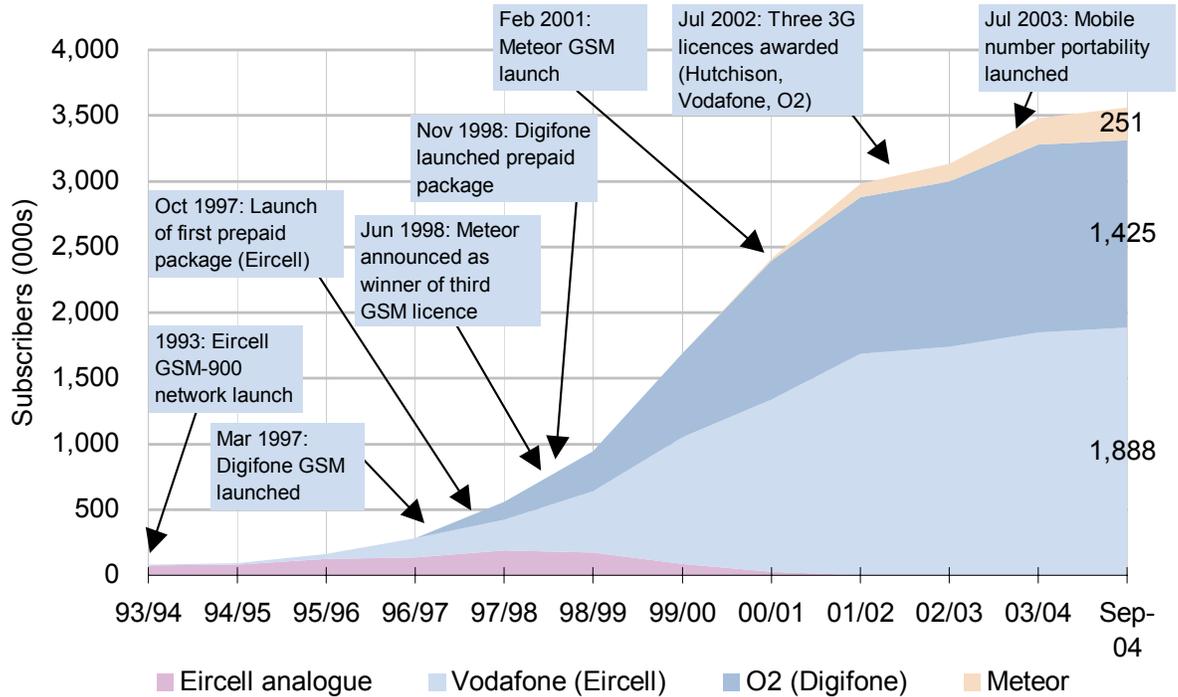


Figure 1.7 – Growth of mobile subscribers [Source: Analysys & company reports]

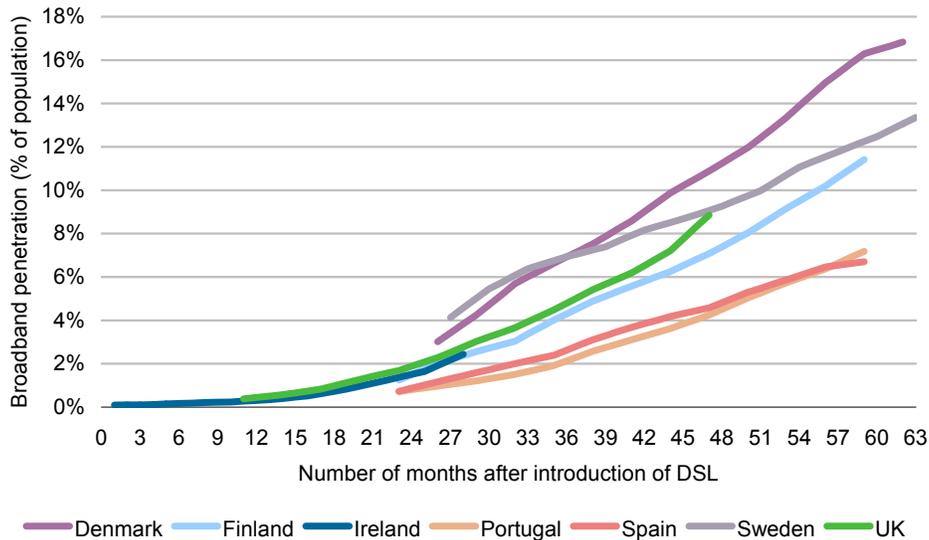


Figure 1.8 – Broadband penetration since the launch of DSL [Source: Analysys]

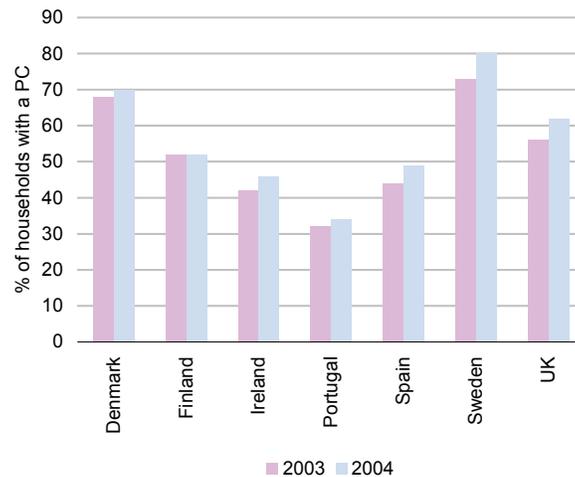


Figure 1.9 – Number of PCs per household [Source: Analysys, CSO, INRA]

Q. 1. Do you agree with ComReg’s overview of the current state of telecoms in Ireland? What other factors could ComReg consider in assessing the current state of telecoms in Ireland?

Identifying and understanding the impact that a range of new and emerging technologies, networks, products and services will bring is key to defining what if any the regulatory response should be. Examples of the types of different developments considered are set out below.

There is a range of issues and developments which may impact on the appropriate regulatory approach in the period to 2010. These include structural issues in the market, lack of infrastructural competition, the role of eircom as a wholesale provider, fixed/mobile service providers, etc. These issues are discussed in more detail in Section 3. There are also a range of technical, product and application developments that are likely to take place which may also require addressing in terms of formulating the appropriate regulatory approach going forward. These would include:

1. Ubiquitous Broadband and new broadband based applications

The provision of a competitively priced broadband service to all businesses and the vast majority of the population, which is capable of supporting a range of new applications is a key ingredient to ensuring Ireland’s continued competitiveness. It also contributes to ensuring that we remain an attractive location for new

investment from both domestic and overseas sources. Growth in the use of bandwidth intensive applications by businesses and consumers is increasingly putting pressure on existing infrastructure and will act as the catalyst for the deployment of Next Generation Networks. The eEurope Expert Advisory Group in a recent review of progress against the Lisbon Agenda recommended that, to support both current and emerging applications, a minimum bit rate of 2Mbps be in place by 2008.

- Among the types of applications for which consumers are increasingly likely to use broadband are always-on services such as Video-on-Demand (VOD), teleworking, ehealthcare, monitoring and provisioning of services, life-long educational programming, Television over Broadband, as well as Voice over Internet Protocol (VoIP) services.
- For Business users, the applications are likely to include the delivery of integrated and enhanced eservices such as procurement, CRM, design, marketing, managing outsourced activities, managing multi-site communications, VPNs, logistics, supply chain management etc.

These services are generally delivered today through a range of different platforms including Digital Subscriber Line (DSL), leased lines, Fixed Wireless Access (FWA) and third-generation mobile networks (3G). The future demands for speed, bandwidth, and competitive prices will change the delivery options going forward. The constraints created with the deployment of rate adaptive ADSL will increasingly give way in urban areas and for higher-end users to ADSL 2 or ADSL 2+/VDSL. In turn, consideration will also need to be given to utilising fibre to the cabinet/neighbourhood to support demands for greater bit rates. Fibre to the home may also become more prevalent where new construction is taking place. However, where a copper access network exists, the cost of installing fibre to the home (which, incidentally, is estimated in a US context to average over \$2000 per home) would seem to make such investment unlikely during the period under review. Ethernet and alternative wireless technologies such as Wi-Fi or WiMax as well as 3G will also have a role to play in the creation of a competitive Broadband Environment. The changing approaches to enabling access, the convergence of content, networks, back-office activities, etc also potentially raise issues for regulators

2. Voice over Broadband/VoIP

One of the early 'killer' applications that Broadband can provide is VoIP. There will be many models of this, ranging from the downloadable type such as that provided by Skype to the indirect variety such as that provided by Blueface in Ireland or Vonage in the US. Incumbent operators such as eircom, unbundled local loop operators and/or cable operators will be able to provide PSTN replacement services. Large corporates through VPNs have been the leading drivers of VoIP deployment to date.

Currently, however, the main cost savings apply for long distance, high call volume users and those using corporate networks where VoIP can be aggregated as part of an overall service

Broader impact of VoIP on the present business model may arise when:

- Overall broadband penetration levels considerably exceed those enjoyed across Europe today or
- Innovative new product offerings including access, Broadband and calls bundles become more pervasive forcing incumbents and other operators to react.

The success of VoIP will however bring new challenges for regulators. It may pose significant access cost increases for consumers in countries where full rebalancing is not yet in place or when call volumes drop-offs to a degree which may impact on the current costs associated with interconnection. In many markets such as Ireland's, low interconnection costs have been one of the primary tools in place to support a competitive marketplace. Significant and short term changes to this could have material consequences. Another additional consideration is that as VoIP may not mirror exactly all of the associated features of traditional PSTN services, innovative solutions may need to be developed to address any identified deficits.

3. Convergence

This is often considered in the context of mobile/fixed convergence. However in future real convergence will relate to the aggregation of content and services over a range of different platforms which will provide for access both at given locations such as at home and the office but will also provide for mobility/nomadic services. These changes coupled with increased movement to platforms such as IP may also facilitate entry to a range of new and different service providers, such as system integrators, who would be able to provide business solutions to their customers utilising some elements only of existing network infrastructure. These developments may in turn create new challenges for regulators, combining, for instance, mobile and fixed services, regulated and unregulated products and services.

4. The development of Next Generation Networks

A converged world with significant growth in products and services in areas such as entertainment, healthcare, educational, enterprise, sales and customer management will need an underlying infrastructure to deliver and support it. One such approach is the provision of Next Generation Networks [NGNs]

NGNs are packet-based networks which are able to provide communications services, able to make use of multiple broadband, QoS enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. They will offer unrestricted access by users to a range of different service and content providers. They will also support generalised mobility which in turn will enable consistent and ubiquitous provision of services to users. They will support a wide range of products, applications and services including real time, streaming, non real time and multimedia services.

NGNs when deployed will radically change the communications sector. Apart from enabling the provision of new products and services, they will also be considerably more efficient and have the potential to render the range of regulatory tools currently in place irrelevant. However a range of regulatory challenges will exist particularly in determining the appropriate interfaces with existing legacy networks, exposure to extra costs for new entrants, impact on competition, etc. Currently in Europe BT would seem to be the most advanced. Possible concerns going forward maybe that NGNs may not in reality be multiple entities. The BT yardstick would seem to indicate an investment requirement in a market the size of Ireland of between €800m and €1.1bn and NGNs may well become the new ‘bottlenecks’ of the future.

5. **Broadband Mobile Access Technologies**

Again there has been significant development and investment in this area over the past few years. Changes underway may materially change the challenges ‘access’ poses today. They also enhance the pace and degree of mobile/fixed convergence. This issue will be covered more extensively in our current consultation on Spectrum policy. Developments may again require changes to any regulatory approach.

Q.2 Do you agree that these represent developments that will impact on the telecommunications sector in the period under review? Are there others? If so, what will they be and what would you expect to be their impacts?

2 Regulatory Context

2.1 Purpose of Regulation: Consumers and Competition

The word “regulation” has become part of the vocabulary of both political and economic debate in Ireland over the past decade. The setting up of independent sectoral regulators in industries such as telecommunications and electricity, the deregulation of the taxi industry, and public concern over issues ranging from overcharging in the financial services sector to major health issues have all raised public awareness. Yet, frequently, the term is misunderstood. Very often, the public associates “regulation” only with tasks carried out by individuals or bodies whose title contains the word “regulator”. Nothing could be further from the truth: very large sectors of the economy, including health, education and agriculture, are very heavily regulated. In these cases, a Government department acts as the regulator. Other sectors of the economy, such as the professions, are largely self-regulated, while others are subject only to some very general forms of regulation, such as the obligation to supply goods of merchantable quality.

Regulation in the telecommunications sector has generally had two purposes. On the one hand, it aims to prevent the exercise of market power by firms to the detriment of consumers. Market power arises where a firm has sufficient size and strength to act independently of its competitors and of its consumers. In a normal competitive market, no firm can charge excessive prices, because consumers simply would not buy their products; they would switch to a competitor. As is outlined in the following sections, however, the telecommunications industry historically developed as a monopoly, so that customers had no choice. This required that governments in Europe, where the State itself provided the service, exercise a dual role as operator and regulator.

Regulation, therefore, has a role in protecting consumers where markets are not competitive. It must be recognised, however, that “protecting consumers” is not the same as “never allowing any price rises”. In a normal market, prices fluctuate according to supply and demand, and firms need to make profits in order to re-invest in their facilities. One of the common problems identified in European telecommunications markets prior to liberalisation was that political reluctance to approve any price rises meant that many services were not being charged for on an economic basis. This meant that these services were not covering their costs, and new investment in networks was not being made.

The consumer protection aspect of telecommunications regulation is explicitly recognised as an objective of ComReg, both in the current EU regulatory framework and in the Communications Regulation Act, 2002. Both of these specify that ComReg shall promote the interests of citizens/consumers by, inter alia:

- (a) ensuring that all citizens have access to a universal service;
- (b) ensuring a high level of protection for consumers in their dealings with suppliers, in particular by ensuring the availability of simple and inexpensive dispute resolution procedures;

- (c) contributing to ensuring a high level of protection of personal data and privacy;
- (d) promoting the provision of clear information, in particular requiring transparency of tariffs and conditions for using publicly available electronic communications services;
- (e) addressing the needs of specific social groups, in particular disabled users; and
- (f) ensuring that the integrity and security of public communications networks are maintained.

The second major objective of telecommunications regulation is the promotion of competition. This is seen, not as an end in itself, but as a means of increasing consumer welfare by providing greater choice, lower prices and improved quality of services. From an economic point of view, monopolies involve substantial losses to society in the form of reduced efficiency and other costs. Competition will lead to increased efficiency both in the short term, because it requires firms to produce goods and services at the lowest cost, and in the longer term, because firms are forced to innovate constantly so as to stay ahead of their rivals.

Introducing competition in a former monopoly sector like telecommunications is not simply a matter of removing legal barriers to entry. Telecommunications is a network, and overall welfare is enhanced if all consumers can contact all other consumers, even though they are connected via different network operators. New entrants must be able to interconnect their networks with those of the incumbent, otherwise their customers will only be able to contact each other, and not the majority who remain as customers of the incumbent. In this situation, the bargaining powers of the parties are very different. Thus, even where competition arises from new network build, there is still a need for regulation to ensure that incumbents do not unfairly disadvantage new entrants by refusing to interconnect with them.

As with protecting consumers, promoting competition is not necessarily a simple or straightforward manner. It is often measured by reference to the market shares of incumbents versus new entrants, and indeed this is one valid measure. However, it must be borne in mind that the objective of promoting competition is to increase consumer welfare. If new entrants gain market share, but this is at the expense of excessively high retail prices for both incumbent and new entrant, then the objective of competition is not being met. Setting excessively low access prices (the prices which new entrants pay to use part of the incumbent's network to provide services) may promote entry in the short run, but may in the long run discourage investment in infrastructure and endanger the viability of the industry as a whole.

The promotion of competition is set as a statutory objective for ComReg, both in the new European regulatory framework and in the Communications Regulation Act, 2002. These provide that ComReg shall promote competition in the provision of electronic communications networks and services by, inter alia:

- (a) ensuring that users, including disabled users, derive maximum benefit in terms of choice, price and quality;
- (b) ensuring that there is no distortion or restriction of competition in the electronic communications sector;

- (c) encouraging efficient investment in infrastructure, and promoting innovation; and
- (d) encouraging efficient use and ensuring the effective management of radio frequencies and numbering resources.

The telecommunications network can be viewed as a series of layers. At the deepest level, the form of competition which is most self-sustaining, and which requires the least ongoing regulatory intervention, is infrastructure-based. Where alternative infrastructure is available – such as cable television, national fibre rings and regional fibre rings – services provided over it can exercise a check on the market power of the telecommunications incumbent, so that it cannot, for example, charge excessive prices or give a poor service to its customers, for fear of losing business.

Some forms of competition are based purely on new entrants buying wholesale inputs from the incumbent and selling them on, without modification, to end users. “Bitstream”, the wholesale DSL-based broadband service which eircom offers its rivals and which they re-sell to end users, is an example of a product which is close to pure resale. This form of competition can be useful in putting pressure on the incumbent to run its retail operations efficiently. However, the very existence of this form of competition usually relies on ongoing regulatory intervention, since most incumbents with Significant Market Power will not voluntarily enter into a wholesale agreement with another party which takes business away from their own retail arm. Also, the new entrant cannot create new products, so the capacity of consumers to benefit from innovation is limited. Resale-based competition is therefore, in the long run, inferior to infrastructure-based competition. This is recognised in the new European regulatory framework, which requires National Regulatory Authorities (NRAs), when imposing access obligations on dominant operators, to take account of, inter alia, the viability of using or installing competing facilities and the initial investment by the facilities owner.

The two cases illustrated above – infrastructure-based competition and resale-based competition – are at opposite ends of the spectrum. In reality, most forms of competitive entry to the telecoms market combine elements of both. Entrants will build some facilities, and lease others. An example is local loop unbundling, where a new entrant seeks access to the incumbent’s facility at the local exchange to which the customer is connected. Most commentators agree that, at present, the local loop – the dedicated twisted copper pair, between the subscriber and the exchange – is unlikely, for economic reasons, to be duplicated by a new competitor. Local loop unbundling allows that customer to lease the loop from the incumbent, and to add its own equipment and facilities in order to create its own service. Thus infrastructure-based competition and resale-based competition can be seen as complements.

A final point concerns the dynamics between the different forms of competition over time. The “ladder of investment” theory holds that, with appropriate economic incentives in place, alternative service providers will move from pure service-based (or resale) competition to infrastructure-based competition. The path towards infrastructure-based investments is seen as a ladder, where each step

requires a higher degree of investment. In this model, alternative operators can enter a market through resale, without the need for large-scale initial investments. They can then use this platform to build scale, allowing them to re-invest funds or source further capital to invest in the next level of infrastructure build-out. In today's capital-constrained world, this can provide an attractive model for new entrants. Its success in promoting a move towards more sustainable, infrastructure-based competition depends on regulators achieving the correct pricing signals and relativities for the various wholesale products.

2.2 Historical Background: from Competition to Monopoly¹¹

The history of direct State involvement in the provision, as opposed to the regulation, of telecommunications in Ireland can be traced back to the Telegraph Act of 1868. This Act, which was only repealed by the passage of the Communications Regulation Act 2002, empowered the Postmaster-General to “work telegraphs in connection with the administration of the Post Office”, and gave him compulsory purchase powers over the existing, privately-owned telegraph companies. The reasons for this step included the perceived “backwardness” of telegraphic communications in the United Kingdom compared to other countries, complaints of high rates and delays, and the uneven geographic development of the service, whereby some districts were left without service. The 1868 Act signalled the start of an era which only came to an end in 1999, with the privatisation of Telecom Éireann. .

Both before and after the passage of the 1868 Act, a lively debate took place about the relative merits of competition and monopoly. A Select Committee of Parliament in 1869 was of the view that it was not desirable that the Post Office should gain a monopoly over the telegraph service, since this would make it sluggish and un-reactive. The telegraph companies argued that the Post Office already had more duties than it could properly perform, and that the Government had shown no special aptitude for telecommunications work. On the other hand, the (monopoly) postal service was considered to work well, and there were difficulties with having the Post Office partially involved in the telegraph industry, since it was likely to be left with the uneconomic routes only. The pro-monopoly argument won the day; in 1869 the Postmaster-General was given the exclusive privilege of transmitting telegrams.

With the invention of the telephone in 1876, private telephone companies emerged in the latter part of the 19th century, and a similar debate took place. In this case, however, the National Telephone Company had developed what was effectively a private monopoly. In 1905 an agreement was signed between the National Telephone Company and the Postmaster-General whereby the State would take over the company's assets when its licence expired in 1911. The Telephone Transfer Act, 1911, provided for the transfer of the plant, property, assets and staff of the National Telephone Company. This in effect established the

¹¹ See “The Electronic Age: Telecommunication in Ireland – the Development and Regulation of the Telephone, Broadcasting and Other Electronic Media”, Eamonn G. Hall, Oak Tree Press, Dublin, 1993.

Department of Posts and Telegraphs,¹² which was to remain as the monopoly State provider of telecommunications for the next 72 years. The Minister for Posts and Telegraphs was essentially both operator and regulator, with the power to fix fees by regulation.

By 1978, “the telecommunications carrier service run as a branch of the Civil Service had become increasingly inefficient and undependable”.¹³ In 1978 a Posts and Telegraphs Review Group was set up, which recommended that the telecommunications service be taken out of the Civil Service and entrusted to a separate State-sponsored body to be run on commercial lines. The Postal and Telecommunications (Services) Act of 1983 implemented this recommendation by setting up two separate State-owned companies, An Post and Telecom Éireann. It did not, in general, update the law in relation to telecommunications services; the statutory monopoly of the Department of Posts and Telegraphs was transferred to Telecom Éireann.

2.3 The modern regulatory framework: the European dimension

Changes in telecommunications regulation in Ireland have generally occurred in line with EU directives. The same could be said of most European countries, with the exception of the UK, which began to liberalise telecommunications markets in 1981. Until the mid 1980s, most EU Member State countries gave the exclusive right to run their telecommunications networks to a national public sector organisation, whether a government Department of Posts and Telegraphs or an arm’s-length state owned organisation such as Telecom Éireann. This monopoly generally extended, not just to the networks themselves, but also to the services run over them and to the telecommunications equipment connected to them.

The legal prohibition on competition, and the fact that pricing was determined by political considerations rather than the cost of services, had effects which are still working their way through the industry today. Prices overall were generally set to recover total costs, but the prices of individual services did not reflect the costs of these services. For instance, the prices of international and long-distance services were generally set far above costs, with the prices of local calls and access (connection and line rental) being subsidised by the excess.¹⁴ In both Europe and the U.S. (where the monopolist took the form of a private company, AT&T), these cross-subsidies were used as an argument against allowing competition, because, it was alleged, new entrants would “cream-skin” by competing only on high-priced services, thus eliminating the excess profits used to fund other, possibly non-economic services.

¹² The name “Department of Posts and Telegraphs” was established in 1924 under the Ministers and Secretaries Act, 1924.

¹³ Hall, *op. cit.*, p. 115.

¹⁴ See, for example Gerard W. Brock, “Historical Overview”, in “Handbook of Telecommunications Economics, Volume 1: Structure, Regulation and Competition”, Martin E. Cave, Sumit K. Majumdar and Ingo Vogelsang (eds), North Holland 2002.

The European telecommunications sector was thus historically characterised by a strong public service monopoly tradition, together with an industrial policy of creating “national champions”. This environment began to change in the early 1980s with developments in information technology both driving greater user demand for new and innovative equipment and services, and changing the economics of the telecommunications industry itself. The process of opening up telecommunications markets began in 1987 with the publication by the European Commission of a Green Paper¹⁵ which proposed the gradual liberalisation and harmonisation of the EU’s telecommunications markets.¹⁶

The mechanism chosen to liberalise telecommunications in the EU was Commission directives based on Article 86 of the Treaty (ex article 90): Article 86 gives the Commission power to require the removal of special or exclusive rights granted to undertakings by Member States where they conflict with other rules of the Treaty. In the telecoms sector, the Commission considered that giving certain public enterprises special and exclusive rights to produce telecommunications equipment, or to provide telecommunications services and operate networks, breached Treaty competition and internal market rules. The various Directives abolished those rights, requiring Member States to permit the provision of competing services.

At the same time, many Member States partially or wholly privatised their incumbent network operators, although there was no requirement in the regulatory framework to do so.

The liberalisation directives were complemented by a series of harmonising directives, aimed at ensuring the coherent implementation of the liberalisation of telecoms across the EU. These included the Open Network Provision (ONP) Directives, the Interconnection Directive and the Licensing Directive – the so-called “1998 package” of legislation, which was established in time for the opening of the EU telecoms market on 1 January 1998.¹⁷

The “1998 package” was primarily designed to manage the transition from monopoly to competition and was therefore focused on the creation of a competitive market and the rights of new entrants. Due to rapidly changing technologies, convergence and the new challenges of the liberalised markets, a single, coherent new framework, that covers the whole range of electronic communications networks and services, has been in place since July 2003. The new framework includes broadcasting transmission services, but excludes content services. According to the European Commission, the new framework caters for

¹⁵ COM (87) 290 final.

¹⁶ For more detail on the history of telecommunications regulation in the EU, see http://europa.eu.int/information_society/topics/ecommm/all_about/history/index_eu.htm

¹⁷ Ireland initially received a derogation until 1 January 2000 for the introduction of full competition. This was subsequently changed to 1 December 1998.

new, dynamic and largely unpredictable markets with many more market players than earlier and a much more developed and detailed market environment.

The new regulatory framework consists of five Directives, and a Decision on Radio Spectrum Policy. The five Directives are:

- Framework Directive
- Access Directive
- Authorisation Directive
- Universal Service Directive
- Directive on Privacy and Electronic Communications.¹⁸

The Framework Directive introduces the concept of technological neutrality; there is to be no discrimination between different means of transmission (fixed or wireless telecommunications networks, or terrestrial, satellite or cable broadcasting networks) for regulatory purposes. The licensing regime has been streamlined; a system of general authorisation now applies, with individual rights (i.e. rights specific to a particular company) only granted where spectrum rights of use or numbering ranges (i.e. a scarce resource of some kind) are involved.

Perhaps the most radical change in the new framework is the shift towards greater reliance on competition law concepts. Regulators must define markets according to competition law principles, starting with a list of “relevant markets” issued by the Commission. In this context, a “market” means, roughly, the set of goods and services which are regarded by consumers as equivalent, by virtue of their characteristics, price and intended use. Thus the new framework is moving towards a more customer-centric, rather than technology-centric, view. Having defined markets, national regulators must then analyse them to determine whether or not they are effectively competitive. If no operator is dominant, either individually or collectively, the market is effectively competitive, and no operator-specific regulation is permitted; if an operator or operators is/are dominant, the regulator must impose appropriate remedies from a set prescribed in the Access Directive and the Universal Service Directive.

In order to ensure harmonised application of competition law concepts such as market definition and dominance, the Commission has a veto over certain decisions by National Regulatory Authorities in the new framework.

¹⁸ For a succinct explanation of the new regulatory framework, see the Introduction to Arnold & Porter, “The EU Regulatory Framework for Electronic Communications and related EU Legislation, Handbook,” Arnold & Porter, London 2003.

3 Review of the Irish Telecoms Sector

Since the creation of the ODTR, the precursor to ComReg, in 1997, independent regulation has helped to shape the telecoms sector in Ireland, from the point of view of both industry and consumers. Of course, many other factors – the state of the Irish economy, the international investment climate, harmonised EU decisions regarding spectrum use – also have an effect. This section attempts to describe where Ireland now stands, in comparative terms, after almost eight years of independent regulation, as a precursor to the discussion of what the ideal outcome is. It begins by identifying the main phases in telecoms regulation since 1997, and then goes on to discuss outcomes for consumers in terms of the main types of services available.

3.1 Telecoms regulation since 1997

The objectives of telecommunications regulation in Ireland were first explicitly set out in the Communications Regulation Act, 2002. Prior to that, either the objectives were not formally set out, or they were fragmented across a range of primary and secondary legislation. Certain key elements of regulation prior to the establishment of the ODTR in 1997, such as the implicit cross-subsidisation of some services by others, were not formally laid down but emerged through custom and practice over the years. In this section, we attempt to summarise the main trends in regulation before and since liberalisation.

3.1.1 Phase 0: Before liberalisation

A number of decisions taken in the years leading up to liberalisation impacted on its pace and scale. Firstly, liberalisation was delayed in Ireland compared to other European countries. In April 1996, Commission Directive 96/19/EC of 13 March 1996 on the implementation of full competition in telecommunications markets (“the Full Competition Directive”) entered into force. It allowed Member States to maintain exclusive rights for voice telephony and public telecommunications networks until 1 January 1998, but required them to ensure that all remaining restrictions on services other than voice telephony on alternative infrastructures were lifted by 1 July 1996. The Directive allowed Member States with less developed networks to request an additional implementation period of up to five years, provided that this was needed to achieve the necessary structural adjustments.

Ireland requested additional transition periods for voice telephony and public telecommunications networks (to 1 January 2000); for alternative infrastructure (to 1 July 1999) and for direct interconnection of mobile networks with other networks (to 1 January 2000). In November 1996 the Commission approved the requested derogation for voice telephony and public telecommunications networks, and shorter derogations (to 1 July 1997 and 1 January 1999, respectively) for alternative infrastructure and for direct interconnection of mobile networks. In the event, the then Minister for Public Enterprise announced in May

1998 that the derogation for voice telephony would be removed by 1 December 1998.¹⁹

Another decision whose repercussions, it can be argued, are still being felt today was to allow Telecom Éireann to acquire a majority shareholding in Cablelink, the country's leading cable television company, in the late 1980s. Although Ireland had a relatively well-developed cable network at the time, the fact that the incumbent telecommunications operator owned the network which, in other countries, became the principal source of alternative telecommunications infrastructure is considered to have hindered competition.²⁰

Before liberalisation, regulation generally took the form of direct price control by the Minister for Posts and Telegraphs. Fixed voice services cover access (connection and line rental), plus local, national and international calls. Historically, the Department of Posts and Telegraphs and, subsequently, Telecom Éireann were required to provide geographically averaged tariffs. This meant that the same price was charged to all consumers, regardless of their location, for both access and calls. Since it is cheaper to provide access to more densely populated, urban areas than to more sparsely populated, rural areas, this tariff structure carries an implicit urban-rural cross-subsidy. While in general it is recognised as desirable that all citizens should have access to basic telecommunications services at an affordable price, the broad-brush nature of this cross-subsidy, and the fact that it is based on location rather than on income, lead to some anomalies. For example, urban dwellers on low incomes could be subsidising telecommunications services to the second homes of wealthy individuals.

Prior to 1996, the Minister for Posts and Telegraphs was responsible for approving charges to individual tariffs. The Telecommunications (Miscellaneous Provisions) Act of 1996 empowered the Minister to put in place a price cap on an overall basket of retail telecommunications services, of the form CPI-X, where CPI is the consumer price index and X was set at 6%. The level of X was intended to promote efficiencies in the incumbent, as well as to provide consumers with lower prices; clearly, if the incumbent made savings of more than 6%, it could retain the benefit of those efficiencies.

3.1.2 Phase 1: Infrastructure investment

The history of infrastructural investment in Ireland since the provision of alternative infrastructure was liberalised in July 1997 is patchy. Initially, there was a flurry of investment, particularly in optical fibre links some of which remain unlit. Esat, now Esat BT, a wholly owned subsidiary of BT plc, has a national trunk network, although it is largely limited to major towns and cities and provides residential and business services. Ntl and Chorus, the two main

¹⁹ See the Department of Communications, Marine and Natural Resource's website at <http://www.dcmnr.gov.ie/Communications/Reports+and+Publications/History+of+Liberalisation/>

²⁰ See Massey, P., and Daly, D., "Competition and Regulation in Ireland: The Law and Economics", Oak Tree Press, Cork, 2003, p. 378.

incumbent cable companies, did not, by and large, upgrade their networks to digital operations before the collapse of the “dot-com” boom and the subsequent restrictions on the availability of capital for investment in telecommunications markets. While both have some fibre infrastructure – ntl between Dublin, Dundalk and Belfast, and Chorus linking Ennis, Shannon, Limerick and Cork – and both have a small market share in the leased lines market, neither currently uses its own infrastructure to provide telecommunications services to end users, in competition with eircom’s ubiquitous access network.

ESB, the national Electricity Supply Board, has deployed fibre around its existing electricity network in two rings – a Southern Ring from Dublin to Shannon, Limerick, Cork Waterford and Arklow back to Dublin, and a Northern Ring from Dublin to Dundalk, Cavan, Letterkenny, Galway and Ennis. ESB manages the network as a “carrier’s carrier”, i.e. it leases capacity to other operators rather than engaging in the retail market itself.

Aurora Telecom Ltd., a wholly-owned subsidiary of Bord Gáis Éireann, was established in 2002 with a 35km fibre optic network in the central business district in Dublin. Aurora also has a national network, providing connectivity between Dublin, Galway, Limerick, Cork, Athlone, Tullamore, Ennis, Shannon, Drogheda and Dundalk. Aurora is a dark fibre provider selling capacity on its network to new entrant telcos, wireless operators and data centres.

There are also a number of operators with metropolitan area networks, mainly used for the provision of point to point capacity in the retail market:

Operator	Location
Colt	Dublin
Energis	Dublin, Cork, Shannon
MCI	Dublin, Galway
Cable & Wireless	Dublin
Equant	Dublin, Limerick, Galway
Global Crossing	Dublin

Table 3.1 Metropolitan Area Networks

Initial attempts to foster competition by licensing Fixed Wireless Access providers on a nationwide basis proved disappointing. In June/July 2000, the ODTR awarded seven Fixed Wireless Point to Multipoint Access licences; three narrowband (to Chorus, eircom and Esat) and four broadband (to Chorus, Esat, eircom and Formus). However, in March of the following year Formus went into voluntary liquidation and Esat handed back their licence. Chorus’s licence was subsequently shortened in duration due to non-compliance with licence conditions. In order to lower barriers to entry and allow new operators to start up on a small scale without onerous licensing conditions, in 2004 ComReg re-issued the frequencies on an area-by-area basis – the so-called “FWALA” (Fixed Wireless Access – Local Area) licences, which are mainly being used by

alternative broadband providers. At present, approximately 11,000 customers are receiving broadband through these FWALA operators.

On the other hand, at a certain level the availability of alternative infrastructure has created a more competitive market. In a recent review of the market for international leased lines (Document 05/06 – Market Analysis: International Leased Lines), ComReg concluded that this market was effectively competitive, due (amongst other factors) to the availability of competing infrastructure and the fact that eircom's market share had reduced considerably in recent years. Similarly, ComReg concluded that the retail market for high bandwidth (greater than 2Mb/s) leased lines was also effectively competitive. eircom's market share in the relevant market was approximately 36%, measured by circuits.

Overall, the picture on infrastructure investment is one of gradual progress. Fibre has been laid by alternative operators, but its availability is patchy and a truly nationwide alternative provider of trunk capacity has not emerged. Eircom retains 85-88% of the wholesale markets for trunk and terminating segments of leased lines. At the level of the local access network, neither cable nor Fixed Wireless Access has developed as a significant competitor to the local loop. This may change in future as the economics of broadband provision make alternative infrastructures more viable.

This period also saw the entry into the market of the second mobile operator, accompanied by high growth in subscriber numbers and usage. Mobile voice markets differ from fixed voice markets, in that they are based to a far greater extent on infrastructure-based competition than on service-based competition. In other words, the second and third operators have rolled out their own networks, rather than depending on wholesale inputs provided by the initial incumbent. On the other hand, in most European countries operators have voluntarily entered into wholesale agreements with Mobile Virtual Network operators (MVNOs) or airtime resellers, in order to compete more vigorously with their rivals. Ireland is unusual in two respects; firstly, despite the fact that there are three operators with national networks, none to date has entered into a wholesale agreement with any other party, and secondly, the fixed and mobile voice markets are distinct, in that eircom, the fixed incumbent, no longer has any involvement in the mobile market.

3.1.3 Phase 2: The dot-com collapse, the growth of service-based competition and direct Government intervention.

The late 1990s saw extraordinary growth in the telecommunications industry worldwide, with companies trying to compete with one another on the basis of rapid innovation and investment. This growth developed largely on the back of high-risk, short-term financial capital. Companies focusing on gaining first mover advantage often neglected to give adequate due process to sustainable business models during this fast moving period. These factors contributed to the sudden collapse of investor confidence in the sector in 2000/2001 that led to widespread consolidation and restructuring. Many companies operating in Ireland – such as Global Crossing, WorldCom, ntl, Chorus – were affected, and some have only recently emerged from the necessary financial restructuring. Efforts to increase liquidity, and a lack of confidence in the potential for growth in the telecoms

sector in the post-collapse period resulted in reduced investment in telecoms infrastructure. However, since the collapse, businesses have become focused on utilising Information and Communications Technologies (ICT) to improve business performance which is generally characterised by more steady growth in ICT. The re-alignment of the ICT sector following the “boom” and “bust” cycle of the late 1990s-early 2000s has had the net effect of adjusting the ICT sector to a more natural growth path, although some sectors of the industry are still suffering from a lack of confidence to invest following the collapse.

Telecom Éireann, which had been floated as a public company in July 1999 at the height of the internet boom, was purchased by Valentia Telecommunications Ltd in November 2001 and de-listed from the Dublin, London and New York stock exchanges.

In the more constrained investment climate, new entrants’ strategies began to focus more on resale or service provision opportunities than on infrastructure-based investment. Carrier pre-selection and non-geographic number portability had been made available in December 1999, on foot of the Voice Telephony Regulations, followed by geographic number portability in November 2000. In July 2002, following a public consultation, the ODTR directed eircom to implement single billing products through Wholesale Line Rental and Agency Rebilling by January 2003 (subsequently revised). Following continued concerns about poor levels of penetration compared to other European countries, the degree of churn in the CPS market, and complaints about selling practices from both operators and consumers, ComReg carried out another review of the market and subsequently directed a number of changes to selling practices.

This period also saw the beginning of the focus on ICT, notably broadband, as an instrument of national competitiveness. Possibly as a result of the dearth of private investment, a number of initiatives funded by local and central government were developed as part of a national policy to facilitate broadband access. These are intended to provide carrier-neutral network infrastructure to wholesale operators for the provision of wholesale and retail leased line markets:

Metropolitan Area Networks (MANs)

The Department of Communications, Marine and Natural Resources (DCMNR) has invested €65 million of Government and European Regional Development Fund (ERDF) funding in the first phase of the Regional Broadband Programme, building 26 Metropolitan Area Fibre Networks (MANs) in towns and cities in association with the local and regional authorities. The State-owned broadband infrastructure is being managed by Limerick-based technology company E-Net (eNasc Éireann Teoranta) who has been awarded the 15-year services concession contract. E-Net operates as a wholesaler making broadband infrastructure available on an open-access basis to authorised telecoms operators. In addition to the fibre and duct products E-Net will also provide lit fibre to carriers who require such a facility, using either SDH²¹ or Ethernet technology. The company will facilitate and broker services with the preferred backhaul supplier of its client.

²¹ Synchronous Digital Hierarchy

Each MAN is equipped with co-location facilities to allow operators to connect and interconnect. E-Net's prices will be standard for all MAN centres.

Already 26 towns have Metropolitan Area Networks (MANs) either built or under construction under Phase I. While some commissioning work remains to be completed, a number of the completed MANs are carrying commercial traffic.

Phase II of the MANs Programme was launched in June 2004. 92 towns with a population of 1,500 and over that do not have an adequate broadband provision from the private sector are to be targeted in a three-year programme with a dedicated multi-annual budget of €35 million per year.

A further 35 towns have been approved and 11 are currently undergoing evaluation under Phase II. The plan will also involve building Community Broadband Exchanges, in association with the local authorities that will remain in public ownership and be managed on an open-access basis.

Other Government Funded Projects

Additionally there have been a large number of other Government funded projects which have aimed to increase the availability of alternative telecommunications network infrastructure.

The National Development Plan (NDP) 2000 – 2006 - €200 million has been set aside, which includes projects to:

- support ESB Telecom's construction of a fibre optic network (€50m project overall).
- extend Esat BT's regional backbone network.

• **Broadband Action Plan** – This was announced in December 2003, with €140m of exchequer funding to be invested before 2007. The aim is to connect 88 towns with community broadband exchanges and strategic fibre-optic metropolitan area networks. The Group Broadband Scheme allows smaller communities to pool their demands and secure high-speed connectivity from a range of providers with grant support from the government.

• **Connectivity Framework Deals**—the government has facilitated framework deals, enabling high-speed broadband packages to be available to towns on the ESB Telecoms fibre optic network; and high-speed products connecting Dublin to 26 regional towns on the Esat BT network. Independent Service Providers, telecoms companies and consortia will be able to use capacity under these framework deals.

Finally, this period saw the first developments in both Local Loop Unbundling (LLU) and Bitstream (wholesale broadband access) which would lead in the following years to further regulatory and market activity. In 2000, the European Commission adopted a Regulation mandating, by 31 December 2000, full unbundled access to the copper local loop by operators with significant market power in the public fixed network under transparent, fair and non-discriminatory conditions. The introduction of LLU in Ireland was dogged by repeated legal

challenges, which have created delays and uncertainty in the marketplace and have undoubtedly contributed to the relatively poor take-up of LLU here. Initially, in April 2001, the ODTR set LLU prices (this being the rental for wholesale use of the unbundled eircom local loop by other operators) at €13.53 per month. This was subsequently challenged, and the price set at an interim level of €16.81 per month pending resolution. In May 2003, following a review, the price was lowered to €14.67 per month and was again immediately challenged. In September of that year, ComReg and eircom agreed to revert to the interim price of €16.81 pending a further review. This resulted in a price of €14.65 being set in November 2004.

The launch of a Bitstream (wholesale broadband) product in Ireland was delayed by a number of factors, including lack of agreement on an appropriate wholesale rate. In April 2002, the ODTR agreed eircom's wholesale ADSL prices, and services became available across the country. Eircom announced €125 million investment in DSL services over five years, and a plan to equip 100 exchanges to provide access to one million customers within two years. Esat also launched DSL services, via LLU, in Limerick. In May 2002 eircom began accepting orders for retail DSL connections.

3.1.4 Phase 3: Consumer protection and the growth of broadband

In 2000, the price cap was renewed by the ODTR, with X in this case set at 8%. Carrier pre-selection and geographic number portability had been made available in 1999, after the period of Ireland's derogation from market opening for public telephone networks had been brought back to 1 December 1998. In recognition of the fact that a certain amount of competition had developed in international voice services, these services were removed from the price cap. Increases in line rental were limited to CPI+2% within the overall cap. Over the period of the Cap annual increases in the line rental averaged between 5-7%.

The most recent price cap was imposed by ComReg in 2003. This recognised a number of important dynamics in voice telephony markets. Firstly, there was by now a well established wholesale regime in place at cost-oriented prices, which allowed competing operators to offer service through Carrier Select/Carrier Pre-Select. Secondly, there was recognition, in Ireland as in other European countries, that in a situation where new entrants were competing on calls but not on access, the cross-subsidisation implicit in historical rates would have to cease, and access charges (notably, the line rental) would have to rise in order to cover costs. Thirdly, it was important to preserve the relativities of wholesale and retail rates. For all these reasons, it was felt that a cap of CPI-0%, with the removal of the sub-cap on access, would achieve a number of desired objectives; it would prevent consumer prices overall from rising at above the rate of inflation, while allowing some necessary rebalancing of rental and call charges and also allowing further competition to develop on calls, which in itself would act as a check on prices.

ComReg is currently consulting on the market reviews of retail calls and access under the new EU regulatory framework. It considers that the line rental charge is now fully rebalanced, and that this charge should now be sub-capped. It also

proposes to maintain the overall safeguard cap of CPI-0%. International calls are excluded from the price cap, but these calls are still subject to relatively heavy regulation at the retail level. This includes the obligation to notify both ComReg and consumers in advance of tariff changes, cost orientation, non-discrimination, and the provision of separated accounts to ComReg, showing the costs and revenues attributed to the different services. Local and national calls are also subject to all of these requirements, and additionally are among the basket of services included in the price cap. In recent years, increases in line rental have meant that a corresponding reduction in call charges has been required.

3.1.5 Broadband: LLU and DSL

2004 saw a renewed regulatory push to make DSL succeed with the advent of new equipment which OAOs believe will enable them to take unbundled loops to compete effectively with the eircom retail broadband and line rental products. The price for full unbundling was reduced to €14.65, certain process charges were reduced by up to 50%, and in early 2005 ComReg signalled their view that eircom should reduce the price for line share (whereby the line is split, with eircom retaining the voice service over the lower bandwidths and another operator providing broadband services over the higher bandwidths) from €9 to €0.39. This is currently the subject of a consultation and draft direction.

At the retail level, eircom launched “eircom Broadband Starter”, a low-cost, introductory level ADSL service, in April 2003. The past two years have seen successive reductions in price by both eircom and other operators, mainly re-selling eircom’s wholesale Bitstream service (although Esat offers some services via LLU, mainly via line share). In November 2004 eircom announced plans to deliver 500,000 DSL connections by December 2007 and 90% coverage by May 2006.

In February 2005 Smart Telecom announced significant broadband plans based on using local loop unbundling. Esat BT has also expressed an interest in full unbundling.

3.2 Fixed voice

3.2.1 Pricing

The increases in line rental allowed under the price cap from 2003 to 2005 have proved highly unpopular with consumers, and were one of the main sources of dissatisfaction identified in ComReg’s most recent consumer survey. Nevertheless, in overall terms the cost of retail telecommunications in Ireland compares reasonably well with that in other European countries. The diagram below shows the movement in Ireland’s position relative to the EU (ranking out of 15 Member States, one being the cheapest²²) in all PSTN baskets since February 2001. Since last quarter Ireland’s relative position has improved by one place in the national residential and business baskets but has remained unchanged in the

²² The same applies to all baskets.

residential and business international baskets. Ireland is fifth cheapest overall in the international residential and national business baskets, sixth cheapest for international business, and seventh cheapest for national residential. The effects of the increase in line rental in February '03 and '04 on Ireland's position can clearly be seen, particularly in the national residential basket.

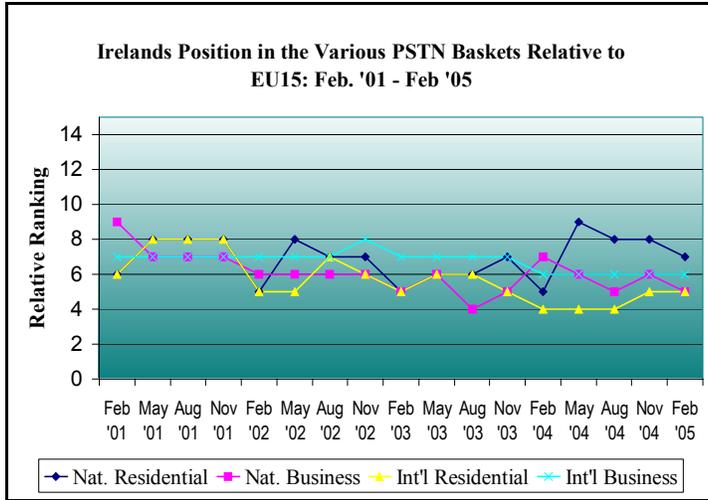


Figure 3.1: Ireland's Relative Position for PSTN baskets: Feb. '01 – Feb '05

In contrast to the index of prices for all goods, which has gained 30 index points since January 1997, prices for telecommunications services in Ireland have decreased by over 19 points in the same period:

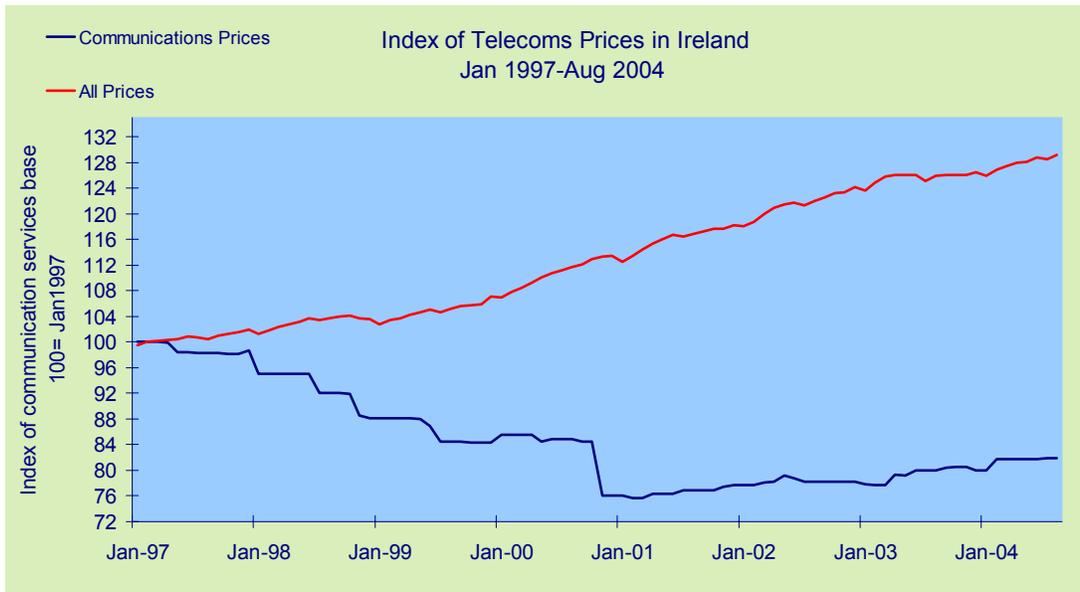


Figure 3.2: Index of Communications Price Basket compared with All Prices

3.2.2 Quality of service

Quality of service data is important to collect in order to gauge customer satisfaction levels with service suppliers. Recent market research by ComReg²³ shows that overall consumer satisfaction with home telephone suppliers has declined in recent years from an average of 3.6 in 2002 to 3.2 in 2004 (where 5 is very satisfied and 1 is very dissatisfied).

There has also been a slight increase in those consumers who say that quality of service information on operators is hard to obtain. While less than 1 in 5 (17%) residential consumers lodged a complaint with their telephone supplier, 60% of this group cited poor service quality as their reason for complaining

However the main reason cited by residential users for not switching their supplier is that they are happy with current service levels.

In relation to the installation of new phone lines, research by Amarach Consulting for ComReg in early 2005²⁴ indicates that 6% of those who have a fixed line phone, had their phone installed in the last year – mainly in the 25-34 year old age bracket. Of those recent installations, over half of them (55%) took up to six months to install. Just over half of these (52%) were satisfied with the service they received when they installed their phone line, while just over one in ten (11%) were dissatisfied.

Quality of service rather than price is also important for around two-thirds of business users according to ComReg's recent survey of SMEs²⁵: 18% of those SMEs stated that their main difficulty in relation to supply of telecoms services in their area were poor service levels from telecoms operators. 29% of SMEs state that satisfaction with current service levels or their supplier is their main reason for not switching their telecoms supplier.

3.2.3 Access to services

A recent study carried out by IPSOS for the European Commission found that, in Ireland, 99% of households had either a fixed telephone or a mobile telephone, and 74% had both. This implies that access to telephone services is near ubiquitous. Given that mobile calls are more expensive than fixed, and that fixed phones are supplied to many disadvantaged consumers through the Department of Social and Family Affairs scheme, it is likely that the majority of those who do not have a fixed phone have chosen not to do so, for reasons of convenience or credit control.

The chart below, extracted from the IPSOS study, shows the penetration of fixed and mobile telephony among households in the EU between 2003 and 2004.

²³ TNS MRBI. Residential Telecommunications Survey 2004. (ComReg document 04/30c)

²⁴ Amarach Consulting. ComReg Trends Report Q1 2005

²⁵ TNS MRBI. SME Telecommunications Services Survey 2004 (ComReg document 05/05a)

Table 3 - Fixed and mobile subscriptions by households - 2003/2004

% of households	Fixed and/or mobile		Fixed +Mobile		Mobile only		Fixed Only		None at all	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
TOTAL EU	97	97	65	66	12	15	20	16	3	3
Belgium	93	94	54	55	18	22	22	16	7	6
Danmark	99	100	67	73	8	9	25	18	1	0
Deutschland	98	96	62	61	4	7	32	28	2	4
Ellada	99	99	79	79	8	11	12	9	1	1
Espana	97	97	66	67	13	16	18	14	3	3
France	97	98	50	55	16	17	31	27	3	2
Ireland	98	99	70	74	12	15	16	10	2	2
Italia	97	97	70	68	13	17	14	12	3	3
Luxembourg	100	100	82	85	3	6	15	9	0	0
Nederland	100	100	77	85	7	9	16	5	0	0
Österreich	91	96	52	53	20	26	19	17	9	4
Portugal	90	90	48	45	28	33	14	12	10	10
Finland	98	98	58	56	29	33	11	8	2	2
Sverige	99	99	80	83	4	5	15	10	1	1
United Kingdom	99	99	75	76	6	7	18	16	1	1

Figure 3.3: Household access to communications services in the EU

Eircom as the designated Universal Service Provider is required to fulfil obligations which are set out in regulations made by the Minister for Communications, Marine and Natural Resources. These regulations permit ComReg to set requirements in connection with aspects of those obligations. In a recent consultation on the scope of Universal Service, ComReg proposed that eircom should meet all requests for connections within stated timeframes, that all connections which involve expenditure of less than €7,000 be provided for the standard connection charge and that where the cost exceeds €7,000, applicants should be able to get service by paying the excess.

3.2.4 Degree of fixed line competition

In one sense, the development of competition in fixed line services has been disappointing. Eircom has 99% of all lower level (less than 2Mb/s) retail access lines. These lines are used to provide voice and Internet services to residential consumers and small business. Competition from alternative infrastructures – notably cable and FWA operators – has not developed, for a variety of reasons, ranging from historic under-investment in cable networks, to the dot-com collapse and subsequent constrained environment for capital investment. In the higher bandwidth access market (2Mb/s and above), more competition has developed as margins have justified the investment by alternative operators to provide direct access to businesses. Since businesses are more geographically concentrated than residences, and since there is more money to be made from a business which requires a high bandwidth link, it makes sense that the cost of OAOs digging to provide their own network is more readily justified. However, even in this market ComReg considers eircom to retain a dominant position with a 77% market share. On the other

hand, this position would not be unusual amongst EU Member States. To date, none has deemed the market for retail access to be effectively competitive. Where competition has developed to any significant degree, it is usually through “brown-field” development, i.e. leveraging investment in existing cable networks.

In the market for calls, eircom’s market share in international calls is 68% and its market share in local and national calls is 87%. In both cases, competition at the retail level is heavily dependent on the availability of wholesale inputs, such as CPS and Wholesale Line Rental (WLR). The degree of competition in the international calls market is considered to warrant the exclusion of international calls from the price cap.

From the consumer point of view, however, competition and choice have greatly improved in recent years. Consumers can now choose between over 25 suppliers of voice services. If they choose an alternative operator, they can also choose to have a single bill for both calls and access, through the Wholesale Line Rental product. There is a wide variety of tariff packages available. Bundled packages of calls and access have now also begun to be promoted.

3.3 Mobile voice services

3.3.1 Pricing

In terms of relative tariffs, Ireland compares poorly for many mobile price ranges, with the exception of low usage and pre-paid users. The figure shows the movement in Ireland’s position relative to the EU 15 in all mobile baskets since August 2002. Ireland’s tariffs for medium and high users have consistently been in the top third, and the relative positions – at third-highest (for high users) and fifth highest (for medium users) have remained unchanged for over a year. Tariffs for low users and for pre-paid users compare better, with the fourth lowest tariffs in pre-paid and currently the sixth lowest in the low user post-paid basket.

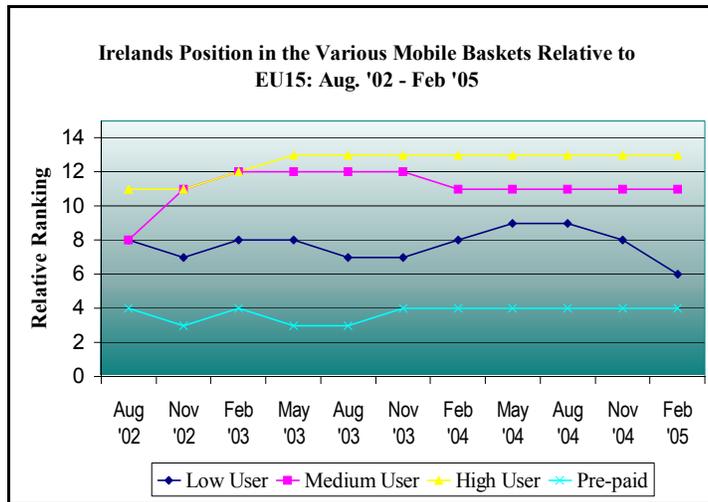


Figure 3.4: Ireland's Relative Position for Various Mobile baskets: Aug. '02 – Dec '04

3.3.2 Quality of Service

Following from its commitment in the previous Spectrum Strategy (document 02/43), ComReg has carried out measurements on the quality of services offered by GSM operators in Ireland. All operators were found to be in material compliance with their licence commitments. ComReg is currently conducting a similar survey of licensed 3G operators to ensure compliance with the rollout commitments of their licences.

There is general consumer satisfaction with mobile quality of service. The main reason cited by users (45%) for not switching their supplier is that they are happy with current service levels. Nine out of ten people with a mobile phone rate the service they get from their provider as “good” or “very good”.

3.3.3 Access to Services

There has been rapid growth in mobile penetration in Ireland over the past decade, and Irish mobile penetration now stands at 94%, slightly below the European average. Network coverage is generally good for the two leading operators, Vodafone and O2. The third 2G operator, Meteor, whose entry into the market was delayed by a court challenge, has faced difficulties in achieving national coverage. In mid-2004 Meteor entered into a national roaming agreement with O2, which should allow it to improve its regional coverage.

In terms of advanced, third-generation mobile services, Ireland is less well served than many of its European neighbours. In 2003, 3G services were available in Italy, the United Kingdom, Austria and Sweden. According to the European Commission's Tenth Implementation Report on European Electronic

Communications Regulation and Markets²⁶ in September 2004, while many countries had between three and five companies offering commercial services, Ireland's three licensees were still at the commercial trial phase. On the other hand, Ireland performed reasonably well in terms of network coverage, being one of three countries with between 50% and 75% 3G network coverage in the EU. Four countries had 75% or more, and the remainder had less than 50% network coverage.

3.3.4 Degree of competition

The Irish mobile telephony market has been exhaustively analysed in recent months, and it is not proposed to repeat that analysis here. To summarise the conclusions, however, ComReg believes that the wholesale market for mobile access and call origination is not effectively competitive; that Vodafone and O₂ are collectively dominant on that market; and that in order to remedy the situation, they should be obliged to enter into wholesale agreements with third parties who make reasonable requests for access. Existing national roaming agreements (between Vodafone and 3, the new entrant which holds only a 3G licence, and between O₂ and Meteor), should remain in place.

3.4 Business Data Services

3.4.1 Pricing

While Ireland generally performs well in terms of international price comparisons for leased lines, such comparisons are difficult to carry out consistently. Although leased line prices are generally based on distance and bandwidth, pricing methodologies vary considerably across Europe. Consequently the pricing comparison is sensitive to the specific assumptions made.

²⁶ available at http://europa.eu.int/information_society/topics/ecom/doc/all_about/implementation_enforcement/annualreports/10threport

3.4.1.1 Leased Line Baskets

National Leased Lines

- Pricing for national leased lines has stayed relatively stable in Ireland in recent years and Ireland now stands in 3rd and four positions ahead of the EU average²⁷,

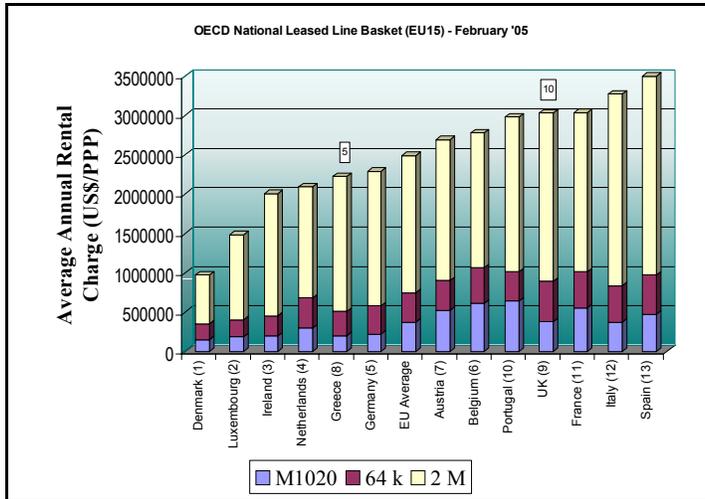


Figure 3.5: OECD National Leased Line Basket – February 2005²⁸

International Leased Lines

- Ireland's pricing for international leased lines is currently the cheapest in the EU²⁹

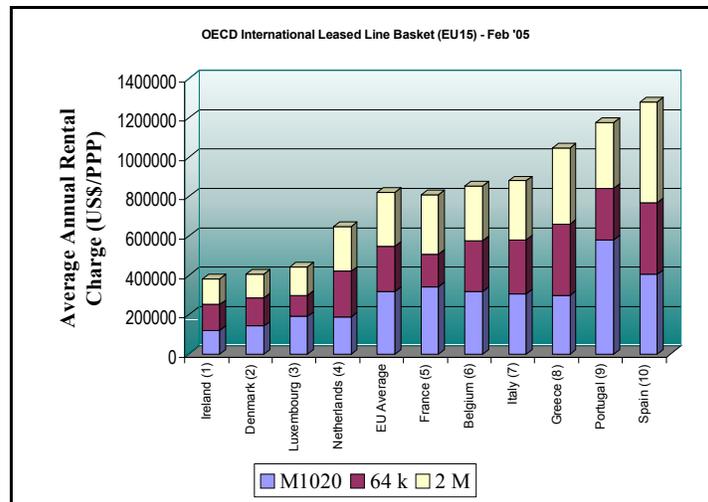


Figure 3.6 OECD International Leased Line Basket – February 2005³⁰

²⁷ The "National Leased Line Basket" is based on 100 circuits distributed over 6 distances from 2 to 500 km. Results exclude Vat.

²⁸ Data for Finland and Sweden is unavailable. The numbers in brackets represent each Member States respective rankings as at Nov 2004

²⁹ The prices for these circuits are devised from the weighted average of half-circuits to all other OECD countries, using the traffic volume weighting method proposed by Teligen.

³⁰ Data for Germany, Finland, Austria, Germany and UK is unavailable. The numbers in brackets represent each Member States respective rankings as at Nov 2004

3.4.1.2 ISDN Baskets³¹

Residential Basket

- Ireland's position in the residential basic rate ISDN basket has remained stable in the last year and is two places ahead of the EU average.

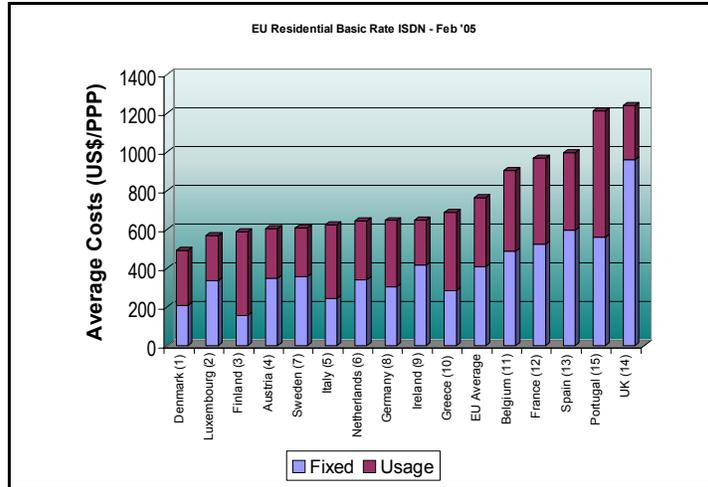


Figure 3.7: Residential Basic Rate ISDN Basket – February 2005³²

Business Basket

- Ireland's position in the business basic rate ISDN basket has remained stable in the last year, six places ahead of the EU average.

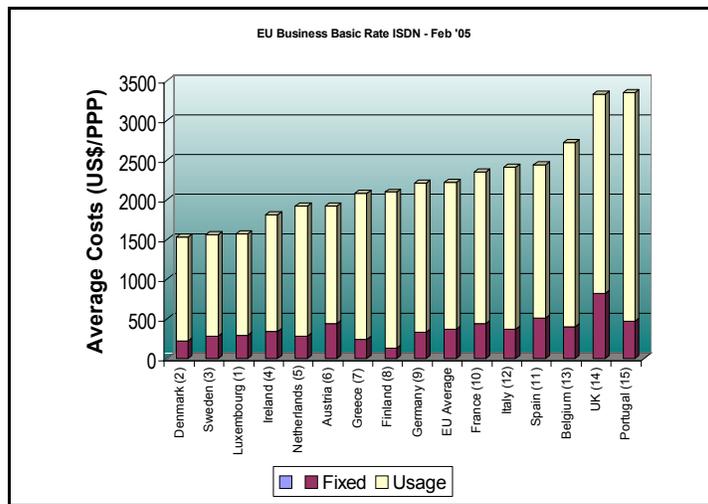


Figure 3.8: Business Basic Rate ISDN Basket – February 2005

³¹ The ISDN baskets are constructed using OECD PSTN business and residential usage profiles and non-recurring charges (such as installation). Basic Rate ISDN involves 2 user channels while Primary Rate involves 30 user channels.

³² Residential tariffs include VAT. VAT rates vary between member states.

Business Primary Rate ISDN Basket³³

- Ireland's position has remained stable in the last year and is three places ahead of the EU average in the business primary rate ISDN basket.

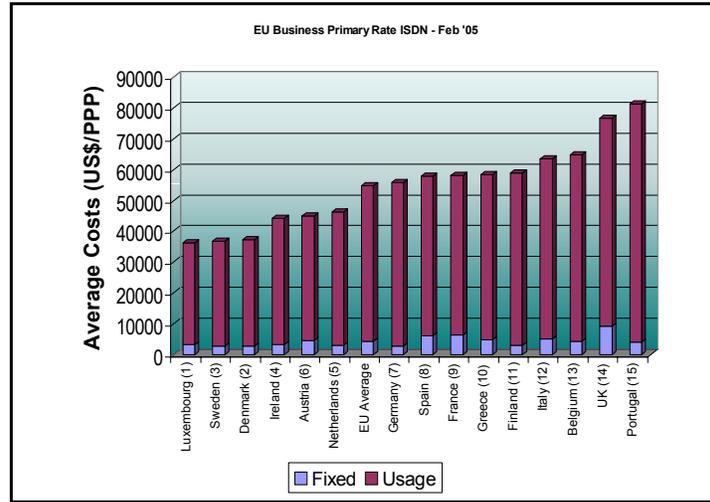


Figure 3.9: Business Primary Rate ISDN Basket – February 2005

3.4.2 Access

Leased lines, and equivalent contended services, are available from eircom on a nationwide basis. As indicated in the “Infrastructure” section, the availability of competing infrastructure is patchy, although the situation is improving with the coming on stream of the MANs. ComReg’s market review of the leased lines market found that eircom had a market share of 85-88% in the wholesale markets for trunk and terminating segments of leased lines. ISDN is similarly available on a nationwide basis.

ComReg’s most recent business data communications survey indicates that DSL is now the most common type of broadband internet access technology in use, at 57%, followed by leased lines at 21%. Access to broadband services other than leased lines is dealt with in the following section

³³ Same usage profile as OECD business PSTN basket. Internet usage is not included in this basket, as we assume that a company of medium size would use more appropriate means of Internet access, such as dedicated lines.

Type Of Broadband Internet Access Technologies Used At Present

Base: All Respondents: 403

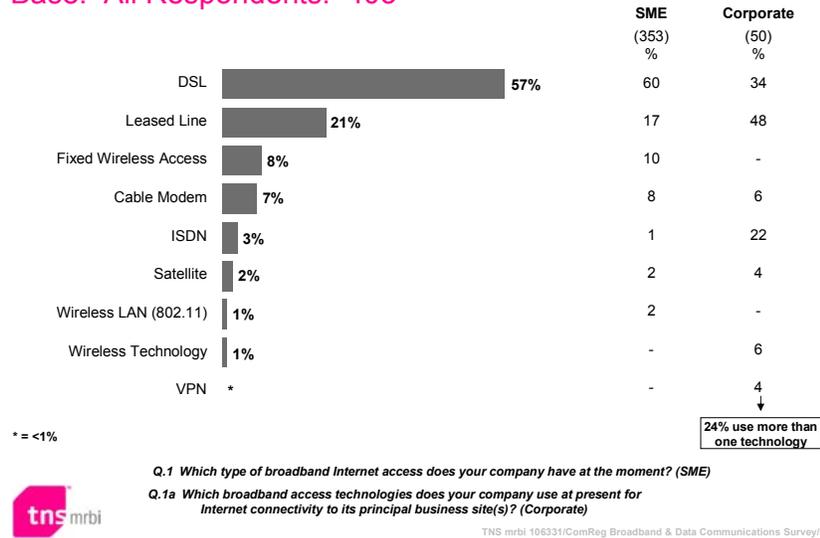


Figure 3.10 Broadband access technologies used by businesses in Ireland

3.4.3 Quality of service

ComReg has examined the quality of broadband services delivered to business in Ireland by means of an annual survey of both SMEs and large corporates.

The most recent survey found that in terms of satisfaction with the different aspects of the service offered by their supplier, both SMEs and large corporates diverged.

Both SMEs (75%) and large corporates were most satisfied with the speed/quality of service (74%) offered. However while SMEs were most dissatisfied with efficiency and general customer service (16%), large corporates were most dissatisfied with prices (22%).

- Data on delivery times for broadband services is also a useful source of information on quality of service.
- The following table sets out the rolling three month average delivery time for circuits delivered by *eircom* to OAOs.

	October '04	November '04	December '04
<i>All Leased Lines</i>	20	21	22
<i>Of Which:</i>			
<i>Sub 2 Mbit Lines</i>	20	21	21
<i>2 Mbit Lines</i>	23	23	27

Figure 3.11: Rolling Three Month Average Delivery Time for Leased Line Circuits Ordered by OAOs (Working Days)³⁴

- The rolling three month average delivery time for 95% of leased line circuits ordered by OAOs for September 2004 was 21 days.³⁵
- Since June 2004 the average delivery time for 95% of leased line circuits ordered by OAOs has risen to 22 days for all types.³⁶

3.4.4 Degree of competition

As with voice services, the degree of competition varies according to the type of service. ComReg analysed various markets for leased lines as part of the market reviews it is obliged to conduct under the new European regulatory framework. In a deregulatory move, it concluded that the retail markets for international leased lines, and for national leased lines above 2Mb/s, were competitive, and removed all existing obligations on eircom in relation to these products. The markets for wholesale trunk and terminating segments of national leased lines, and for retail leased lines up to and including 2Mb/s, have found to be dominated by eircom, and regulatory obligations were accordingly retained. ComReg recognised that the prospects for the development of competition were stronger in some markets – for example, trunk segments of national leased lines – than in others.

In the market for retail narrowband access at speeds of 2Mb/s and higher, which is mainly used to provide ISDN services to businesses, ComReg's recent market review found that eircom had a 77% market share. While this still represents a dominant position for eircom, there is some evidence of competition in this market.

3.5 Broadband

3.5.1 Pricing

ComReg analyses ADSL pricing in Ireland relative to other countries by means of a basket of incumbent tariffs for entry level products which is updated quarterly.

³⁴ The impact of delivery times for 2 Mbit leased lines on all leased lines is low due to the small number of 2 Mbit circuits in proportion to total number of circuits.

³⁵ The figures reported above are for 95% of orders i.e. the average of the first 95% of orders to be delivered. This removes the effect that any anomalies may have had on the figures and presents a true reflection of how fast the majority of circuits were delivered. Figures relating to 100% of orders are published on eircom's website.

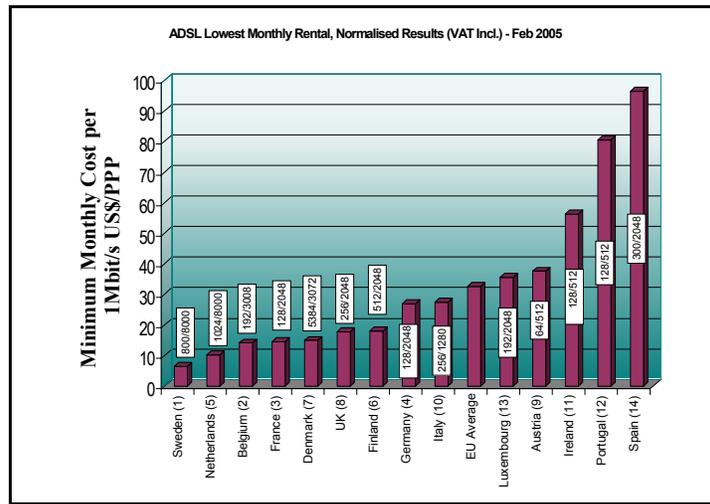
³⁶ 1) Delivery lead-time is shown for 95% of orders delivered in the period 2) Sub 2mb deliveries include digital circuits with transmission speeds of less than 2mb. 3) The statistics provided relate to orders from other authorised operators only. 4) Other interconnect circuits are not included in the statistics.

Allied to the relatively late launch of ADSL in the Irish market, initial tariffs were high by European standards. However eircom has introduced a series of price cuts in the past 2 years and allied to the increasing availability of ADSL products from competing operators and the introduction of free trials by a number of operators, broadband take-up is accelerating.

The following two ADSL baskets should be looked at together to get the most complete picture of ADSL prices across the EU.

Lowest Monthly Rental ADSL Basket (Normalised)³⁷

- Ireland’s position has fallen by one place to 12th and is now three places behind the EU average. It is envisaged that there will be an improvement in this statistic based upon the recent announcement that in line with other countries eircom will be increasing the headline speed of its DSL products for the same price.



N.B. Greece has not yet been included because the pricing of the ADSL product available is excessive.

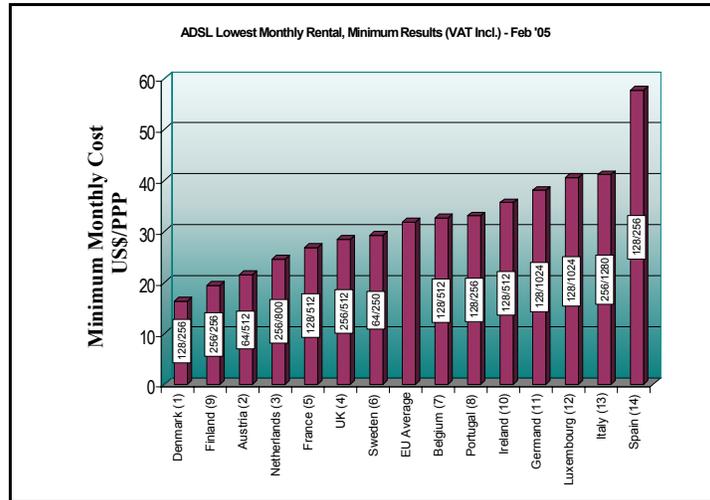
Figure 3.12: Lowest Monthly Rental ADSL Basket (Normalised) – Feb 2005.

Lowest Monthly Rental ADSL Basket (Minimum)³⁸

- Ireland’s position in this basket has not changed much in the past year at 10th place, two places behind the EU average.

³⁷ The normalised (1Mbit/s) results show the cheapest offering in each country, per 1 Mbit/s of service. This method may favour countries offering higher speeds. Figures in boxes represent the upload/download speed (kb/s) of the service offered.

³⁸ The minimum results show the lowest monthly rental charge offered in each country. This method may favour countries offering lower speeds. Figures in boxes represent the upload / download speed (kb/s) of the service offered.



N.B. Greece has not yet been included because the pricing of the ADSL product available is excessive.

Figure 3.13: Lowest Monthly Rental ADSL basket (Minimum) – Feb 2005.

3.5.2 Access to services

Broadband penetration in Ireland is among the lowest in the EU-25 as can be seen from the chart below.

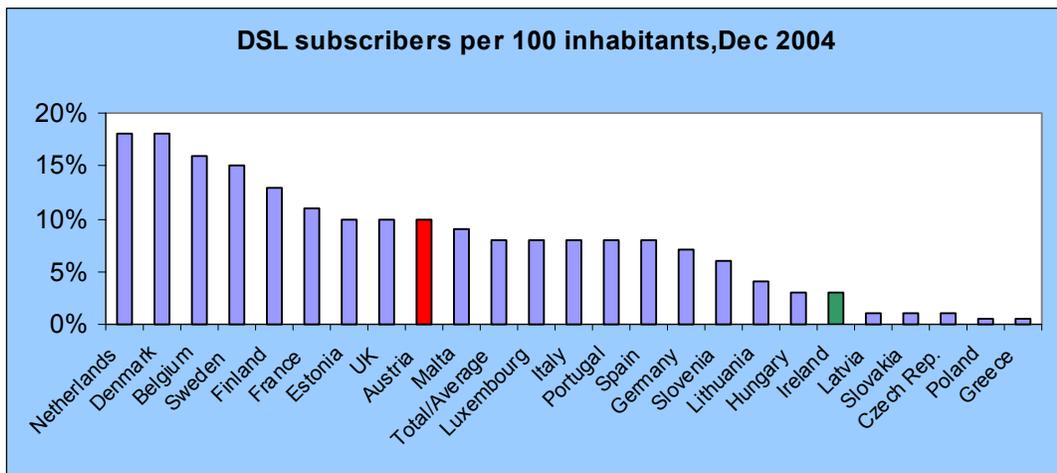


Figure 3.14 Broadband take-up in the EU-25 ³⁹

DSL coverage in Ireland is currently around 80%. Eircom has announced a target of rolling out broadband over ADSL to exchanges serving 90% of the population by March 2006. This does not mean that all subscribers connected to these exchanges will be able to avail of broadband, since a certain percentage of lines will not be suitable for ADSL, because of the length or quality of the line.

Eircom has also set itself a target of 500,000 DSL subscribers by December 2007.

³⁹ Source: ECTA

Given the fact that not all users can avail of DSL because of issues with line failure and distance from the local exchange to the last mile into the customer's premises, alternative broadband technologies such as wireless and satellite can fill this broadband gap.

To this end ComReg has issued Fixed Wireless Access Local Area licences, which are mainly being used by alternative broadband providers. At present, approximately 11,000 customers are receiving broadband through these FWALA operators.

Cable companies are also rolling out broadband services. However cable modem services are only available to approximately 8% of households and while both NTL and Chorus have announced funding programmes for broadband investment in Ireland, cable competition is still slow to develop.

The Government has also moved to address broadband supply deficits in specific regions by means of targeting funding for the regional MANs and demand-driven initiatives such as the Group Broadband Scheme.

3.5.3 Quality of service

As with other services ComReg gathers much information on broadband quality of service by means of end-user surveys. A survey carried out by Amarach Consulting in June 2004 for ComReg indicated that 59% of residential narrowband Internet users would consider switching to broadband if it delivered higher quality of service.

With regard to business users, Comreg's 2004 data-communications survey found that 83% of SMEs and 88% of corporates were satisfied that stated delivery times for DSL services had been met by their supplier. In addition over half (57%) of both SMEs and corporates stated that they did not intend to switch their broadband supplier based on the fact that they were happy with current service levels.

3.5.4 Degree of competition

Under the new EU regulatory framework ComReg completed its analysis of the market for the supply of **wholesale broadband access** services, a market which covers 'bitstream' access and self-supply by cable operators and Fixed Wireless Access ('FWA') operators.

ComReg conducted an analysis of the relevant market to decide whether or not it is effectively competitive and came to the view that eircom is dominant in this market having a market share of 85%, with a number of OAOs sharing the remaining 15%.

In addition based on an analysis of the market for unbundled local loops, ComReg has also found eircom to be dominant with 100% market share.

In consequence ComReg has imposed a number of remedies on eircom in an attempt to introduce more competition into the broadband market.

4 Regulatory Options

4.1 Introduction

Where a given result can be achieved by competitive forces, this is always more desirable than attempting to achieve the same result by regulation. Regulation can never be perfect. It is subject to the problem of information asymmetry, whereby the regulated firm knows more about the subject than the regulator, and can withhold or selectively provide information in order to influence the regulatory outcome. It can be difficult for regulators to achieve the correct balance between promoting competition and protecting the networks of users; for instance, measures designed to ensure that dominant operators do not impose a “margin squeeze” on their competitors, by setting wholesale and retail prices in such a way that it is impossible even for an efficient operator to make a profit, may delay the introduction of tariff changes, to the detriment of consumer welfare. And the necessity for transparent decision-making, expressed in the current regulatory framework as the need to carry out both national and international consultations prior to the imposition of obligations on dominant operators, introduces considerable delay into the process, so that regulators may be dealing with problems which, in the fast-moving world of telecommunications, are now out of date.

In the ideal world, therefore, there would be sufficient inter-platform competition at the infrastructure level to obviate the need for much sector-specific regulation. There may, however, continue to be a need for an obligation to interconnect at the wholesale level, because otherwise network effects could unfairly advantage firms already in the market, as opposed to new entrants. This is because customers of the new entrant must be able to contact, or connect with, customers of the existing firms in the market. New entrants may be in a weak position to negotiate such agreements with firms already in the market.

If infrastructure-based competition does not develop to the point where no single operator controls the facilities needed to offer retail services, then regulation must focus next on the wholesale level. In order to promote competition in retail markets, the appropriate wholesale inputs must be made available, on a transparent and non-discriminatory basis, to allow operators to package and bundle them in a way which best meets the needs of subscribers. If wholesale markets operate efficiently, so that retail markets become effectively competitive, then the need for regulation at the retail level should be accordingly scaled back.

It must be recognised that a national regulatory authority (NRA) like ComReg does not apply economic concepts in a vacuum, and that its freedom of action is circumscribed by national and EU legislation. In the case of telecommunications markets, the trigger for regulation is a finding of “significant market power” (SMP) on a given market. NRAs are given, as a starting point, a list of eighteen markets identified by the European Commission as being susceptible to ex-ante regulation. ComReg must review each of these markets. If it finds the market to be effectively competitive – in other words, if there is no dominant operator – it must withdraw any operator-specific regulation. If it finds one or more firms to be dominant, it must apply appropriate obligations from a list contained in the

Access and Universal Service Directives. These obligations must be proportionate, justified and related to the nature of the competition problem identified.

The requirement in the regulatory framework to remove obligations where a market is found to be effectively competitive is an inbuilt “sun-setting” mechanism, aimed at ensuring that regulation is imposed only where it is necessary. This is an important element of any light-handed and proportionate regulatory regime.

4.2 Infrastructure-based competition

As stated above, the ideal outcome for telecommunications markets would be one in which operators using a number of different platforms – traditional fixed telephony network, cable TV networks, wireless, power line communications – compete vigorously with each other. This competition could take place either by the network operators providing services to end users themselves, or through the provision of wholesale inputs to other operators who then supply services to customers. In this ideal scenario, the focus of regulation would be likely to shift to ensuring the availability of scarce resources. Thus regulation might concentrate on ensuring the ready availability of spectrum, whether on a licensed or an unlicensed basis, or on resolving issues about the sharing of infrastructure (masts, ducts, manholes etc.). As pointed out above, however, there might still be a necessity for some form of regulation to ensure end-to-end connectivity, to ensure that new entrants are not disadvantaged vis-à-vis existing operators.

It might be argued that the current situation is very far from the ideal. But decisions taken by regulators in today’s world can influence the rate of progress towards the ideal scenario. One of the most important issues is how the setting of access prices can influence the build-or-buy decisions of new entrants.

Telecommunications markets are not simple, and regulators are faced with a multitude of inter-related pricing decisions. If they give the wrong signals, they can perpetuate service-based competition at the expense of infrastructure-based competition. If they set access prices too low, new entrants will never have any incentive to build out their own networks, since they could never match the price of buying wholesale inputs from the incumbent instead. If they set access prices too high, they can artificially encourage entrants to build new facilities even where it is not economic to do so – the “inefficient entry” problem. This can damage competition in the long term, since new entrants may go out of business, investment is wasted and the incumbent’s position is further entrenched.

ComReg is conducting a separate consultation on its spectrum strategy (document 05/01a, “Preparing the Radio Spectrum Management Strategy for 2005-2007, available at www.comreg.ie), which proposes a number of methods for making access to spectrum easier and more cost-effective. Current trends in spectrum management are summarised in Section 10, “Spectrum”. Broadly, there are two main trends. The first is to define more precisely the rights and obligations attached to spectrum rights of use, with a view to allowing market mechanisms to operate wherever feasible. This involves creating tradable rights of use, and also allowing greater flexibility so that, for example, a given piece of spectrum is not

confined to a single application, such as broadcasting, but could be used for fixed, mobile, broadcasting or other uses, provided that interference is not caused to other users of the spectrum. This approach is intended to allow spectrum to be used for the applications where it is most valued.

The second trend could loosely be described as the “spectrum commons” model. In this approach, spectrum is regarded as a shared, rather than a scarce, resource. Wireless technologies which do not depend on an exclusive use of spectrum are already in the marketplace. Over the next five years, technologies which can intelligently adapt themselves to their spectrum environment – by varying the frequencies and power levels used in response to the level of interference encountered – are likely to emerge in commercial systems. Such systems are often known as agile, smart, cognitive or software-defined systems.

In Section 10, we invite comments specifically on our approach to spectrum management. We would also appreciate suggestions as to how we can better promote other forms of infrastructure-based competition.

Q. 3 How can ComReg best incentivise infrastructure-based competition in the Irish market?

4.3 Wholesale regulation

Where infrastructure-based competition has not developed to the point where no single operator is dominant on any telecommunications market, the need for wholesale regulation arises. This form of regulation is aimed at curbing the exercise of market power in an anti-competitive way (as opposed to retail regulation, which is generally aimed at preventing exploitative abuses of dominance, such as excessive pricing.) Where an operator has control of bottleneck facilities, wholesale regulation is generally aimed at allowing other operators to have access to those facilities. However, an access obligation (as laid out in the Access Regulations⁴⁰) must generally be supported by other obligations, such as transparency, non-discrimination, accounting separation, price control and cost accounting.

The European Commission’s list of eighteen markets susceptible to ex-ante regulation includes three wholesale mobile markets and one wholesale broadcasting market. Since the issues they raise are different to those in fixed markets, they are dealt with separately at the end of this section.

Wholesale regulation is a difficult task. Not only must regulators try to set the appropriate price for each form of access, they must ensure that the relativities between prices for different forms of access are set appropriately. Otherwise,

⁴⁰ The European Communities (Electronic Communications Networks and Services) (Access) Regulations 2003; (SI No. 305 of 2003).

they run the risk that access seekers will migrate from more infrastructure-based to more service-based forms of competition. An example is the regulation of the wholesale inputs required to provide retail leased lines. Under the 1994 Leased Line Directive, several years before the full liberalisation of the sector, Telecom Éireann were required to make available a wholesale leased line product, to facilitate the provision of value added services by other operators. Historically, wholesale leased lines have been priced at a discount to the retail price, rather than at a cost-oriented price. Moreover, wholesale leased lines are a pure resale product: they are provided by the incumbent on an end-to-end basis, and are either re-sold by the OAO, or used to construct other services. In order to reward operators who built out their networks, and thus provide the stimulus for more infrastructure investment by alternative operators, in 2003 ComReg introduced Partial Private Circuits (PPCs). These allowed an operator to construct end-to-end circuits partly from their own infrastructure and partly from eircom inputs offered at a cost-oriented price. The fact that PPCs give operators a better price than leased lines provides the appropriate signals in terms of rewarding infrastructure build-out.

Where entrants are reliant on wholesale inputs from the incumbent, the principle of non-discrimination is paramount. According to Recital 17 of the Access Directive⁴¹,

“The principle of non-discrimination ensures that undertakings with market power do not distort competition, in particular where they are vertically integrated undertakings that supply services to undertakings with whom they compete on downstream markets”.

If put into practice, this principle would mean that the wholesale department of eircom should treat Other Authorised Operators (OAOs) equally with their own downstream retail arm. Other operators would have equal terms and conditions, would have faults rectified just as quickly, would have the same access to the wholesale arm in terms of requesting new product development, etc. ComReg has now carried out market reviews of four wholesale fixed markets (unbundled local loops, wholesale broadband access, and trunk and terminating segments of leased lines), with another three pending. To date the overwhelming feedback from OAOs is that they do not receive equivalent treatment. Given the complex nature of most wholesale products, it is impossible for the regulator to anticipate all the ways in which access seekers can be discriminated against; they can only be dealt with on an ex-post basis. This entails delays in the introduction of innovative services, and deprives consumers of the benefits of competition in terms of price, choice and quality.

Given the issues identified above and if the market here is to develop into a fully competitive one then further change will be necessary. In this context a number of different options exist. These could range from behavioural change supported by appropriately transparent organisational structures to structural change – the

⁴¹ Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities.

vertical separation of eircom. While ComReg does not itself have the power to require the structural separation of eircom into separate wholesale and retail companies, it is worth noting that the Courts possess such a power under Section 14 (7) of the Competition Act, 2002.

While, theoretically, the separation of eircom into wholesale and retail companies (as opposed to the current notional separation into different business units within the same company) would remove any incentive for it to discriminate in favour of its own downstream arm, it must be recognized that it would not provide either a quick or easy solution.

The following table sets out what the separation of eircom could potentially achieve:

-	increase equality of access (removing any means and incentive for discrimination)
-	prevent any leverage of market power from one area to another
-	potentially allow deregulation in certain areas
-	encourage competition in more advanced broadband access

However, implementing measures of this magnitude would be difficult from a regulatory perspective. It would be difficult to determine exactly where to make this separation of eircom, particularly during a period of NGN migration. Furthermore, a complex and extensive investigation would be required, where other potential solutions would also have to be investigated and considered equally.

Such an action could inadvertently have some negative impacts on the market:

-	Could prevent investment in the short-term (particularly from eircom)
-	Cause disruption to the industry which is currently in a state of growth
-	Result in reduced investment from alternative access providers (embedding market power in eircom's access network)

Q.4 Do you agree with ComReg analysis that further improvement is necessary at the wholesale level to facilitate the development of a fully competitive market place here in the interests of Irish consumers? If so, what would be the best way to ensure equal treatment between OAOs and eircom's own downstream retail arm?

Much of the debate about the need for wholesale regulation centres about the idea of control points, or bottlenecks. In the ideal scenario, with infrastructure-based competition, no bottlenecks would develop. In reality, however, given the pace of technological change and the increasing convergence between telecommunications and media, it is likely that new control points will develop. The implementation of next generation network architectures could potentially facilitate the creation of new control points, or allow existing ones to be manifested in different ways, where operators could leverage their control over certain aspects of network operation to limit another operator's ability to compete. This is dealt with in more detail in Section 8. Furthermore, given the convergence between telecommunications and media, in next generation networks control points could be developed by non-network operators also – e.g. service providers, software vendors, content providers. Section 9 provides more detail on this.

4.4 Retail regulation

The new regulatory framework makes it clear that retail remedies should only be applied (a) where an operator has significant market power in a retail market and (b) where wholesale obligations would not result in the achievement of the objectives of the Framework Directive. In theory, the availability of wholesale inputs on a non-discriminatory basis to OAOs and to eircom's own retail services should gradually erode market power at the retail level. In practice, eircom's share of retail markets has remained high: 99% in lower level access, 77% in higher level access, 68% in international calls, and 87% in domestic (local and national) calls.

Detailed regulation of retail prices is difficult to get right in any industry, given the information asymmetries that characterise the relationship between the regulator and the incumbent firm. It is particularly problematic in the fast-moving communications sector, which is characterised by a high rate of technical innovation and by increased bundling of previously separate products. In order for consumers to be able to gain the benefits of innovation, operators – both incumbents and new entrants – need to be able to move quickly.

On the other hand, allowing a dominant operator the freedom to price as it sees fit at the retail level creates the possibility of a number of abuses, both anti-competitive and exploitative. This is recognised in the Universal Service Directive, which allows regulators to impose requirements “that the identified undertakings do not charge excessive prices, inhibit market entry or restrict competition by setting predatory prices, show undue preference to specific end-users, or unreasonably bundle services.” National regulatory authorities may impose retail price caps, measures to control individual tariffs, or cost-orientation obligations. It is clear, therefore, that the Directives foresee this type of problem arising from the unfettered exercise of market power.

Regulators therefore face a difficult task in balancing light-handed regulation and allowing the market to work, on the one hand, with protecting consumers against exploitation and competitors against abuse, on the other hand. It may be the case that regulation needs to be more finely tuned to take account of the different state

of competition in different markets. It might be possible in the future, for instance, to remove pricing controls on local and domestic calls (as has already been done for international calls, with no apparent harm resulting to consumers), while retaining price controls on areas where eircom's dominance is more extreme and where competition is unlikely to develop – for instance, in the lower-level retail access market. Regulation of call charges would then focus on the availability of wholesale inputs and the requirement, at the retail level, to provide clear and accurate information to consumers. While eircom's market share in local and national calls is still such that their inclusion within the price cap of CPI-0% is a necessary measure to protect customers, this cap is viewed primarily as a safeguard measure.

The future shape of retail regulation will depend, to a large degree, on how competitive voice markets are. This, in turn, will depend on both the level of competition within fixed voice markets, and on the degree of convergence between fixed and mobile services. These trends are dealt with in more detail in Sections 7 and 9, respectively. In its current round of market reviews, ComReg, in common with other European regulators, has concluded that fixed and mobile voice are not in the same market, mainly because they offer different functionality and because mobile is much more expensive. As outlined in Sections 7 and 9, however, both fixed-mobile substitution (where consumers increasingly regard both types of call as interchangeable) and fixed-mobile convergence (where operators begin to offer packages which combine features of both services) are likely to increase in the future. If this happens, no single operator may be dominant on any voice market, and the need for operator-specific regulation (i.e. regulation which is based on a finding that an operator has dominance, or SMP, on a particular market) may fade away.

As outlined in Section 11, Government policy for social inclusion and the development of the information society is an influential factor in the telecommunications sector. Universal service in telecommunications is defined in the Universal Service Directive as “the provision of a defined minimum set of services to all end-users at an affordable price”. It includes the provision of access to the public telephone network at a fixed location, at an affordable price and is designed to ensure that all users are able to avail of telecommunications services, recognising their importance for participation in society. The scope of the Universal Service Obligation is due for review by the European Commission in 2005. It is difficult to predict how these requirements should or might evolve in the future. On the one hand, it might be considered that such facilities might best be provided by the market, in which case there might be no need for any further regulation specific to the telecommunications industry, over and above general consumer protection legislation applicable to all industries. On the other hand, telecommunications is regarded as so fundamental to economic development, and access to telecommunications services by citizens as so vital for their participation in society, that it might be considered important to strengthen these obligations.

In addition, the current regulatory framework and, in particular, the Universal Service Directive, also imposes certain requirements on all providers of publicly available telephone services. These include the requirement to provide consumers with a written contract stating terms and conditions, the requirement for tariffs to

be readily accessible and clearly understandable, and the requirement to provide access to the emergency services, free of charge.

- Q.5 How can ComReg achieve the right balance, at the retail level, between light-handed regulation and the prevention of abuses of dominance? Can the availability of wholesale inputs on a non-discriminatory basis allow the relaxation of retail regulation?**
- Q.6 Will substitution and convergence between fixed and mobile services reduce or eliminate the need for retail controls on a dominant operator?**
- Q.7 What, if any, retail controls should be applied to all operators providing voice services to consumers?**

PART TWO

Forward-looking Analysis of Key Emerging Trends

5 Introduction

This part of the document takes a forward-looking view of the telecommunications sector in Ireland, and attempts to explore the regulatory impact of the key emerging trends. Its focus is on the future development of the telecoms sector in Ireland over the next 5 years. A number of techniques are used throughout this part of the document to help explore potential developments in the Irish telecoms sector.

Scenario analysis is used to help stimulate thought on how potential trends could affect the future telecoms environment in Ireland. Two simple scenarios are presented:

Fibre-nation: A positive scenario characterised by competitive conditions and investment in telecoms infrastructure, systems and services.

Hiber-nation: A less positive scenario where low demand and a lack of private investment in modern infrastructure and services lead to a much slower growth in telecoms services with limited end-user benefits.

Fibre-nation	Hiber-nation
<ul style="list-style-type: none">- Commercial investment in infrastructure and services- Widespread adoption of new technologies- Reduction of traditional barriers to entry, and the emergence of new ones- New business models & services	<ul style="list-style-type: none">- Lack of demand and adoption of technology- Government investment in infrastructure is needed to substitute for lack of private investment- Fear over security and complexity- Lack of platform competition

These scenarios are developed in Section 6 and throughout this document.

Potential operator and regulatory strategies with respect to emerging trends are also considered. The report goes on to look at likely trends and their potential effects with respect to current trends and market structures. These likely trends are divided into five key categories which form the basis of the chapters of this document:

The Evolution of Voice Markets: Voice services are of key significance due to their history as the central telecommunications service and basis for network infrastructure and regulation. Fundamental changes to voice markets currently underway have very important implications for operators.

Key trends explored	- Fixed mobile substitution
	- The adoption of VoIP
	- Changes in tariff structures
	- Disaggregation of voice networks

The Migration to Next Generation Networks: The move towards IP technology and next generation networks, which can integrate multiple different services, has the potential to change the way operators deliver telecommunications services and offer major cost savings.

Key trends explored	- The speed of adoption of next generation networks
	- The return of the ASP (Applications Service Provider) model
	- New control points
	- Other potential issues during migration

User Access and Content Delivery: With convergence between new technologies and existing technologies and services, the way in which consumers access communications services is likely to undergo significant transitions.

Key trends explored	- New control points
	- Convergence of media and telecoms sectors
	- Fixed mobile convergence

Radio frequency Spectrum: The radio frequency spectrum is an important natural resource which must be utilised to achieve maximum social and economic benefits in Ireland.

Key trends explored	- Spectrum trading
	- Spectrum liberalisation (change of rights of use)
	- Disruptive wireless technologies (e.g. nomadic wireless)

Universal Service Obligations: Universal service obligations are used to ensure that all citizens have access to basic fixed telecommunications services. However, these could be affected by an increased availability of commercial offerings, and changing social needs (e.g. access to broadband services).

Potential trends explored	- Broadening of USOs
	- Narrowing of USOs
	- The affect of NGN's on USO

Summary of Key Points

A number of potentially important trends are highlighted in this part of the document. Key points are summarised below:

- **Investment in telecoms infrastructure:** Investment is needed in both access capacity, beyond what is considered broadband today, and in next generation network architectures (e.g. IP⁴², IP Multi-Media System (IMS) etc) if consumers and service providers are to benefit from the potential of next generation networks, and Ireland is to remain competitive. There are some indications that this investment is beginning in Ireland.
- **Convergence in the sector:** Convergence is likely to occur between different aspects of the telecoms sector including technologies, services, and markets. Nomadic wireless technologies such as Wi-Max are likely to play an important role in fixed mobile convergence. Developments in the area of radio spectrum management could impact on this.
- **Adapting regulation:** Increased competition at various levels is likely to emerge as next generation networks are adopted which could reduce barriers to some forms of market entry. This may result in an opportunity for some regulation to be withdrawn or lessened. On the other hand, more radical measures to increase competition up to even the separation of eircom's network and retail businesses into separate companies⁴³ would ensure non-discrimination of access to infrastructure, enabling OAOs to be more innovative in terms of quality, service and price in the interests of the Irish consumer. As next generation networks emerge they could also create the potential for new barriers to entry or bottlenecks ('control points') to emerge. This is likely to require regulatory attention.
- **The changing social role of telecoms:** The importance of telecoms for social inclusion is increasing as we integrate telecoms further into our lives. How we use telecoms and the types of services that we use continue to change. This calls for careful attention to be paid to ensuring that the needs of all sections of society are met. As next generation networks develop the role of universal service obligations may also need to develop accordingly.

⁴² Internet Protocol

⁴³ See Section 8.3.1

6 Scenario Analysis and Strategies

In this section a simple scenario analysis looking at general economic issues is carried out. Scenario analysis is used to help explore issues that may emerge by examining hypothetical situations in the future. Predicting particular outcomes or choosing one trend over another is not the intended purpose of this analysis. Trends and themes described in these scenarios are highlighted in greater detail in the analysis that follows in sections 7 to 11. Two hypothetical scenarios are presented: an optimistic scenario characterised by competitive conditions ‘Fibre-nation’ and a pessimistic scenario with much slower growth in telecoms services ‘Hiber-nation’.

Fibre-nation	Hiber-nation
<ul style="list-style-type: none">- Commercial investment in infrastructure and services- Widespread adoption of new technologies- Reduction of traditional barriers to entry, and the emergence of new ones- New business models & services	<ul style="list-style-type: none">- Government investment in infrastructure is needed to substitute for lack of private investment- Lack of demand and adoption of technology- Fear over security and complexity- Lack of platform competition

6.1 Scenario 1: 2010 - “Fibre-nation”

A period of continuous stable economic growth between 2005 and 2010 has had positive effects on the telecommunications sector. A more positive investment climate has given rise to significant increases in infrastructure at various levels (core and access), from both eircom and other operators - fixed, wireless, and cable. Increased levels of alternative infrastructure have led to thriving competition throughout the sector. The government fibre MANs initiative successfully facilitated competition from new entrants, typically providing broadband access through FWA and LLU, giving them a platform to increase their own infrastructure. A wide range of services, available in various integrated packages, is available to consumers and business users alike. Irish people have increasingly adopted advanced telecoms services as part of their everyday lives and generally have an appreciation for the security and privacy implications that come with them.

Voice and Next Generation Networks

There was a fast transition to VoIP with most voice services now entirely IP based, except for some access segments in outlying rural areas. 3G mobile also now utilises VoIP. VoIP emerged as part of an evolution from integrated vertically connected networks and services to disaggregated horizontal market structures where services are completely separated from the provision of network capacity, although network providers typically also provide services. 2G mobile is mostly used for pre-paid voice and SMS service, as most post-paid customers have migrated to 3G. A key event was the establishment of “Multi-Network

Service Operators” (MNSOs) owning no network infrastructure, but providing integrated bundles of services delivered seamlessly over multiple different infrastructures (e.g. fixed, 2G & 3G mobile, and nomadic systems) owned by others.

The introduction of VoIP led to reduced revenues from standard voice services, which had the effect of forcing operators who relied on these revenues to adapt. Incumbent operators (in Ireland and globally) facing this challenge generally moved towards providing complete integrated telecoms solutions, forming partnerships and other business relationships where necessary. This period of consolidation resulted in some start-up voice service providers being absorbed by larger existing operators. The introduction of innovative new services (such as virtual office desktops for SMEs), in some cases enabled by VoIP, was important for new revenue generation during the transition period.

Convergence between different types of services and networks increased the flexibility and choices available to telecoms consumers (e.g. 3G, Wi-Max, Wi-Fi combined devices). Other more advanced mobile and nomadic wireless systems are now being overlaid on these networks (e.g. IEEE 802.11n, 802.20, more advanced 3G technology). Mobile operators have migrated many of their customers to 3G, through advanced data services and the introduction of new handsets. However, it is integrated 3G and Wi-Fi/Wi-Max services that are proving the most compelling. Mobile video content is provided through Digital Video Broadcast (DVB) networks operating in partnership with both fixed and mobile operators, although video applications have not yet emerged to the same extent as audio applications. Emerging video content typically involves short mobile soap operas, news headlines, sports highlights⁴⁴, and promotional advertisement content. The traditional distinction between fixed and mobile operators is often less clear, as many operators offer integrated services in both areas. The key competitive battle ground is no longer network infrastructure but rather access to single billing and single secure sign on arrangements for both content and delivery which have made life much simpler for the user.

DSL penetration is high, enabled by increased fibre roll-out into the network (by both eircom and alternative operators), although there is a significant divide in the speeds available in rural and urban areas, with higher speed advanced DSL technologies such as VDSL⁴⁵ available in some urban areas. Most DSL subscribers use what is known as ‘naked DSL’ where their voice services are delivered using VoIP on the DSL connection. Many businesses now avail of direct fibre access services, along with some newly built housing developments. The widespread adoption of DSL has led to growth in fixed line connections, slowing fixed-to-mobile substitution in terms of subscribers (fixed-to-mobile substitution is apparent in terms of voice traffic). FRIACO has reduced significantly as customers have migrated to broadband where available.

⁴⁴ e.g. localised broadcast information and video content at sporting events – i.e. electronic match programmes.

⁴⁵ VDSL – Very high speed Digital Subscriber Line

Regulation

Investment in new next generation infrastructure and network upgrades has reduced many of the traditional barriers to entry associated with vertically integrated network operators, thus reducing the need for 'traditional' regulation. As well as this, increased integration and substitutability of fixed and mobile services has led to the treatment of voice as a single market. Many believe that the need to differentiate between voice and data markets is diminishing. The fast pace at which new technologies were introduced into developing markets has led to the emergence of new control points in operators' networks. These presented new regulatory challenges which have taken time to adjust to. Several new interconnection products were developed early on to encourage the deployment of next generation networks on a level playing field (e.g. IP interconnect, Ethernet interconnect, bitstream with quality of service control). The use of peering facilities such as INEX have helped internet service providers to grow their businesses. ComReg facilitates co-operation between operators on access to application programming interfaces (APIs) necessary for providing advanced services over other operators' networks.

6.2 Scenario 2: 2010 - "Hiber-nation"

A period of reduced economic growth, more in line with average European levels, combined with a continued rise in labour costs has helped contribute to poorer economic conditions for investment in the telecoms sector. In the absence of the threat of strong competition and investment from alternative operators there has been little incentive for eircom to invest in new services or infrastructure. This lack of investment has also slowed fixed broadband and cable broadband rollout, and left many users more reliant on mobile services (where 3G has progressed steadily although with fairly basic services only). The larger 3G networks are more cost effective through greater economies of scale. Higher speed 3G services look set to become the main means of broadband access, with users choosing mobility over fixed offerings. Government investment is required to stimulate infrastructure and demand initiatives to meet government policy objectives. Limited user demand has helped to discourage private investment. A prolonged period of underdevelopment has made Ireland less attractive to technology firms and the strong knowledge base has decreased as technology workers migrated and 3rd level science and technology student numbers diminished. Consumers have adopted communications services in isolation from one another, carrying out separate tasks on separate devices (i.e. mobile phone for voice and text, PC for email and internet, TV for broadcast video, etc.). A generally more wary public with sceptical and fearful attitudes toward new technology has resulted from increased levels of fraud, viruses and spam.

Voice and Next Generation Networks

A lack of investment and innovation has led to a lack of convergence between services. Existing operators have maintained significant vertical control over customers. Slow broadband penetration stifled early attempts by pure VoIP operators to gain market share. Now VoIP mainly exists in core networks, where operational cost savings encourage migration during normal upgrade cycles, and in corporate network solutions where the buying power of large customers is

sufficiently strong to demand it. Due to a lack of investment in network infrastructure VoIP offerings are still generally considered to be inferior in terms of quality of service.

While the adoption of mobile services has occurred at a slightly faster pace, the adoption of fixed wireless access has not spread despite initially showing signs of promise. Wi-Max and some proprietary technologies are provided in high density urban areas, by a number of fragmented operators. Initial plans to create networks of Wi-Max hotspots by existing fixed and mobile operators were scaled down significantly. Public concerns over potential health hazards of wireless masts are high particularly when close to schools and outside urban areas.

Regulation

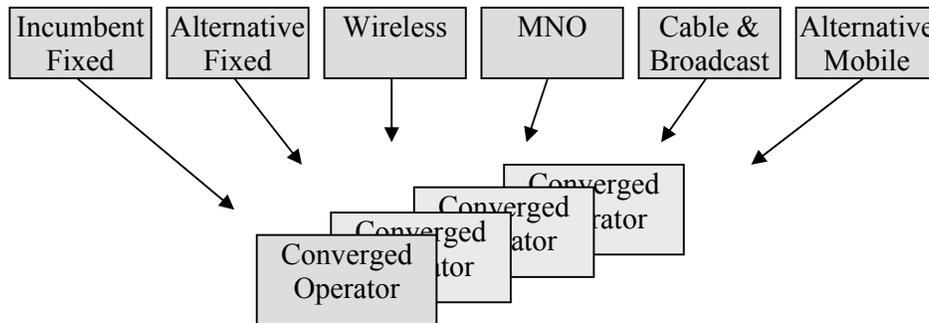
The bottlenecks in access remain as platform competition develops slowly. The need to ensure other operators are protected against margin squeeze in tight margin products is a feature of regulation in this scenario.

Q.8 Do you have any comments on the Fibre-nation and Hiber-nation scenarios presented above? What other scenarios do you think would be useful to explore?

6.3 Operator Strategies

This section looks at key Irish operators in relation to strategies and trends, and considers how they might develop over the next 5 years.

With convergence between different areas of the telecoms sector service providers and operators find themselves facing larger addressable markets, but also falling revenues from voice services and greater levels of competition from a larger number of industry players. Therefore the need to expand combined with the need to cut costs and become more efficient is ever present.



Predominantly Fixed Operators:

In general terms fixed operator strategies are likely to involve continuing to cut costs, retaining market share against competition from mobile and other areas, and maintaining control over the customer relationship (i.e. avoiding becoming infrastructure operators only). Transforming themselves into complete IT solutions providers could help them maintain this control in the future. Incumbent fixed operators have the opportunity to keep ahead of alternative operators by investing in new technologies, particularly if they are innovative. Migrating customers to broadband will continue to be important for generating new revenues as traditional voice revenues continue to decline. Furthermore investment in higher capacity broadband technology will be important to fend off the threat of fixed to mobile substitution and as mobile services become more advanced. Fixed mobile convergence is another potential strategy for fixed operators, through convergent nomadic or portable wireless technologies⁴⁶ (e.g. Wi-Fi, Wi-Max), through an MVNO, or by means of acquisition of a mobile operator. The strategic focus for alternative fixed operators is likely to be more biased towards acquiring new customers. They are likely to continue to target high-end users. Unbundling local loops and investing in infrastructure will continue to be important and as demand for higher capacity services increases. A growing reseller fringe offering calling cards and basic reselling of calls to residential and niche markets is likely to continue. Nearer term strategies are identified for several key operators below:

⁴⁶ See Section 9.3.3 on fixed and mobile convergence.

Incumbent Fixed

eircom's recent strategy is focused on the Republic of Ireland and Northern Ireland (corporate market) and the company has pulled back from its international ambitions (for example, in the UK). The company, similar to other incumbents who have spun off mobile arms, is looking to broadband access services as the predominant growth area as competition continues to put pressure on fixed telephony revenues. eircom is likely to consider re-entering the mobile market either through an MVNO or an acquisition. A key result of the acquisition of eircom by Valentia was to reduce eircom's historically high level of capital expenditure relative to its size. eircom is continuing to invest in DSL roll-out and plans to have 500,000 broadband connected customers by December 2007⁴⁷. eircom recently announced a €10 million investment in VoIP, and plans to begin offering services to government customers in 2005. Following trends set by incumbents in other countries it is likely that eircom will adopt a more comprehensive VoIP and next generation network strategy.

Alternative Fixed

Esat BT continues to integrate its operations more closely with that of BT, its parent company. Through the interconnection of the two companies' networks Esat BT is likely to be increasingly strong in targeting the business sector (particularly those businesses with international voice and data connectivity requirements). The company is building on its position as a major business and residential ISP and continues to promote the dial-up as well as the broadband markets – for example through its successful lobbying for the introduction of FRIACO to support flat-rate dial-up. However Esat BT is also looking to convert its customer base to broadband accounts with its dual strategy of using targeted LLUB in combination with resold bitstream access. Esat BT sees itself as a service innovator and as a competitively-priced provider.

Smart Telecom has a strategy to utilise the availability of alternative national backbone networks (e.g. the fibre MAN⁴⁸s) and the capabilities of its IP-based technology platform to satisfy the demand for broadband based voice and data services in the Irish market. Smart Telecom plans to invest in the rollout of a network of optical rings, targeted primarily at corporate customers nationwide. The network positions Smart to acquire corporate customers by direct fibre connection and to acquire residential customers through the installation of IP-DSLAMS in local exchanges, i.e. unbundling the local loop.

International operators present in Ireland (for example COLT, Equant, and MCI), which typically do not have extensive network infrastructure outside Dublin, are likely to remain focused on the business market, providing competitive international voice tariffs for indirect access telephony and data services. During 2003, Energis Ireland increasingly focused on the business and carrier markets and discontinued its fixed residential services.

⁴⁷ <http://investorrelations.eircom.net/pdf/ResultsQ304pres2004.pdf>

⁴⁸ Metropolitan Area Network.

Wireless

A number of broadband FWA operators (such as Digiweb, Leap Broadband and Irish Broadband) are attempting to build up a customer base. These operators have the potential to capitalise on the lateness of eircom's launch of DSL services and on Ireland's relatively low population density, by serving customers currently out of reach of DSL services. With further developments in technologies such as Wi-Max, these operators will have the capability to begin moving into the mobile sector with broadband portable or nomadic products.

Cable, Broadcast and content providers

Developments in telecoms technology and digital media are opening up a whole range of alternative options for broadcast and content providers to deliver their products. The strategic goals of these service providers are likely to involve leveraging their brand power to distribute their products through telecoms channels, while at the same time maintaining as much control over their customer relationships as possible. For broadcast carriers there is an emerging threat of competition from telecoms operators with higher capacity broadband networks capable of carrying digital television services, and attractive offers that bundle TV content with internet access and telephony. These operators must upgrade their networks if they are to be able to offer competitive TV, internet and communications services in the future. Partnerships between broadcast only operators (e.g. satellite broadcasters) and telecoms operators could emerge to provide bundled offerings. Any roll-out of DTT would be likely to increase convergent opportunities among broadcast, mobile and fixed operators (e.g. DVB-H⁴⁹). ComReg's recent wireless trial licence consultation set out a scheme that could be utilised for trialling such services on a commercial basis⁵⁰.

The two main cable operators, ntl and Chorus, both offer broadband access in addition to cable TV services. Chorus has a number of old generation limited bandwidth fixed wireless connections (MMDS) in addition to coaxial cable local loops. Both companies have announced substantial investments in infrastructure. However, the future strategy for ntl remains uncertain with its proposed sale.

International broadcast operators such as Sky, while already accustomed to distributing their content with cable network operators, may have to rethink some of their programming strategy in an environment where subscribers have access to multiple other service providers (e.g. through the Internet).

Mobile:

In general mobile operators' strategies are likely to continue to focus on growing Average Revenue Per User (ARPU) while at the same time keeping costs low. Voice revenues relative to data revenues are currently more important in mobile than in fixed making the improved quality offered by 3G a potentially important

⁴⁹ DVB-H is a standard for digital video broadcasting to handheld devices currently being trialled in countries around the world.

⁵⁰ 'Opportunities for trialling wireless services and technologies in Ireland' - http://www.comreg.ie/_fileupload/publications/ComReg04115.pdf

product differentiator⁵¹. Offering new high value services will involve partnerships and distribution deals with established content providers. Mobile operators will try to maintain as much control as possible over the customer relationship as this develops. Investment in 3G networks and other high capacity technologies (e.g. Wi-Fi and other fixed to mobile convergence solutions) will be important to sustain long term growth and to compete with fixed operators as they venture into the mobile sector. The move from 2G to 3G is expected to bring greater economies of scale than with previous platforms⁵². The implementation of advanced architectures and technologies such as IMS (IP Multi-service subsystem)⁵³ will place mobile operators in a key position to offer services through other networks (e.g. other operators' fixed networks⁵⁴). The prospect of MVNOs entering the mobile market is an opportunity for existing and new operators, and Irish consumers. MVNOs could gain market share through competitive full services offerings and through low priced basic service offerings (e.g. voice and text).

Vodafone Ireland has adopted its parent company's global policy of focusing away from the low revenue pre-paid sector and concentrating on increasing post-paid and corporate subscriber numbers. To help achieve this, Vodafone has launched a range of value-added services, such as GPRS⁵⁵ and Vodafone Live!. Vodafone Ireland launched Blackberry in Ireland in April 2004 to try to retain business market share. The organisation has said that it will invest EUR1 billion in the rollout of its third-generation network. On 30 June 2004 Vodafone soft-launched the 3G network, initially providing data services to business users through its combined 3G/GPRS data card for laptops. Full services were launched in September 2004 and Vodafone plans to leverage its successful Vodafone Live! service to sign up subscribers to 3G services.

O₂ Ireland has been second to Vodafone (in terms of market share) since its launch. It is targeting higher-value customers and is building up its data services. O₂ reported that data accounted for 20.9% of O₂'s revenues in Q4 2004. In January 2002, O₂ launched a GPRS network and introduced MMS in October 2002 in response to the popularity of camera phones. O₂'s Business Solutions unit is increasingly looking to provide bespoke solutions to retain market share in the higher-value user segment. Similarly, O₂ launched Blackberry in May 2004. In a

⁵¹ Data accounted for approximately 17% of ARPU for Irish mobile operators in Q1 04: Source - Analysys, Merrill Lynch Wireless Matrix Q104.

⁵² HSBC Global Research, 'Telecoms Unplugged', November 2004.

⁵³ See Section 9.3.3 on Fixed Mobile Convergence.

⁵⁴ IMS gives operators the ability to offer advanced services in an environment where customers access from different locations (i.e. mobility). This potential enables IMS operators to offer customers access to their services via fixed or any other NGN type networks that are convenient for its customers, and eases their implementation of FMC strategies.

⁵⁵ In March 2001, Vodafone Ireland launched a nationwide GPRS network, ahead of its rivals.

deal with NTT DoCoMo O₂ intend to launch i-mode⁵⁶ in Ireland during 2005⁵⁷. O₂ is rolling out a 3G network in Ireland. O₂ also operates a number of Wi-Fi hotspots (e.g. in hotels) in Ireland which could potentially lead them to further fixed mobile convergence in the future.

Meteor Mobile launched GSM services in February 2001. Having been delayed by legal challenges, it missed out on the rapid subscriber growth of the late 1990s and 2000. In contrast to O₂ and Vodafone's focus on high-end users, Meteor's strategy has been to target a higher number of lower revenue customers by offering cheap call charges and eliminating peak and off-peak rates. As such, the organisation did not see 3G as a priority and did not bid for a 3G licence, claiming that the licence and launch costs would not make economic sense. The impact of the recent purchase of Western Wireless International by Alltel on Meteor's strategy, and ownership, is currently unclear. Without a 3G licence Meteor would need to investigate other wireless broadband technologies (e.g. Wi-Max) to provide future broadband wireless services.

Hutchison 3G holds one of the three 3G licences and launched a trial service in Dublin under the '3' brand in September 2003. As part of this trial, the company offered its key corporate partners access to services such as video mobile calling and a range of content.

Convergence of Strategies

We are likely to see operators emerge from the distinct sectors described above with converged strategies that involve them branching out into other areas, following their customers' needs. Examples involve fixed mobile convergence where both fixed and mobile operators could utilise nomadic wireless technologies and other methods (e.g. fixed operators entering MVNO market) to gain a presence in one another's core markets (e.g. eircom's and O₂'s wireless hotspot services). Other examples involve broadcast telecoms convergence where fixed telecoms operators offer broadcast services over their broadband access networks, or where mobile operators deliver broadcast services over DVB networks for example. Wireless operators expanding into the fixed line business (e.g. Leap's LLU initiatives) is another form of convergence. While the term convergence generally refers to a contraction of services, technologies, markets, etc., for an operator this is a means of expanding its potential customer base and diversifying the types of services it offers. Convergence can also provide operators with a way to reduce the costs associated with providing multiple different types of services.

Q.9 Do you agree with this assessment of trends in operator strategies?

⁵⁶ i-mode is a mobile internet access system developed by NTT DoCoMo in Japan that allows users access to multi-media information and internet services. An important attribute to i-mode's success in Japan is a revenue sharing relationship that encourages content providers to develop i-mode content. Vodafone Live is a broadly equivalent system.

⁵⁷ <http://www.ovum.com/go/content/c.52759>

7 The Evolution of Voice Markets

7.1 Introduction

The delivery of voice services is currently under going the greatest changes it has seen since the transition from analogue to digital in the 1980s. The most significant forces acting on traditional fixed voice markets over the next five years are likely to be competition from mobile voice and competition from and the transition to voice over IP (VoIP).

Voice over Internet Protocol (VoIP) - also known as 'IP Telephony', refers to the general case of using IP technology to carry voice traffic. A sub-set of this is 'Internet Telephony', which refers to voice calls on the public Internet. There are currently two main categories of VoIP:

- **Managed VoIP:** This is typically operated over a managed IP network ensuring that quality of service is maintained. Managed VoIP may be used in a portion of a voice operator's network without them necessarily offering a VoIP service to end users.
- **Unmanaged VoIP:** These services are typically free over the Internet with charges only occurring for calls to fixed or mobile numbers, or for additional services (e.g. voice mail).

Voice revenues, which were traditionally the core revenue source for telecoms operators, are declining, and some believe that in some cases call prices will eventually tend towards zero (e.g. Internet type voice services). The decline in voice revenues is primarily due to a number of key factors: fixed to mobile substitution, fixed to data substitution (e.g. email, text messaging), changes in tariff structures and the migration of traditional voice to VoIP. eircom's revenues relating to advanced voice services have increased from 12% of basic voice services in 2000/2001 to 17% (see Figure 7.2).

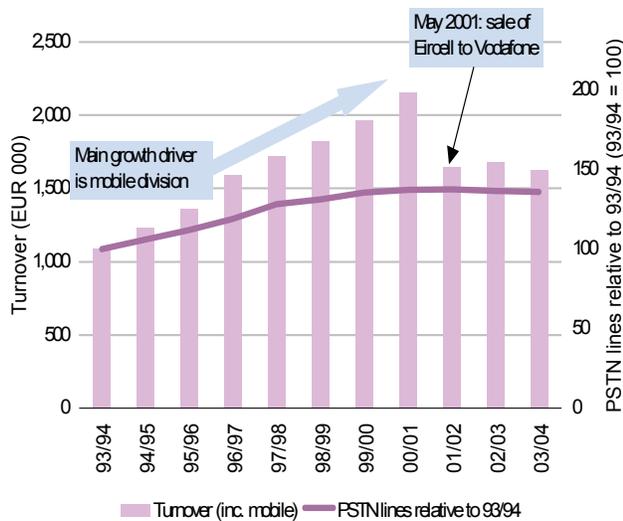


Figure 7.1 - eircom turnover and PSTN line growth [Source: Analysys, eircom annual reports, IPO and SEC reports]

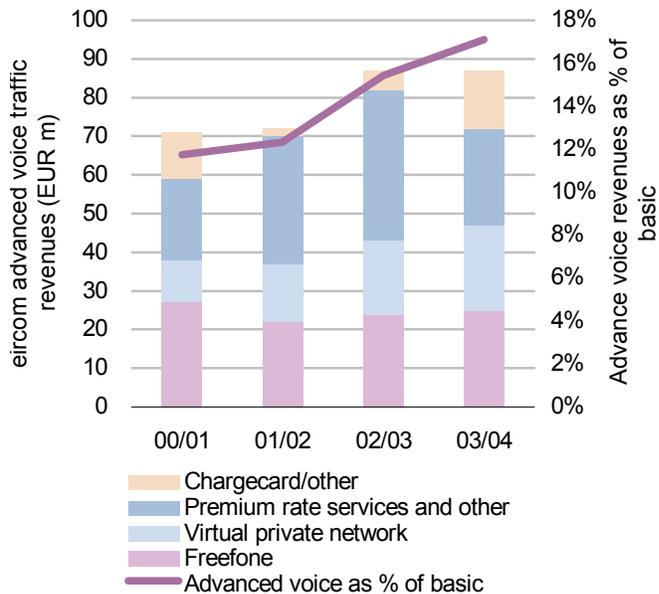


Figure 7.2 - eircom advanced voice services revenue [Source: Analysys, eircom]

7.2 Review of potential trends

In this section evolving voice markets are assessed with respect to key forces acting on them over the next 2 to 5 years.

From an economic perspective voice markets will come under increasing pressure over the next five years. Revenue from basic voices service – once the core revenue generator of fixed and mobile telecoms operators – will continue to decline, causing operators to focus on other areas of their business for core revenue generation (for example some operators are re-positioning themselves as complete IP solutions and content providers in an attempt to move themselves higher up the value chain – e.g. NTT⁵⁸). This is likely to happen more slowly in the mobile sector where voice will still be valued at a premium due to mobility. Factors leading to lower revenues include:

- Increased competition in fixed (VoIP, portable wireless, CPS, Mobile)
- Increased competition in mobile (MVNO, 3G voice services, portable wireless, low priced fixed)
- New non-time based tariff schemes – flat rates, buckets of minutes etc.

Declining voice revenues will have a significant impact on other parts of fixed incumbents' businesses as traffic migrates to VoIP and mobile, since fixed costs will remain the same despite a declining number of customers. Declining circuit switched voice traffic on eircom's network would result in the need to reduce the number of 'stranded' circuit switched assets in their network, to help keep

⁵⁸ www.ntt.com

network costs down, and therefore interconnection costs also. These factors could lead to pressure on eircom to recover costs in other ways. Efforts to further re-balance fixed and variable costs or to increase interconnection rates would potentially raise regulatory and competition in the market related issues.

General economic conditions have implications for the level of investment in telecommunications systems and therefore affect voice services. Shortages of funds to invest in next generation infrastructure would cause existing operators to attempt to retain more value from existing infrastructure, therefore delaying the widespread adoption of VoIP. Similarly a shortage of funds for investment in infrastructure from new operators would reduce the threat of competition on incumbents and therefore inhibit the incentive to innovate.

Voice telecommunications services have key significance in terms of social inclusion, and are highly integrated into most peoples' lives. Mobile voice communications have already changed the way voice services are used in Irish society with 94% of people in Ireland with mobile phones, and further adoption of mobile is expected. Relatively young demographics and high GDP per capita are positive factors pointing towards further adoption of advanced telecoms services⁵⁹. The widespread adoption and usage of broadband is likely to have several important implications for voice service providers:

- users become accustomed to flat-rate or partially capped tariffs and expect this for voice services
- increased adoption of VoIP over broadband (initially as a second line solution, and eventually as a replacement for PSTN voice)
- increased levels of tele-working help fixed operators retain market share against mobile operators (i.e. some protection against fixed-to-mobile substitution – see Section 7.3.1).

Pressure on network capacity will come from growing demographics; growth in the Irish population over the next 5 years, partially due to a growth in immigration (125,000 – 175,000 immigrants are expected over the next 5 years)⁶⁰, will impact voice markets. Many of these are likely to be mobile subscribers; however, a forecast for growth in housing developments would also be likely to generate growth in the fixed market⁶¹. It is also possible that there will be general changes

⁵⁹ GDP per capita ~ USD 45000: Source Analysys, EUI.

⁶⁰ Source CSO

⁶¹ NCB Stockbrokers has commented on this: "The annual number of new house completions has been steadily increasing, with around 80,000 expected this year. We estimate sustainable demand at around 70,000. eircom will face increased competition in new housing developments as alternative operators negotiate directly with builders to install their own networks. While some of the increase in new house completions in Ireland can be attributed to holiday homes (where a phone line is often not installed), some consumers, especially those in apartments are choosing to go .mobile only. eircom disclosed in August 2004 that its penetration in new housing developments had declined from 85% to 65%. It is interesting to compare the number of new houses built each year in Ireland with the change in eircom's PSTN/ISDN line base. Overall its residential line additions from FY2001 to FY2004 equalled the number of new homes constructed. However, last year its residential line additions appear to have fallen below 20% of new homes completed. This year we expect eircom's net additions to be just 5% of new homes constructed. eircom hopes that by increasing

in attitudes towards the quality of service that end users expect from their voice services. In some cases consumers may be willing to accept quality concessions in order to avail of lower priced services.

Regulation has been central to the development of competition in voice markets since liberalisation, as voice has traditionally been the primary telecommunications service. Examples include the introduction of Carrier Pre Selection (CPS) and Number Portability in 1999, and Wholesale Line Rental (WLR) in 2004. The recent proposal to allow Mobile Virtual Network Operators (MVNOs) access to existing operators' networks is also likely to have a significant effect on competition in the mobile voice market. It is possible that regulation of voice services as we currently understand them could be significantly reduced over the next five years due to the following key trends:

- equivalence between different voice services leads to consolidation of regulation relating to voice services (e.g. a single fixed and mobile market)
- the separation of voice from infrastructure/access regulation as voice becomes simply a service and is commoditised (VoIP). This could have knock-on effects on other aspects of telecommunications markets as the costs of providing services to a diminishing number of customers on traditional networks puts pressure on eircom to regain costs from other aspects of their business (e.g. re-balancing, increasing interconnection rates)
- increased competition in the fixed and mobile markets (e.g. MVNOs, which also enable fixed operators to employ Fixed Mobile Convergence (FMC) strategies – see Section 9.3.3).

Changes in USO policy or regulations, which have traditionally been centred on fixed voice services, relating to telecommunications services and access could affect obligations relating to voice (see Section 11). USO issues could potentially have economic implications for voice service providers.

Technology Developments

Technology developments in both the fixed and mobile sectors are likely to have significant impacts on voice markets over the next five years. A key technology is VoIP which enables operators to consolidate their voice and data networks enabling operational cost savings (estimated to be between 10 & 40%⁶²). VoIP also enables service providers with a minimum of infrastructure to offer voice services (e.g. 'pure-play' VoIP service providers utilising existing network operators' broadband access networks), therefore reducing barriers to the market.

Technology developments in the area of VoIP enable greater integration in end user services (e.g. unified messaging etc.) and new voice-related services might

broadband take-up it can slow the rate of PSTN line decline as a consumer must have a PSTN line in order to receive eircom's broadband service"

⁶² Deutsche Bank, "Expanding Coverage – Networking at the crossroads", September 2004.

emerge as a result of VoIP based on technologies such as vXML⁶³, for voice-based control of Internet applications. Other advanced voice related services include presence services⁶⁴ and interactive gaming where participants speak to one another. Improvements in VoIP technology and associated systems are likely to improve quality of service and access to emergency services (e.g. positioning technology) in time⁶⁵. Mobile operators are also likely to adopt VoIP, perhaps initially on core networks, followed by 3G (3GPP Release 5, IMS & SIP). Push-to-talk services could bring VoIP to 2G mobile networks.

Emerging wireless technologies such as portable wireless systems (e.g. Wi-Fi & Wi-Max) typically support VoIP and are already being applied in corporate networks to reduce expenditure on mobile calls⁶⁶. Existing fixed and mobile operators will adopt some of these technologies as forms of fixed-mobile convergence (see Section 9.3.3). This means that VoIP is bringing voice services to new access platforms not previously associated with voice.

Agent technologies that will enable users' handsets to choose the most appropriate network or system to attach to when making a voice call based on knowledge of parameters such as tariffs, time of day, location, destination of call are likely to emerge by 2010. In principle BT's BluePhone is an early example of this, although it only switches users between BT's fixed network and its MVNO. Empowering customers to switch operators this easily would increase competitive pressure on voice service providers.

7.3 Analysis of key trends

In this section a number of emerging trends which are likely to be important over part of the next five years at least are assessed with respect to key players in relative voice markets. The key trends considered are:

- Fixed Mobile Substitution
- The adoption of VoIP
- Changes in tariff structures
- Separation of voice from access

7.3.1 Fixed Mobile Substitution

Fixed-to-mobile substitution describes a migration of traffic and subscribers from fixed networks to mobile networks. Although there may be some indications that this is beginning to occur in Ireland, now that growth in fixed lines has levelled

⁶³ vXML – voice eXtensible Mark-up Language. A technology to allow voice interactivity with Internet technology.

⁶⁴ Presence services intelligently route calls to the appropriate destination for an end user (e.g. to mobile, fixed, home, office, voice mail), and may consider factors such as who is calling to determine where to route the call.

⁶⁵ e.g. E112 location provisions

⁶⁶ Corporate users can potentially avail of cost savings by implementing VoIP combined with Wi-Fi in their premises (i.e. portable voice and data solution) to take the place of mobile phone subscriptions.

off (see Figure 7.3), the relatively high price of mobile compared to fixed voice leaves many consumers unwilling to abandon their fixed lines (see Table 7.1). As mobile prices reduce, with the introduction of efficient 3G technology, and competition from MVNOs in the mobile market, more users may be willing to become mobile only customers. Competitively priced high speed mobile internet access tariffs could also attract internet users to become mobile only customers, particularly where the convenience of a complete mobile solutions to all a users' communications needs is met (e.g. voice, text, email, internet etc.). Substitution of voice to messaging (e.g. text messaging) could also increase the shift towards mobile. However, other factors such as falling fixed voice prices and increased adoption of DSL broadband, are likely to help fixed operators retain customers.

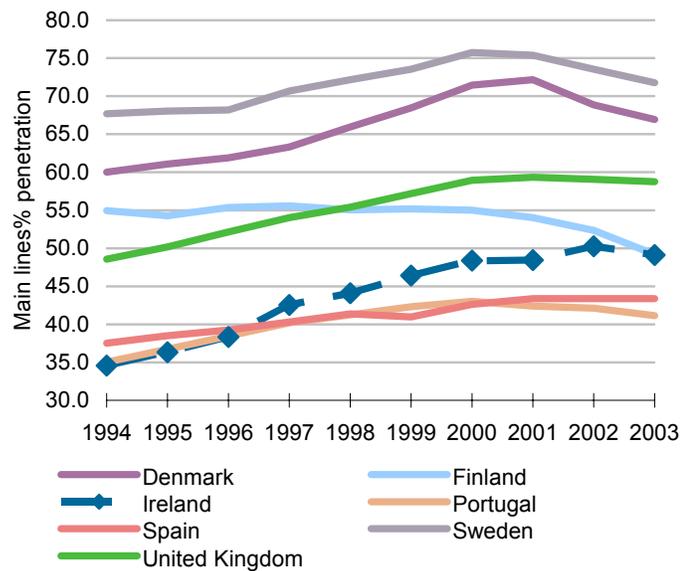


Figure 7.3 – Main line penetration [Source: ITU, Analysys]

	Fixed + Mobile	Mobile Only	Fixed Only
2003	70 %	12 %	16 %
2004	74 %	15 %	10 %

Table 7.1 – Telephone access in Irish households [Source: IPSOS⁶⁷]

Drivers	Challenges
<ul style="list-style-type: none"> - Retention/increase in market share. - Lifestyle changes (demand for mobility). 	<ul style="list-style-type: none"> - Persuading users to change habits. - Implementing FMC strategies. - Offering competitive prices.

⁶⁷ IPSOS, Telecoms Service Indicators, 2004 (<http://europa.eu.int>)

Strengths	Weakness	Opportunity	Threat
Mobility. Established customer base.	Lack of high speed broadband. Reliance on voice revenues.	Fixed mobile convergence. Increased revenue, increased market share.	Fixed mobile convergence. Fixed MVNOs.

Table 7.2 – Mobile operators’ perspective on fixed-to-mobile substitution

Strengths	Weakness	Opportunity	Threat
Established customer base. Ability to lower prices. Ability to offer broadband.	Lack of mobility.	Fixed mobile convergence (Wi-Fi, Wi-Max). Lower costs. Establish presence in mobile using MVNOs.	Fixed mobile convergence (local pricing ⁶⁸ , Wi-Fi & Wi-Max for broadband). Loss of revenue, loss of customers.

Table 7.3 – Fixed operators’ perspective on fixed-to-mobile substitution.

Fibre-nation	Hiber-nation
In this scenario fixed operators embrace VoIP, treating voice as just another one of the services that can be packaged with their broadband access offerings. Low priced fixed voice offerings keep people using fixed voice in addition to mobile voice. Fixed operators deploy FMC technology and utilise MVNOs to offer customers complete one stop telecoms packages.	Lack of development and added value on fixed networks enables mobile operators to continue to increase their share of voice traffic. Mobile operators also add broadband through FMC and advanced mobile technology, increasing fixed to mobile substitution to services beyond voice such as internet access. Fixed operators continue to focus on voice to compete. Increased substitutability between fixed and mobile voice leads to a single fixed-mobile voice market, which affects the regulatory environment.

7.3.2 The Adoption of VoIP

eircom announced in early January 2005 that it will invest €10m over 3 years in VoIP technology⁶⁹, and expects to launch services to government customers

⁶⁸ e.g. O2’s Genion service. See Section 9.3.3.

⁶⁹ Investment in Cisco technology - <http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=109&STORY=/www/story/01-10-2005/0002814629&EDATE=>

during 2005. ESAT BT also already offers VoIP services to corporate customers. Other VoIP services are available in Ireland to broadband consumers.

Although VoIP appears attractive to fixed operators in terms of costs, the rate and way in which it is adopted, and/or cannibalises existing circuit switched voice revenues, will have significant impacts on market development. This could cause operators to approach VoIP cautiously or to seek to maintain income via other methods (e.g. increases in interconnection charges). VoIP is likely to be targeted at corporate users first, followed by residential users (initially as second line solutions bundled with broadband).

Drivers	Challenges
<ul style="list-style-type: none">- Operational cost savings through integrated networks (up to 40%)- Enhanced features and integration with other communications systems- Competition	<ul style="list-style-type: none">- Quality issues and congestion on networks as IP traffic increases- Competition through broadband by 'pure-play' VoIP service providers- The provision of emergency services- Availability of technology (for mobile operators)

Implications of eircom adopting VoIP

Incumbent operators are in a prime position to embrace VoIP as part of their migration to next generation networks: the availability of funds, [the scale of their networks]. This would lead to cost savings for the operator that could be passed down to price reductions. Clearly eircom must initially offer VoIP to meet the needs of corporate customers. A VoIP package for bundling with their DSL products would be the next logical step, offering home broadband users a low cost 'second line' option.

A major shift by eircom to VoIP could have implications for carrier pre select based competition as this is implemented on voice switches (i.e. not routers which are used for VoIP). However, other forms of service based competition from pure-play VoIP operators would be likely to emerge in its place.

Analysis of existing operators (who also provide access):

Strengths	Weakness	Opportunity	Threat
Already have customer base of voice subscribers – market share.	New tech. – may be difficult to integrate. Quality may be difficult to achieve (no control over off-net calls). Potential new security issues.	Save operational costs (network consolidation). Development of new services (P2T ⁷⁰ , vXML). Increase revenues and market share. Important element of bundled offerings.	Erosion of revenues for fixed incumbents (PSTN) which carry common costs. Reduction in quality as IP network loads increase.

Table 7.4 – Operators’ perspective on VoIP adoption.

Fibre-nation	Hiber-nation
<p>Rapid progress is made by operators in deploying VoIP, following the initial migration of core networks to IP. eircom’s adoption of a VoIP migration strategy was a key catalyst in this progress. Quality of service issues are solved through a combination of: increased network capacity, service level agreements, bitstream with quality of service, and the development of other interconnect products with quality of service for IP. Widespread adoption of VoIP by business users is followed by residential take up, driven by increased broadband penetration - voice is considered as just another service available over broadband. Managed voice services are available for residential and business users. Call prices have reduced as a result of more efficient VoIP networks and increased competition. The adoption of VoIP has eroded CPS subscriber levels. The voice market is beginning to consolidate again following the initial emergence of many pure-play VoIP companies. Cable operators also add VoIP to their service bundles in some areas.</p>	<p>Steady progress is made by operators on VoIP. VoIP is primarily offered to business users on a managed basis. Un-managed services (Internet telephony) develop in niche markets (non-nationals, international calls, some early adopter broadband users). VoIP is implemented in core networks to save operational costs, but access networks remain largely PSTN-based for voice services. Fixed to mobile substitution occurs eventually leading towards a single converged market for fixed and mobile voice.</p>

⁷⁰ Push to talk.

7.3.3 Changes in Tariff Structures

Innovative approaches by operators, most of which are likely to involve VoIP, will lead to a wide range of different tariff structures. In general tariffs are likely to move away from per-minute usage charges to flat rate services. However, in the longer term strictly flat-rate tariffs may not be sustainable, and some form of volume based tariffs will be needed to help fund future investment in network capacity. If the business cases for flat-rate tariffs become too challenging for service providers it is likely that more complex tariffs would need to be introduced, including volume caps, quality of service, and even a return to per-minute charging could be possible in some cases. Innovative tariffs could involve ‘buckets’ of minutes, bundled access with other services (even from outside the traditional telecoms sector), bundled fixed and mobile minutes, among other offerings.

Drivers	Challenges
<ul style="list-style-type: none"> - Need to provide customers with competitive and convenient tariff schemes. - User demand for flat-rate tariff structures and convenient ‘all-in’ schemes. - Competition 	<ul style="list-style-type: none"> - Legacy billing systems - Changes in business models (based new ways of collecting revenue) may prove disruptive for traditional per-minute operators - Regulatory issues related to bundling and access to billing information.

Strengths	Weakness	Opportunity	Threat
Expertise in existing billing systems. Existing relationships with customers and market share.	Lack of expertise in new (more flexible) billing/rating systems. Reliance of business on per/minute tariffs.	Integration of services leads to bundling of tariffs. Retain market share though bundled tariffs. Grow usage and attract consumers with more suitable, convenient and flexible tariffs.	Face regulation due to inappropriate bundling. Challenge to keep up to date with competitors’ offers. Loss of revenue due to new tariff schemes. Demand elasticity does not compensate for unit price reduction.

Table 7.5 – Existing voice operators’ perspective on new tariff schemes

Fibre-nation
In this scenario the continuing trend towards flat rate tariff systems with volume caps also applies to voice. 'Buckets of minutes' and bundling free voice along with other services are common. This is typical in FMC offerings. There is an increased need for ComReg to examine these bundles to ensure that dominance in one area is not being leveraged to affect another as convergence blurs the distinction between traditional markets. Such developments offer consumers more flexible choices in the way they purchase their telecommunications services. There are also opportunities here to premium price demonstrably higher quality of service. 3G is utilised as more than just a voice solution, offering data access and other services.

Hiber-nation
There is little innovation in the area of tariffs in this scenario. Limited convergence, and bundling of services, has allowed the persistence of per-minute charging in both the fixed and mobile markets.

7.3.4 Disaggregation of Voice Networks

Liberalisation of telecoms has led to the opening up of markets allowing alternative operators to compete on services with a minimum of telecoms infrastructure. Voice, as a service, is decoupled from the provision of network access. Networks are now developing with IP that increase this separation between services and transport/infrastructure (NGN), where VoIP is just another data service. This further removes obstacles to market entry, enabling operators with no traditional voice based telecoms infrastructure to potentially provide competitive voice services (i.e. using call servers connected to an IP data network). This creates new opportunities for network operators to sell capacity on their IP networks, but at the same time creates a potential threat by relegating them to lower levels of the value chain, resulting in lower revenues. However, new barriers to entry could emerge as next generation networks are deployed (see Sections 8.3.4 and 9.3.1 on Control Points). This disaggregation could also potentially occur in mobile networks which could highlight similar barriers to entry (e.g. access to home location registers, control over the routing of calls).

Although NGNs allow for a functional separation of voice and access, from an end-users perspective VoIP can result in voice services being bundled in with other services or access charges. This is likely to emerge as voice prices fall.

Drivers
<ul style="list-style-type: none"> - Consequence of liberalised markets - IP & next generation network technology

Challenges
<ul style="list-style-type: none"> - Infrastructure (i.e. access) and service closely integrated in existing networks - Loss in revenue due to falling tariffs

Strengths	Weakness	Opportunity	Threat
Existing customer relationships – operators can decide how users access services.	The provision of IP services makes this inevitable.	For new entrant service providers. For existing operators to establish themselves as service providers.	IP pushing service providers towards becoming data carriers (i.e. not service providers).

Table 7.6 – Operators’ perspective of the separation on voice services from access

Fibre-nation	Hiber-nation
In this scenario fixed, and later mobile, network operators disaggregate their networks and services creating more horizontal structures. This enables alternative services providers, without infrastructure, to offer value added services (Internet access, voice, etc.), typically targeting niche markets. These developments are a result of increased next generation network deployment in association with more open access to networks and network functionality. A more competitive and open voice market results, leading to a reduction in traditional voice regulation. One potential drawback is that the value chain becomes more complex, making it potentially more difficult to hold individual companies accountable for poor service.	Mobile and fixed operators are able to maintain control over the vertically integrated service provision aspects to their businesses, despite regulatory efforts to increase competition from third party service providers. Regulation in voice markets continues.

7.4 Conclusions

Although voice services were traditionally the primary telecoms service, largest revenue generator and often the main focus of regulation, they are becoming less important due to technology and market developments. Falling fixed voice revenues due to fixed to mobile substitution, voice to data substitution and the migration of traditional voice to VoIP will put pressure on traditional operators to cut costs, attempt to recover costs from other areas (e.g. increases in interconnection rates), and find new sources of revenue – which is likely to involve increased investment. The introduction of VoIP is likely to decrease the cost of providing voice services and the price of services to end users. This is likely to be problematic for operators who are more dependent on revenues from voice services (i.e. traditional telcos, and new entrant voice only operators). VoIP also creates opportunities for new service providers to begin offering voice services.

Mobile operators, who are also heavily dependent on voice revenues, will remain unaffected for longer due to the added value that mobility brings to their customers and due to the increased control they enjoy over access to their networks. However, lower cost 3G voice networks, and 3G MVNOs will eventually help to drive prices down here also.

As voice services become less tied into network access, regulation on voice services is likely to diminish. Similarly, as fixed and mobile voice services become increasingly substitutable (i.e. through FMC) it is possible that fixed and mobile could be considered as a single market and regulated accordingly.

Q.10 Do you agree with ComReg's assessment on the evolution of voice markets? What other options do you see emerging?

Q.11 What effect do you expect these trends to have on the need for regulation at the retail level in future? What form do you expect such regulation, if any, to take? (For instance, should regulation focus on preventing abuses of dominance/SMP, or on general consumer protection measures applicable to all operators?)

8 The Migration to Next Generation Networks

8.1 Introduction

The benefits of migrating to IP next generation network architectures are now generally acknowledged by network operators, many of which have publicly announced strategies and timescales for achieving this (e.g. BT's 21st Century Network⁷¹, KPN⁷²). This represents a significant change in the way networks are operated that will impact network operators, service providers and ultimately end-users (in terms of the price and choice of services available to them).

A next generation network is a network that can provide a range of services (multi-service) independent of the network infrastructure, and can interconnect with multiple different types of network (although typically with a common IP layer), offering greater flexibility and efficiency for operators and end-users alike.

In addition to the increased functionality afforded by NGN architectures, there are significant operational cost savings to be made in an environment where customers require multiple different types of services with different characteristics. This is in line with operators' strategic goals of becoming more efficient, which are reflected in a declining trend in the number of employees in the sector (see figure 8.1 below).

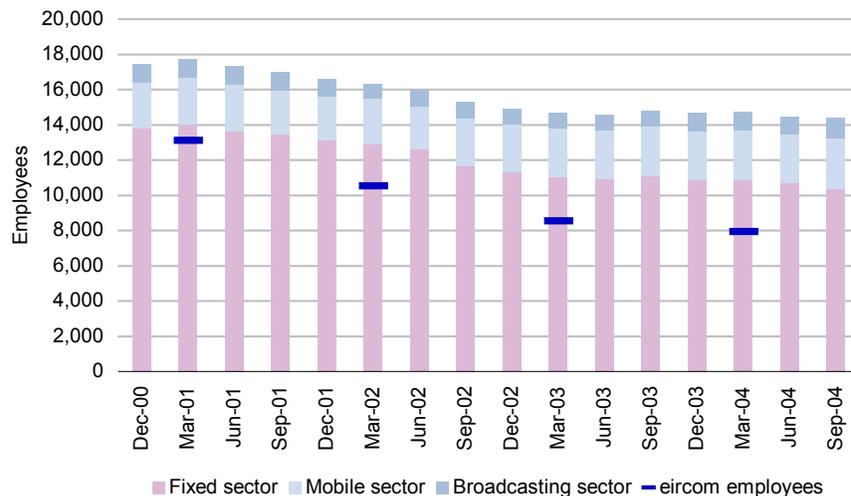


Figure 8.1 - Employees in the telecommunications and broadcasting sector [Source: Analysys, ComReg, eircom]

⁷¹ BT plans to invest £10 billion over the next 5 years in its 21st Century initiative, which is expected to save the company £1 billion per year in operational costs by 2008/9.

⁷² 'KPN boosts broadband and VoIP investments', March 2005 - http://www.kpn-corporate.com/eng/pers/?id=2.01&taal=eng&pers_id=701

NGN architectures can achieve this desired efficiency by integrating what were previously separate voice and data networks into a single multi-service network, resulting in fewer physical elements, less physical space, and fewer operational employees. However, for existing operators with large networks of existing technology, upgrading to NGN requires significant investment and operational changes.

This section deals with some of the key implications of the adoption of NGNs in the Irish market.

8.2 Review of potential trends

Government investment can be a significant economic factor in telecoms infrastructure roll-out, which can have effects on the telecommunications market. Recent examples of government investment in the Fibre MANs, the Regional Broadband programme, and the Broadband Action Plan are all targeted at creating advanced networks. The Fibre MAN project in particular could have a significant impact on the market by improving the business case for infrastructure-based competition e.g. LLU by proving back-haul from local exchange locations to another operator's network. Furthermore, government departments and agencies represent significant customers for telecommunications services with significant buying power, which can therefore make next generation networks a requirement. An example of this is the requirement for all future government IP procurement to be IPv6 ready, and a trend towards VoIP.

Operators are currently under pressure⁷³ to retain revenues and reduce levels of debt, resulting in them delaying up-upgrades to next generation networks, instead focusing on gaining more value from their existing assets. At the same time operators will need to invest in modern infrastructure and systems if they are to be competitive in a next generation network environment, and if they are to continue to reduce costs.

As telecommunications services are incorporated into our everyday lives to an increasing amount there are social impacts. Communications services have the potential to enhance social inclusion and can change the way we interact with society. The Internet and mobile communications are clear examples of how communications systems can have significant impacts on society and lifestyle in just a few years. The direct social impact of next generation networks is difficult to quantify, as it is the services and applications enabled by such networks and the market environments in which they will operate that have social implications. Many next generation technologies themselves will have no directly noticeable impacts on end-users in terms of service quality or functionality (e.g. converting core networks to VoIP); however these services would not develop to the same extent without these networks.

The implications of next generation network technology for market development raises important issues for telecoms regulators. A central aspect of next generation networks that is significant for market development and regulators is

⁷³ Stock market/shareholder pressures.

its ability to further modularise telecoms networks and separate services from telecoms infrastructure/architecture. Regulatory policy directed towards this disaggregation of networks and services could help encourage the implementation of next generation networks and services. New regulatory products could be developed which would help to further progress (e.g. IP/MPLS interconnect). However, the general regulatory environment is perhaps the most important factor in encouraging investment in next generation networks, and regulators must strike a balance between encouraging operators to keep prices low for consumers in the short term with creating an environment that encourages operators to invest. From a government perspective policy objectives related to the information society⁷⁴ could also be achieved on the basis of advanced next generation communications networks.

Technology

The central technological driver behind the adoption of next generation networks is Internet Protocol (IP). IP has gone beyond a certain critical mass and is now driving all services and applications to be adapted to this type of network. A key enabler in this adaptation, enabling network segments of various types (e.g. ATM networks), to be incorporated into unified IP based next generation networks is MPLS (multi protocol label switching). This technology enables traffic to be controlled as it traverses different networks that use different network technologies⁷⁵, helping it meet operator objectives for traffic engineering (i.e. control the flow and quality of traffic on a network). A characteristic of next generation networks is the concentration of network intelligence away from the core of the network, bringing a networked approach to services (i.e. services can be provided from anywhere to anywhere on a network⁷⁶). This has implications for alternative service providers and operators seeking easier access to incumbent networks, potentially reducing barriers to entry and therefore increasing competition. It is worth noting that many of these technologies have been implemented in networks around the world for several years and do not have the same risks associated with them as new 'un-tested' technology developments often do.

VoIP technology currently seems like the most significant technological application under the next generation network umbrella (see section 7). However, the integration of mobile technology and mobility in IP networks is also a key technological issue. Next generation technology is also emerging in the mobile sector in the form of packet-based mobile technologies such as 3G, proprietary technology (e.g. Flarion, Navini, IP wireless), and other standardised technologies (e.g. IEEE 802.20, 802.16, 802.11, 802.15) which could all be brought together by the common implementation of IP. Developments in broadband access technologies, both fixed-line and wireless, are continuing to change the environment for next generation networks (see section 0). Next generation

⁷⁴ See <http://www.euractiv.com/Article?tcmuri=tcm:29-134976-16&type=News> for details of the i2010 initiative under the renewed Lisbon agenda.

⁷⁵ e.g. SDH, Ethernet etc.

⁷⁶ This would include services being provided internationally as equivalents to local services. So, although services are located further from the core of the network, they may not necessarily be physically closer to end users in some cases.

networks will typically require significantly reduced numbers of network elements due to convergence and aggregation of elements (e.g. Multi-service access nodes in place of PSTN switches and DSLAMs).

Regulators need to be aware of the implications of emerging technologies in future networks. As incumbent operators upgrade their networks there is a need to balance investment incentives with the need to obviate market power. Regulators must be vigilant as incumbents migrate to next generation network access architectures, as this could potentially result in a more difficult environment for OLOs to access unbundled lines for example. In the UK Ofcom identified potential problems with the manual LLU migration process as next generation networks are introduced and local exchanges are upgraded, potentially leaving OLOs with unequal access in terms of provisioning times⁷⁷. One possible solution is a form of 'soft LLU' where OLOs would be able to access line cards on an incumbents NGN exchange⁷⁸ as quickly as incumbents can themselves. ComReg is currently reviewing the LLU products and associated processes; any new issues that emerge as a result of next generation network roll-out, that could potential threaten equality of access, would also have to be considered by ComReg.

8.3 Analysis of key trends

In this section a number of emerging trends and issues with respect to migration to next generation networks are assessed. The key trends and issues are:

- The speed of adoption of next generation networks
- The return of the ASP (Application Service Provider) model
- New control points
- Other potential issues during migration

8.3.1 How quickly will NGN be adopted?

The migration to next generation networks is already underway by all major network operators. Although this will be a long process that is likely to continue on beyond the timeframes being considered in this study, significant progress is likely during the next 2 to 5 years. Investment strategies need to be balanced so that leading edge technologies are adopted to keep ahead of the competition, while at the same time achieving maximum value from existing assets. As many next generation network technologies are now sufficiently mature to merit wide-scale investment the threat of competition is needed to urge operators forward. Other factors affecting investment strategies are the potential to recover costs and the generation of new revenues.

There is some evidence that Irish operators are beginning to adopt next generation network investment strategies. Investment in core network infrastructure from eircom, ESAT BT, ESB, Ntl, Aurora, and the government sponsored MANs have

⁷⁷ <http://www.ofcom.org.uk/consult/condocs/ngn/>

⁷⁸ Known as MSANs (Multiple Service Access Nodes).

increased core infrastructure in Ireland that will facilitate next generation networks (see Figures 8.2 and 8.3 below).

Investment in IP-networks, while not necessarily part of a next generation network implementation, is useful for introducing operators into next generation networks. So in some ways the migration to next generation networks has already begun. Equipment installed in the 1980s as part of the digitalisation process is now 15 to 20 years old – the expected lifespan of such equipment – and is now due for replacement. This presents a good opportunity for an operator to begin their next generation network migration. Further incentive to upgrade is given by increasing operational expenses on older equipment (equipment maintenance typically increases with age). However, an operator that maintains a high book value for PSTN or other older infrastructure may find it more difficult to initiate large scale migration to next generation infrastructure⁷⁹.

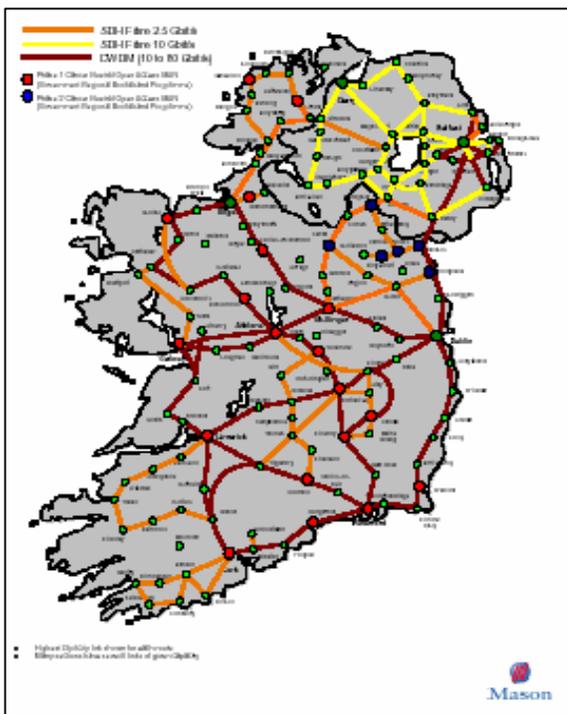


Figure 8.2 – Backbone infrastructure in Ireland (2003). [Source: Mason]

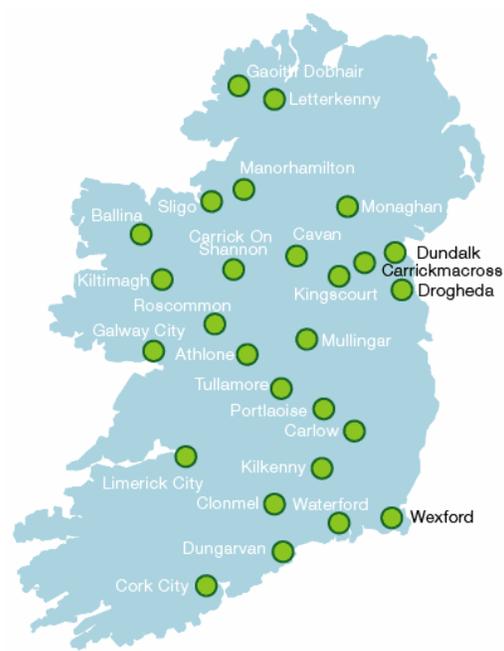


Figure 8.3 – Government MANs initiative (Phase 1). [Source: e-Net⁸⁰]

Government Fibre-MANs

The first phase of the government Fibre MAN project, providing fibre networks in 26 towns and cities is nearing completion with active customers on many of the networks (managed by e-Net⁸¹). Access to these networks in association with

⁷⁹ Recent eircom financial reports indicate that the book value of older infrastructure is being written down. <http://investorrelations.eircom.net/>

⁸⁰ www.enet.ie

⁸¹ e-Net have been allocated as the management entity over the MANs for fifteen years from 2004. www.enet.ie

alternative back-bone infrastructure in Ireland (e.g. ESB-Telecom⁸², Aurora Telecom⁸³, Esat BT⁸⁴) provides access to alternative network capacity that could be used to deliver next generation network services.

Drivers	Challenges
<ul style="list-style-type: none"> - Cost savings - New revenue opportunities - Need to remain competitive - Customer demand 	<ul style="list-style-type: none"> - Funding of investment - Loss of control of customers (demotion in value chain) - Major operational changes - Stranded assets

Cost Savings

Operational cost savings are particularly important in an environment where revenues are under threat (e.g. traditional voice telephony). The types of operational costs that can be saved through the introduction of next generation network technology are:

- fewer network elements (single converged IP network in place of several overlaid networks) incurs lower operational costs
- fewer operational staff
- shorter development cycles and time to market for new services
- reduction in real-estate needed (potential source of capital⁸⁵)
- reduction in backhaul costs
- reduction in electrical power consumption

New Revenue Opportunities

The additional flexibility afforded by next generation networks is useful when implementing new services, particularly where services need to be integrated. Furthermore, greater levels of broadband penetration are likely to create demand for access to next generation type services. It is possible for operators to provide the same set of services using a mix of traditional technologies, but this would be more costly to implement in terms of equipment and operational staff.

User Demand

Investment in next generation networks depends to a large extent on anticipated demand for the types of services that can be provided over them. Demand, from

⁸² <http://www.esbtelecoms.ie/infrastructure/overview.htm>

⁸³ <http://www.auroratelecom.ie/main.htm>

⁸⁴ www.esatbt.com

⁸⁵ eircom's financial report for 2004 lists land and buildings at €480m (www.investorrelations.eircom.net). According to Marconi (source: CSFB, "Integrated operators. IP: The Holy Grail for telcos?", March 05), operators migrating to NGN could expect to reduce real-estate that supports network devices by up to two thirds. Other cost reductions estimated by CSFB include 35% reduction in staff, 60% reduction in power costs, 50% reduction in back-haul costs – resulting in an overall operating cost reduction of 30%.

both the business and non-business consumers, is likely for converged and flexible services which require next generation networks.

Challenges

Some of the key challenges facing operators during the migration to next generation networks are the potential loss of control of customers as access to networks by third party service providers is made easier, and a general lack of funds and/or willingness to invest in new technology. Operators may seek to restrict access to services in order to try to keep control of customers in terms of service provision (e.g. walled gardens) which presents challenges to third party service providers. Large incumbent operators may face industrial relations challenges while migrating to more efficient next generation architectures that require less manpower.

Other challenges that a company adopting next generation networks could expect to face relate to the integration of a number of existing networks, and their associated technologies and processes. This could incur significant re-alignment costs for large operators. New network topologies with reduced numbers of network elements could also require re-alignment between different interconnecting operators.

Strengths	Weakness	Opportunity	Threat
Existing customer base. Installed infrastructure.	Need to get more returns from existing investment.	Ability to save operational costs. Ability to create and integrate new services.	Loss of control over services.

Table 8.1 - Operators’ perspective on the migration to next generation networks.

Fibre-nation (fast adoption)	Hiber-nation (slow adoption)
In this scenario network operators change their business models to be more IP & IT focused (e.g. NTT, BT 21 st Century). Government investment in the fibre MANs encouraged new operators to emerge providing broadband services via fixed wireless access and LLU. The widespread deployment of NGNs, initially in core networks, leads to greater accessibility to alternative operators of eircom’s network. This results in increased competition and changes in market shares as new entrants emerge to exploit next generation networks	Alternative network operators wait for eircom to invest in infrastructure, partially out of fear that they might have to open up their own infrastructure, and partially through a lack of funds. Government investment in network infrastructure is needed in place of privately funded infrastructure ⁸⁶ to prevent Irish infrastructure from lagging. 3G operators capitalise on demand for high speed data services, as a result of fixed broadband shortages. Regulatory strategy focuses on encouraging investment by

⁸⁶ The European Commission must apply state aid rules when considering whether state investment in telecoms infrastructure is justified, to ensure that aid is only applied where there is a ‘service of general economic interest (SGEI)’.

accessibility. 3G mobile operators also move quickly to adopt NGN architectures (i.e. IMS). Regulatory measures and new regulatory products are needed in some cases to deal with new control points that emerge as a result of next generation network migration.

operators, resulting in higher end user prices in the short-term.

8.3.2 Increase in access capacity

As operators seek to generate higher revenues through higher capacity services they will need to invest in access infrastructure – wireless, fixed line (copper), optical, cable etc, in addition to the networking equipment feeding these access networks. However, investment in capacity alone will not be enough to stimulate new revenues; investment is also needed in the capability to carry next generation network services by putting technologies such as MPLS, and IMS in place. Looking to developments in countries with more advanced broadband societies (e.g. Japan and South Korea), it is possible that there will be a typical demand for between 4 and 6 Mbit/s by 2010. While technology developments are likely that can increase the capacity of some existing access infrastructure (e.g. copper and co-axial cable), significant investment would be needed in network equipment and back-haul capacity (i.e. connecting a group of customers to the core network). Ultimately, for significant improvements in access capacity, deeper fibre penetration is needed (i.e. bringing high capacity fibre optics cables to points closer to the end customers – ‘fibre to the node (FTTN)’), allowing higher speed DSL technologies (e.g. VDSL) to be deployed. Deeper fibre penetration by eircom would put increasing pressure on alternative operators who utilise ULL to roll-out their own fibre closer to customers, or settle for wholesale IP type products. Belgacom is an example of an operator deploying this strategy⁸⁷. While much cable infrastructure in Ireland is currently insufficient for widespread deployment of broadband, investment in fibre, on a similar scale to that needed by fixed telecoms operators, could make cable operators competitive players in the next level of higher-speed broadband roll-out.

⁸⁷ HSBC Global Research, “Telecoms Unplugged”, November 04.

Magnet Networks	Fibre to the home in Dublin offering phone, TV, and Broadband for ~ €70/month ⁸⁸ .
Leap	€10 million investment in SDSL on unbundled lines in association with Lucent and IBM ⁸⁹
Irish broadband	€18 investment in broadband FWA ⁹⁰
eircom	Commitment to increasing DSL coverage to 500000 customers by December 2007 ⁹¹
Smart Telecom	€34 million investment in DSL through LLU ⁹²

Table 8.2 – Some current Irish initiatives.

Strengths	Weakness	Opportunity	Threat
Existing network infrastructure. Existing ducting, relationships with civil contractors.	Lack of funds for investments.	Create the ability to offer more services. Future-proof networks.	Possible requirement to open up networks. Competition.

Table 8.3 – The decision to invest in access capacity – telecoms operator perspective

Future Scenarios

In Ireland the majority of broadband access is currently DSL (over 85%). Even with substantial investment in cable networks there is unlikely to be a significant relative increase in cable broadband over the period under consideration. However, major investment in cable networks could give cable a chance to compete at the next level of higher speed broadband roll-out (where major investment of a similar scale would also be needed from fixed line operators). The threat of competition from investment in cable infrastructure would serve as a useful stimulus for investment in other networks. Fixed wireless access is showing promising signs of being able to stimulate competition in the broadband access market. The threat of high speed competition from FWA technologies is likely to stimulate investment in more sophisticated DSL technology. Delivery of advanced broadcast content is also likely over sophisticated digital broadcast networks which could be integrated with existing fixed or mobile access networks.

The **Fibre-nation** scenario would arise from increased investment in all of the networks mentioned above, including deeper fibre penetration providing increased

⁸⁸ www.magnetnetworks.com

⁸⁹ http://www.leap.ie/Leap%20Announces%20_10m%20Unbundling%20Local%20Loop%20roll%20out.doc

⁹⁰ <http://www.ntr.ie/doc.asp?key=81>

⁹¹ http://investorrelations.eircom.net/news/rns_22.htm

⁹² "Smart Telecom plans €34m investment", Irish Times, 8/02/05.

platform competition. Even under the **Hiber-nation** scenario, where mobile is the main form of broadband access, investment in network infrastructure would be needed to enable mobile networks to continue developing.

Wildcards:

A technological breakthrough in access technology such as a low cost power-line access solution, or access from low altitude platform stations⁹³ could be sufficient to jolt the market into a period of accelerated investment and innovation.

A rapid change in social behaviour⁹⁴ such as users choosing to avail of broadband access in public hot-spots (e.g. Internet Cafés⁹⁵, the workplace, while commuting), instead of in the home⁹⁶ could affect the shape of the broadband access market.

8.3.3 Return of the Application Service Provider model

The application service provider (ASP) model of delivering computing and communications services to end-users was much hyped in the late 90s. It promises lower priced simpler computing⁹⁷ services to end users. However, many now believe that the conditions are emerging that would support this model despite its previous failure. A number of driving factors could lead to this:

⁹³ A wireless base station located on an aerostat vehicle that could be located over a geographical area giving wireless coverage.

⁹⁴ Rapid changes in social behaviour have occurred before where the widespread adoption of a technology or service –which may have existed previously as a niche market – suddenly occurs over a few years (e.g. mobile communications, the Internet).

⁹⁵ In China, where PC penetration is low, the predominant place of Internet access is Internet Cafés where usage is high. China currently has approximately 94 million internet users (7.3%), and 43 million broadband connections [Source: CNNIC – www.cnnic.net.cn].

⁹⁶ Experience in South Korea suggests that substantial demand outside the home e.g. through Hot Spots and Internet Cafes does not diminish demand inside the home, so this scenario is unlikely.

⁹⁷ This could potentially manage end-users computers, simplifying the PC experience for users, thus encouraging further adoption.

Drivers

- The need for existing operators and service providers to generate more revenues and avoid being bypassed by customers or being made into 'bit-pipes'.
- Users (particularly business users) seek managed services in an increasingly complex telecommunications environment to save time and costs.
- Potential cost saving for end users with pay-per-use licence arrangements (i.e. no need to pay for a suite of software applications where only a few specific applications are regularly utilised).
- Move into IT service provision by service providers to elevate themselves to more lucrative areas of the value chain.
- The widespread availability of broadband access, which is essential for the seamless provision of networked applications.
- Trend towards licensing arrangements by software vendors (to increase revenue and combat piracy)⁹⁸.
- Trend towards web services puts more computing power onto the Internet and off individuals' computers.
- Next generation network technology allows greater integration between different services and systems on a service provider's network. Enables services to be network based.
- The need to minimise exposure to viruses and other malware by placing more processing power behind professionally managed security perimeters.
- Major investments globally in the 'Grid Computing' model of utility computing⁹⁹.

Challenges

- Availability of broadband
- Convincing users to adopt this approach

This would represent a major shift in the way we use computers and communications services as it involves a greater convergence between the two. Users would in effect be buying their 'computation' as a communications service. It is worth noting that when this model previously emerged (Application Service Providers), insufficient broadband capacity among other factors led to its failure. One other factor was lack of basic user confidence in such remotely provided services. However, recent research indicates that confidence levels are now much stronger¹⁰⁰.

⁹⁸ See <http://www.vnunet.com/news/1158826>

⁹⁹ E.g. Sun Microsystems & IBM - http://www.technologyreview.com/articles/05/02/ap/ap_2020205.asp?trk=nl

¹⁰⁰ UK Institute of Directors, Summer 2004

Strengths	Weakness	Opportunity	Threat
Existing customer base. Existing infrastructure.	Expertise in IT service provision. Existing user culture.	Maintain market share. New source of revenue.	NGN will permit other service providers to do this.

Table 8.4 – Implementing the ASP mode – telecoms service providers’ perspective

Fibre-nation	Hiber-nation
<p>Most service providers and operators offer ASP-based managed services to customers such as combined billing, email hosting, security and virus protection. This began with a general trend in the software industry towards individual licensing arrangements, coupled with service providers in search of new revenues higher up the value chain. The widespread adoption of broadband access, trends in grid computing and user willingness were also key factors in nurturing this approach. Service providers offer managed services for a range of applications (e.g. Microsoft office), on a per user basis, along with storing and managing data for end users, reducing requirements on end user systems. This has made computing more accessible to mobile users where processing power and storage is more difficult to implement.</p>	<p>In this scenario ASP-type services have not emerged, primarily due to insufficient capacity and customer reluctance to adopt subscription based models. IT management complexity and costs for users at all levels continues to grow.</p>

8.3.4 New Control Points

The implementation of next generation network architectures could potentially facilitate the creation of new control points, or allow existing ones to manifest in different ways, where operators could leverage their control over certain aspects of network operation to limit another operator’s ability to compete. Furthermore, in next generation networks control points could be developed by non-network operators also – e.g. service providers, software vendors, content providers. An example of a control point in traditional telecommunications networks is access to the local loop, where regulation is needed to ensure other operators have access to customers. Regulators will need to be vigilant with regard to the development of new control points as next generation technology is deployed. Some potential control points that could emerge in next generation networks are listed below¹⁰¹:

¹⁰¹ Source Devoteam Siticom & Cullen International, “Regulatory implications of the introduction of next generation networks and other new developments in electronic communications services”, May 2003,

Network Address Translators, Firewalls and Routing Tables: These systems would enable operators to control communications capabilities, traffic and quality at points between networks. The adoption of IPv6 would help to eliminate network address translators and firewalls as potential control points, however this may not occur on a widespread basis within the timescale of this study. Several initiatives are occurring that are likely to impact on this: ENUM, VoIP numbering, and international activities on Internet addressing. Where operators control routing tables they can control the routes that traffic takes in an IP network which could potentially affect the cost of transit and interconnection.

Quality of Service, Interconnection and Access Termination: Large operators can control QoS ‘tunnels’ over their networks, which other operators must use. They can control the type of QoS that must be used, which means that they can effectively limit the types of services that other operators can provide over their networks. The power of larger networks when it comes to making IP interconnection (peering) arrangements with smaller networks could also be abused as a control point. IP interconnect products may be needed to deal with this potential control point. Access termination is a type of control point which currently exists in access networks and could remain despite current regulatory measures as new access technologies are deployed.

Access to Billing data: This is important for the creation of single unified bills. Service providers may be restricted in the services that they can provide without access to customer billing and authentication information.

Service Control Points: This is an important area where control points could emerge and may in many cases be beyond the control of telecoms regulators. Examples are call set-up capabilities controlling QoS and access to billing data for the creation of single unified bills. Application programming interfaces (APIs) are key elements for operators accessing services on another operator’s network, as they control what functions can be utilised. Without access to operators’ APIs, alternative operators and service providers would be unable to provide advanced next generation networks services that involve QoS and location based services for example. Access to APIs could be restricted by the intellectual property rights of software developers. Operators could bundle interfaces, potentially tying interconnecting operators into unwanted aspects of their network.

Note: Further potential control points relating to services and content are identified in section 9.3.1.

Regulatory action in terms of these potential control points might be considered inappropriate in some circumstances due to the newness or emerging nature of the markets under consideration. The potential emergence of these types of control points is consistent with the **Fibre-nation** scenario.

8.3.5 Potential issues during migration to NGN

Migrating to next generation network architectures is a major step for a telecoms operator in terms of its entire business including: investment, network and organisational structure, business models, service delivery and operation, among

others. It is therefore possible that some problems will emerge during the transition of some networks that could affect the following key issues:

Resilience: With such significant changes taking place in terms of new technologies, services and business models, there is the potential for network weaknesses, at least during the transitory phase. New technology is being implemented that is untested in real situations on the scales being considered. New operators and service providers are emerging with new and untested business models, which could lead to vulnerabilities. Such factors could impact the overall resilience of telecommunications network infrastructure.

Security: The deployment of new technologies is likely to lead to the exploitation of new security threats, as operators seek to come to terms with implementing a secure solution for these networks. Individual customers with multi-operator relationships are expected to become common in next generation network environments, which is inherently more risky than a single operator environment. On the other hand, the potential risks brought out by the implementation of new technologies provide opportunities for security systems service providers. This is already an area of concern, particularly for business users, which needs to be addressed.

Quality of Service: Quality of service, from a network management perspective, is most commonly being delivered in next generation networks by implementing a technology called multi-protocol label switching (MPLS). This enables quality to be maintained as communication transverses several different types of networks. Although this capability exists, and even where this technology has been implemented, operators need to formalise agreements and procedures for allowing their networks to interoperate in this way. With increased broadband take-up, traffic levels on networks could become greater, causing congestion and related QoS problems if capacity is not upgraded accordingly.

Integrity: The initial migration to next generation networks could have implications for network integrity where VoIP is concerned. Where services are designated as Publicly Available Telecommunications Service (PATS) network integrity must be maintained. However, with some VoIP services the service provider may not have control over the integrity of the network that is being used to carry its traffic. It is currently difficult for some service providers to enter into service level agreements (SLAs) with customers where they do not own or have control over the networks that they utilise. Similarly network operators may have no control over the services being carried over their networks. Another concern relating to VoIP is its ability to operate during a power failure – although it is likely that systems with battery back-ups or line power capabilities will be developed to meet this need if necessary.

As new products are introduced on next generation networks that substitute for existing products or certain functions of existing products (e.g. ISDN), finding the appropriate timing for withdrawal of these services will be important to minimise disruption to existing customers and businesses.

The migration of incumbent operators to next generation networks may cause some disruption to other operators who rely on interconnection to their networks at points which may become obsolete (e.g. LLU operators). This could result in significant re-alignment of networks which would incur costs for alternative operators.

8.4 Conclusion

The implementation of IP and next generation network technologies into telecoms networks will have significant implications for network operators, service providers and end users. Operational cost savings and the need to modernise are drawing Irish telecoms operators towards next generation networks, and many network development projects are already underway or have been announced. The rate at which next generation network technology is adopted will depend on a number of factors including general economic conditions and the investment climate, the level of competition, and operator strategies.

To extend the benefits of next generation network technologies to end users investment is required in access networks. The government funded fibre MANs project provides a platform for the roll-out of broadband access across Ireland. There is likely to be demand for capacities beyond current domestic broadband access offerings by 2010, and this will require substantial investment in broadband access infrastructure, including the deeper roll-out of fibre into operators' networks. This sort of increased availability and take-up of broadband access creates new possibilities for delivering services and applications to end users in a more efficient way – e.g. allowing users to subscribe to applications on an individual or even per use basis (ASP model). Investment in access capacity must be partnered with investment in next generation network architectures such as IP/MPLS and IMS if operators are to benefit. Widespread adoption of next generation network technologies will affect the number and location of network elements deployed, which could potentially impact existing interconnect arrangements between operators.

With increased investment in new network architecture and the implementation of new business models, the potential exists for new sources of dominance (i.e. bottlenecks or control points) to emerge. ComReg must continue to closely monitor market and technology developments with this in mind so that such situations can be averted where possible. There is an opportunity for regulatory bodies to try to ensure that telecoms services in a next generation world set off on an equal footing. Regulation must seek the difficult balance between encouraging investment and meeting the immediate needs of consumers.

- Q.12 Do you have any comments on this analysis of the migration to next generation networks? Are there any other issues that ComReg needs to consider?**
- Q.13 What effects do you expect Next Generation Networks to have on the prospects for infrastructure-based competition in the 2005-2010 timeframe?**
- Q.14 If infrastructure-based competition develops, what markets will it affect and in what timeframe? Are there any areas where this could be expected to lead to the withdrawal of wholesale regulation /access requirements?**
- Q.15 Are there areas where the development of Next Generation Networks could lead to the development of new bottleneck facilities or control points? If so, what are they, and how could regulation address them?**

9 User Access and Content Delivery

9.1 Introduction

This section deals with next generation networking issues more directly related to end-users. Here issues such as access to advanced mobile and broadband services and the way in which services and content are delivered in next generation network environments are considered. This area is possibly the most important part of the value chain as control over the end customer typically determines control over revenues and the market. Much of this section deals with convergence: convergence between fixed and mobile services and technologies (Fixed Mobile Convergence) and convergence between media and telecoms sectors.

9.2 Review of potential trends

Convergent technologies offer existing operators and service providers in various markets opportunities to expand into other markets generating new sources of revenue and gaining more customers. This is particularly evident in fixed-to-mobile convergence (FMC) where both fixed and mobile operators can utilise portable technologies to offer services in one another's core markets.

Some important aspects of how users will access services and content in a more converged environment will include issues such as branding and device selection. Branding will be important for service providers as they move beyond their established set of services into new areas (e.g. fixed operators moving into mobile in an FMC scenario). Branding will also influence consumers' choices when it comes to specific content, and could be used by companies from outside the telecoms sector to enter the sector (e.g. Tesco). In terms of device selection, there is likely to be a continuing trend towards users seeking to add mobility to services available to them on fixed networks (e.g. broadband mobile access). However the choice of devices will depend on the particular type of application (e.g. business or entertainment). Convergence in mobile and portable devices is also likely to change how people use telecoms services – e.g. convergence of audio media players with wireless communications devices expands the market for mobile audio services. Similarly the convergence of broadcasting and mobile devices is also likely to play a role here. This type of convergence will raise issues for both communications and broadcasting regulatory authorities so close co-operation will be needed between them.

A potential social implication of the implementation of a large number of new technologies and services is that, through a lack of understanding, peoples' fears over security and privacy will delay their adoption of new services. On the other hand Irish people spend a proportionally high amount on entertainment¹⁰² which could indicate a potential latent demand for electronically delivered entertainment

¹⁰² In 1999 Irish households (along with Spain and the UK) had the highest levels of 'recreational consumption' in the EU. It is estimated that the penetration rate of Sony Playstation 2 consoles per household in Ireland is second only to Japan.

services. Almost 500,000 internet users in Ireland made online purchases in Q4 2004¹⁰³. In part these issues could be addressed through government initiatives (e.g. eSecure). Other important social implications for users accessing communications are considered under the USO section of this document (see section 11).

Regulations that were established to develop markets in a traditional non-converged environment may in some cases seem inappropriate in a converged environment, and will need to be re-assessed. This is most evident with respect to radio spectrum where convergence is putting pressure on traditional assignments in particular frequency bands (see section 10). Convergence also affords operators the opportunity to bundle services together into attractive packages for end-users. However this may raise regulatory concerns where a service provider could potentially unfairly leverage their power in one market into a new emerging one.

Many of these developments are available through the implementation of new technologies that enable such convergence to take place. Portable wireless technology such as Wi-Max and Wi-Fi are likely to be important elements in fixed mobile convergence. Similarly digital broadcasting technologies are likely to influence the way in which end-users avail of advanced converged services.

9.3 Analysis of key trends

In this section a number of emerging trends are examined with respect to user access and content delivery:

- New Control Points
- Convergence of Media and Telecoms Sectors
- Fixed Mobile Convergence

9.3.1 Control Points

Regulators must be vigilant during the migration to next generation networks as the technologies and services introduced could in some cases create new sources of market control for certain operators and service providers (see also section 8.3.4). In relation to user access and content delivery these new 'control points' could take the form of shared access to customer information between operators (e.g. location based information from a mobile network operator needed by a location based service provider). Some potential control points are outlined below¹⁰⁴:

Software Services, Bundles and Devices: By controlling basic functions, service providers and software vendors/licensors can tie end users into certain types of content (e.g. Apple's iTunes lock in); thus preventing their customers

¹⁰³ Source - Amarach, Trendwatch survey, Q4 2004.

¹⁰⁴ See Cullen International & Devoteam Siticom, "Regulatory implications of the introduction of next generation networks and other new developments in electronic communications", May 2003.

from easily accessing services from their competitors. Similarly, device manufacturers are currently able to control the type of services and standards used that will ultimately be accessible by end-users. This is particularly true in mobile handset and set-top-box markets.

Walled Gardens and Content: Using network partitions service providers can limit end-users access to the Internet and other services outside of their control. In this way, service providers can extract revenues from the provision of their own brand of services since the end users have no means of accessing alternative services. Existing content providers with strong market power have been able to choose the delivery channels used for their content. Similarly portals and the order in which content is offered (in what are effectively electronic programme guides) can also be used to influence customers. Filtering points for information and content will also become increasingly important where users and content providers need to assess the legal status of the content being passed.

Tunnelling: This is where a network service provider implements their service in such a way that end-user traffic must first be routed via their home network before being allowed to travel onward. This has implications for mobile users while roaming on other networks.

Customer Information: New services may emerge in this area which may be used to control which services and applications an end-user can access. Access to information for authentication, single sign-on and account management are all important. Where single billing solutions are preferred by end-users control over their billing information is a potential control point that could limit their access to a greater selection of services. Resolving names and numbers through customer identification systems could also be important for enabling inter-working between PSTN and IP networks for voice communications. Control over network functions or elements such as ENUM registries could be important here. Mobile operators that collect end user location information are able to control that information, potentially limiting access to other service providers wishing to use it to provide location based services.

Many of these potential issues may be beyond the remit of telecoms regulators as they relate to content or user information (which may be for example the responsibility of the Data Protection Commissioner), or these may be part of new markets that must be allowed to develop and therefore cannot be regulated under the current framework. Further thought will need to be given to future developments in regulation that may be required to address these issues.

In any competitive market, or where there is a threat of competition, market players are likely to be attracted to any form of control point that is likely to help them get a competitive edge over other market players. It is therefore likely that telecoms service providers will attempt to leverage new control points that emerge in an attempt to gain market share. The potential emergence of these types of control points is consistent with the **Fibre-nation** scenario.

9.3.2 Convergence of Media and Telecoms sectors

As with any form of convergence, the convergence of media and telecoms is emerging in both sectors. Mobile and fixed telecoms operators seek to generate new revenue opportunities by delivering popular content typically associated with broadcast medium (e.g. sport, news, music, soap-operas etc.), and broadcast providers seek to deliver telecoms services over their networks or to become part of an integrated media-telecoms package. Strong brand awareness associated with content will give some content providers strong bargaining power when entering into distribution deals with telecoms providers, possibly resulting in shifts in some market power from telecoms providers to content providers. This could make it more difficult for network providers to maintain valuable position in the value chain, becoming simple bit pipes.

Strengths	Weakness	Opportunity	Threat
Experience in producing and sourcing content. Brand awareness in the area of content.	Limited access to individuals or small customer groups. Limited return channel mechanisms for interactivity. USO and must carry obligations.	To generate higher revenues by producing more targeted content.	From telecoms operators who control many return channels. From content providers who may deal with telecoms operators instead. Piracy of content. Damage to advertising based business models ¹⁰⁵ .

Table 9.1 - Media-Telecoms convergence implications for broadcasters

On the other hand, telecoms providers with access to large market segments could have significant influence over content providers (e.g. NTT DoCoM's influence over i-mode content providers). Broadband access channels are needed for telecoms operators to deliver equivalent traditional broadcast style content (e.g. TV, movies). Traditional broadcasting may remain relatively unchanged in terms of market structure (despite the introduction of digital broadcasting technology with some interactivity). Broadcast content over telecoms networks is likely to remain complementary to traditional broadcast channels over the period considered. An important element of this convergence is that either side (telecoms or broadcast operators) do not try to simply replicate the services of the other, and that value is added to the customer in terms of more compelling services, and not just the convenience of dealing with a single provider.

¹⁰⁵ e.g. Personal digital video recorder systems that allow end users to 'skip over' advertisements could have a negative impact on broadcasters' business models that are based on advertising.

Strengths	Weakness	Opportunity	Threat
Existing customer base and individual communications channels	Lack of experience in delivering content. Lack of access to content – i.e. must pay content suppliers.	Generate new revenue streams. Develop interactive services.	Get side-stepped by content providers, and become just data carriers.

Table 9.2- Media-Telecoms convergence implications for telecoms operators

Developments in this area could result in shifts in market power from traditional telecoms operators to content providers and vice versa. Furthermore, the situation could develop where a dominant position is present at several levels in the one value chain (e.g. content provider, service provider, network operator). Control points could also emerge outside of the direct telecommunications sector that would have implications for end users (e.g. software/platforms on end-user devices). These would have to be dealt with by competition law where appropriate. These are potential pit-falls consistent with the **Fibre-nation** scenario.

9.3.3 Fixed Mobile Convergence

Fixed mobile convergence has the potential to alter market structures as it enables operators to begin to compete in markets outside of their traditional core areas.

Fixed Mobile Convergence (FMC) – Convergence between fixed and mobile systems can occur via nomadic (or portable) systems. A nomadic system allows wireless users to connect to the network with mobility within a close range to a cell/hot-spot, but not as they move from location to location as in a mobile system. Wi-Fi is an example of a nomadic technology. Wi-Max technology is also under development with nomadic capabilities which could create significant FMC opportunities for fixed and mobile operators alike.

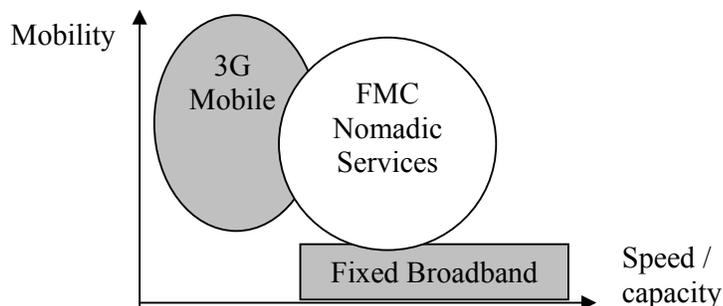


Figure 9.1 – Fixed Mobile Convergence exists between mobile and broadband communications

FMC occupies the space between the two most significant telecoms trends in recent times: mobile communications and broadband communications. It enables mobile operators to offer broadband services comparable to fixed offerings, and enables fixed operators to provide services with a degree of mobility. FMC offers consumers new ways to access fixed and mobile services and is likely to be targeted differently at different segments of the market:

Business Users: FMC, in terms of being able to use VoIP over in office Wi-Fi networks, gives corporate users a new way of accessing what has traditionally been a fixed wired (with the addition of mobile voice later) environment. Multi-mode data cards and handsets will increasingly be able to communicate in all of these systems depending on which option is most suitable. The ability to access high-speed wireless data on a nomadic basis in hot-spot type locations is also useful for business users to facilitate high capacity downloads, and to complement their lower speed data services available through traditional 3G networks. The application of advanced nomadic or portable wireless technologies could be beneficial to both fixed and mobile operators. FMC is aligned with a trend towards consolidation in corporate IT infrastructure, bringing once separate fixed and mobile solution together, reducing equipment levels and costs. FMC could be utilised to increase access to corporate networks for users while at the same time increasing security (i.e. by having a single security solution in place of separate ones for each technology type).

Home Users: Adding wireless capability to fixed broadband connections in users' homes facilitates portability within the home (e.g. connecting computers, telephones, entertainment equipment etc.). Other forms of FMC for home users enable them to use their mobile services at a reduced rate more comparable with fixed rates (e.g. O₂'s Genion service). The presence of virtual mobile operators and partnerships between fixed and mobile operators will enable customers to avail of converged fixed and mobile services.

Operator Strategies

Some possible FMC strategies for both fixed and mobile operators are outlined below:

Fixed Operators
<ul style="list-style-type: none"> - Becoming a Mobile Virtual Network Operator - Incorporating fixed wireless access technology with portability (Wi-Fi/Wi-Max) in hot-spots. - Adding portable wireless support to DSL (Wi-Fi) (this is good for small businesses when VoIP is added). - Partnership with/acquisition of mobile operators. - Combination of the above (e.g. BT BluePhone).

Mobile Operators
<ul style="list-style-type: none"> - Implementing local pricing (i.e. cheaper calls when attached to home base-station) - Adding fixed wireless access technology with portability (Wi-Fi/Wi-Max). - Partnerships with fixed operators.

Strengths	Weakness	Opportunity	Threat
Both fixed and mobile operators have existing customers and infrastructure.	Lack of expertise and customer awareness in non-core areas.	Retain and increase market share. Increase revenues by providing more complete solutions.	Progress by each is a threat to the other. Consolidation could threaten smaller players.

Table 9.3 - FMC implications for fixed and mobile operators.

Fibre-nation	Hiber-nation
Both mobile and fixed operators embrace FMC, resulting in both sides maintaining market share – i.e. no net fixed-to-mobile substitution. Users can select between a variety of fixed and mobile operators on a variety of fixed and mobile devices, depending on their particular needs. Following some early initiatives from new entrants, consolidation brought on by convergence such as FMC generally occurs in the overall telecoms sector (i.e. as a few key operators provide services in both fixed and mobile sectors). 3G operators have augmented their networks with broadband portable wireless technologies to meet customers’ broadband and mobile needs in a converged package. Smaller new entrants (e.g. FWA operators) deploying FMC remain active primarily in niche segments.	In this scenario FMC (and fixed-to-mobile substitution) could tip the balance in favour of mobile operators resulting in large growth in mobile markets, leaving fixed operators with high capacity broadband markets only. 3G operators implement FMC technologies in hot-spot type locations (e.g. business parks, hotels, etc.). Mobile operators are also beginning to augment their traditional services with broadcast services using DVB technology.

9.4 Conclusion

Convergence is a key force acting in numerous different ways in the telecoms sector. Convergence between different markets, technologies, and services increases competitive pressures on existing operators while offering a greater degree of choice for end users in how they access telecoms services. With

convergence and a more open market with easier entry (and exit) the power of brands is likely to become even more important. Strong brands are likely to stand a better chance of winning market share as they branch out into new markets, or if they are entering the telecoms sector for the first time. Fixed mobile convergence brings together two of the key trends in recent telecoms development: broadband and mobile.

While next generation network technologies and market structures bring about new opportunities for companies to begin offering services, this is new territory which could potentially allow the emergence of new bottlenecks or control points as companies compete for control of their markets. Regulators will have to be vigilant to protect consumers in such cases. Some of these control points are likely to fall outside of the traditional scope of telecoms regulations and may need to be addressed by other bodies such as the Competition Authority, the Data Protection Commission or the Broadcast Commission.

- Q.16 Do you have any comments on this analysis of trends in user access and content delivery? Are there any other issues that you think ComReg should consider?**
- Q.17 What effects do you expect these trends to have on the prospects for competition (whether infrastructure-based or service-based) in the 2005-2010 timeframe?**
- Q.18 Are there areas where these trends in User Access and Content Delivery could lead to the development of new bottleneck facilities or control points? If so, what are they, and how could regulation best address them?**

10 Spectrum

10.1 Introduction

ComReg recently published a consultation on the Spectrum Management Strategy (ComReg 05/01 Jan. 2005) that follows on from the first Spectrum Strategy published in May 2002 (ComReg 02/43). This section contains a summary of key points emerging from that analysis set in the context of this study.

Radio spectrum is a vital but limited natural resource that provides the means to convey audio, video or other information content over distances from a few metres to thousands of kilometres. Radio spectrum is essential for the provision of mobile communications and to provide wireless reception of broadcast services. It is also fundamental to the safe operation of air and maritime transport, is used widely by the defence forces and emergency services and supports important scientific applications such as meteorology and radio astronomy. Navigation services such as GPS are important for many applications for businesses and consumers such as transportation, surveying, emergency services, location based services and even synchronisation of telecommunications systems.

An assessment of the economic value of radio spectrum in Ireland carried out as part of the spectrum strategy statement work. Aegis Systems, Indepen and Ovum Consulting concluded that the total contribution to Irish GDP arising from the use of radio spectrum in 2003 was over €1.9 billion, or approximately 1.4% of total GDP. A conservative estimate of the number of employees in Ireland whose jobs are dependent on the use of radio spectrum is over 24,000.

As discussed in Section 4.2, spectrum has the potential to foster infrastructure-based competition, which is not based on access to element of the incumbent's network. ComReg would like to gain a better understanding of how its regulatory policies can promote this form of competition.

10.2 Review of potential trends

Government interest in the effective management and utilisation of radio spectrum is primarily related to its vital contribution to many aspects of our economy and society. However, as a natural resource, radio spectrum also raises funds for the exchequer (i.e. licence and spectrum fees). Governments must therefore carefully consider policy in relation to current issues such as spectrum trading and spectrum liberalisation. At a European Commission level, policy guidance on these issues is being produced by the Radio Spectrum Policy Group¹⁰⁶, which will have implications for the rate of adoption of these emerging principles by European member states. Spectrum management agencies (such as ComReg) must deal with the actual implementation of these policies in relation to spectrum management, carefully balancing the requirements of innovative new services with the requirements of existing commercial, social, and scientific users of spectrum. The emergence of mobile technology and broadband wireless systems

¹⁰⁶ <http://rspg.groups.eu.int/>

has brought the importance of radio spectrum, beyond broadcasting, to the attention of society in general thus raising the political importance of its administration. International harmonisation efforts¹⁰⁷, which previously determined the nature of practically all spectrum use, are finding it increasingly important to keep up with technology and commercial developments in relation to new applications of spectrum. If advanced technology developments such as agile radio systems that can be adapted to operate in a variety of spectrum arrangements become more cost effective, such harmonisation efforts and their associated bodies are likely to become increasingly less influential.

Technology developments have increased the economic and social value of spectrum allowing users to utilise it more effectively. The emergence of additional spectrum allocation tools such as spectrum trading increase the possibility for service providers with small scale or local requirements for spectrum to access it more quickly – in principle. There is also the possibility that smaller players will be priced out of the market for any available spectrum by larger companies. Necessary safeguards need to be implemented by regulators and competition authorities to prevent such situations emerging.

Radio spectrum has a crucial role to play in supporting key social objectives, such as ensuring widespread access to broadband services and content, or efficient delivery of public services such as health and law enforcement. Broadcasting has played a key role in promoting national culture and new opportunities for regional and specialist programming will arise with the introduction of digital services.

There are a number of areas where social, cultural and political issues might influence demand for radio spectrum. Two areas where these factors are particularly relevant are extending the availability of broadband access and the future of broadcast services. To some extent these are linked, since digitisation of television may provide opportunities to extend future broadband availability either using the digital TV platform itself or making use of some of the UHF spectrum to extend broadband access in rural areas.

New technology developments are taking place that could have a significant bearing on how spectrum is used in the future to deliver electronic communication technologies. Some of the key developments include:

- Convergent networks and devices that combine fixed, mobile and broadcast transmission media enabling different content and services to be delivered to the same terminal using the most appropriate choice of platform (see above)
- Improved spectrum efficiency, enabling higher volumes of data to be transmitted in a given amount of spectrum
- Ultrawideband (UWB) technology, offering the potential to carry very large amounts of data over short distances
- Cognitive and software defined radios that can adapt dynamically to different frequencies or networks depending on time and location

¹⁰⁷ e.g. from bodies such as ITU-R, CEPT etc.

- The increasing practicality of utilising bands located higher in the frequency spectrum.

10.3 Analysis of key trends

This section focuses on the three key possible trends or issues that are likely to affect many users of the radio spectrum over the next 2 to 5 years:

- Spectrum Trading
- Spectrum Liberalisation (change of use)
- Disruptive wireless technologies (e.g. nomadic wireless)

10.3.1 Spectrum Trading

Spectrum trading actually refers to the trading of rights of spectrum use as operators or end users do not actually own any spectrum, only a right to use it (typically granted via a licence). Spectrum trading proponents promise more efficient access to and use of radio spectrum via the use of market forces, releasing the potential of underutilised spectrum. From a regulatory perspective spectrum trading is just another tool in a spectrum manager's 'tool box', along with administrative pricing, auctions, beauty contest etc.

Following a number of years of media attention and hype, spectrum trading is now beginning to be gradually introduced in more countries. With general trends in Europe and the recent publication of the ComReg spectrum management strategy consultation it is likely that a limited degree of spectrum trading will be introduced in the next few years – provided that the necessary primary legislation is in place to permit trading¹⁰⁸. The way in which any further spectrum trading initiatives are introduced would depend to some extent on the success of initial initiatives and demand as the broadband and mobile landscapes continue to develop.

¹⁰⁸ This is currently being considered by the Department of Communications, Marine and Natural Resources - <http://www.dcmnr.gov.ie/Home/Communications/Business+and+Technology/WT+Act/WT+Act.htm>

Strengths	Weakness	Opportunity	Threat
Users with rights to existing blocks of spectrum could possibly sell them to generate revenue.	May be difficult for smaller companies to gain access to the spectrum they need. More difficult for spectrum managers to control usage. Interference control. Abundance of spectrum in Ireland – poor trading conditions.	Quick access to new spectrum. Release potential of under utilised spectrum, if change of use is permitted.	Fragmentation of spectrum resulting in inefficient use. Challenge of compliance with international agreements. Hoarding of spectrum. Lack of demand.

Table 10.1 - The impact of spectrum trading on the wireless sector

Spectrum trading is likely to be attractive to emerging operators seeking quick access to spectrum. At the same time it is attractive to current holders of relatively large amounts of spectrum (e.g. broadcast operators).

Fibre-nation	Hiber-nation
Limited spectrum trading is introduced and successfully stimulates the development of innovative wireless broadband access products. Faster easier access to regulated radio spectrum helps bring wireless into the main product set of fixed operators. An increasing amount of spectrum is utilised for nomadic and FMC applications.	Poor market conditions indicate a lack of demand for spectrum, and spectrum trading is not considered an efficient means in this situation. Trading has only been applied to a small portion of spectrum bands where demand warranted it. Apart from mobile, users are generally confused over the wireless options available.

10.3.2 Liberalisation of Spectrum

Liberalisation of spectrum or ‘change of use’ has the potential to increase innovation in spectrum usage, allowing wireless operators to utilise spectrum originally intended for one purpose to be used for another (e.g. using fixed wireless spectrum to provide mobile services). The implementation of this is challenging for spectrum managers, as the interests of existing spectrum users become increasingly difficult to protect (i.e. from interference). Licence-exempt frequency bands are an example where this approach is currently permitted. This topic is addressed in the ComReg spectrum management consultation. Change of use of spectrum is expected to have limited application over the next five years¹⁰⁹.

¹⁰⁹ Limited applications of this are permitted in Ireland via the wireless test licensing regime: ComReg Doc. 04/115

Technology developments are making spectrum liberalisation more practical, through developments such as tuneable radios, polite or cognitive wireless technologies (where devices are able to assess and avoid interfering with other users). This type of technology would eventually reduce the need for international harmonisation of spectrum usage as devices could adapt to local regulations and frequency allocations automatically.

Strengths	Weakness	Opportunity	Threat
Flexibility to create new services. Flexibility to utilise emerging technology. Flexibility to compete with those in possession of spectrum with exclusive allocations.	Sense of uncertainty relating to interference from other users. Uncertainty in relation to technology choices. Increase in the number of proprietary technologies means higher equipment costs.	Innovative new applications – brought quickly to market. Increased competition in the market. Access to spectrum for small operators.	Increased interference. No control for spectrum managers. Inefficient use of spectrum.

Table 10.2 - Impact of spectrum liberalisation on the wireless sector.

Future Scenarios

Spectrum liberalisation holds out the hope for operators to enter the lucrative mobile market without having to compete for national licences, either by re-using existing spectrum that they hold or by acquiring (e.g. via a spectrum trade, lease, or rental agreement) some new spectrum. If successful, the application of spectrum liberalisation would decrease the importance of international spectrum harmonisation and international organisations such as the ITU Radio-communications Conferences for certain areas of spectrum. This would have significant repercussions for future spectrum regulation.

Fibre-nation	Hiber-nation
In this scenario limited spectrum liberalisation in selected bands enables innovative nomadic services to develop. These are adopted by traditional fixed and mobile operators and new entrants alike. Similar developments worldwide have led to accelerated innovation in wireless devices and systems that can operate safely without the need for time consuming international harmonisation procedures.	Change of use is applied too liberally in an attempt to rapidly stimulate innovation, following developments in other countries. Without sufficient safeguards against inefficient use, unscrupulous operators are able to abuse portions of the radio spectrum making it difficult for other users to co-exist. This inhibits development in competitive wireless services. New regulatory strategies are needed to reassert control over troublesome spectrum bands.

10.3.3 Disruptive Wireless Technologies

A number of relatively recent wireless technology developments are beginning to emerge that could have a disruptive effect on traditional wireless businesses.

Portable Wireless Technology

Portable wireless technologies such as Wi-Fi, Wi-Max and a number of other standardised and proprietary technologies occupy a functional space that sits in between traditional fixed technology and traditional mobile technology (i.e. a form of FMC – see section 9.3.3). This makes these technologies a natural convergence between fixed and mobile systems offering end users a degree of high capacity broadband with a degree of mobility (commonly referred to as portable or nomadic). A wide range of Wi-Max technologies with different capabilities will become available over the next few years ranging from broadband fixed wireless access solutions to mobile solutions.

Agile, Smart, Cognitive Radio

Wireless technologies, which are able to adapt themselves or be adapted to different spectrum environments (e.g. different frequency bands, different power limits) are likely to emerge in commercial systems over the next five years. Such systems are often known as agile, smart, cognitive¹¹⁰, and software defined radio systems. In theory these systems would benefit from a fully liberalised spectrum environment, however the possibility of spectrum misuse in such an environment is an important concern (i.e. ‘the tragedy of the commons’). In the nearer term early versions of this type of technology could be used to allow radio equipment to meet regulatory conditions in multiple international regions, thus lowering production costs and avoiding lengthy international harmonisation procedures.

10.4 Conclusion

ComReg is currently assessing its spectrum management strategy following a public consultation. This consultation highlighted the economic and social importance of radio spectrum in Ireland to help put in perspective future decisions made in relation to its management. Ireland is in a key position with regard to the potential exploitation of its radio spectrum resources; relatively low spectrum usage and its position on the edge of the European continent are favourable in terms of spectrum opportunities.

Key trends emerging include spectrum trading (i.e. the trading of rights of use), spectrum liberalisation (i.e. change of use of frequency bands), and the utilisation of disruptive technologies (e.g. portable broadband technologies such as Wi-Fi and Wi-Max). These trends have the potential to dramatically alter the shape of the wireless sector in Ireland and can impact the wider telecoms sector in general. Regulation that encourages wireless innovation, while at the same time ensuring

¹¹⁰ Cognitive Radio, represents the most advanced form of software radio technology, where a device is able to reconfigure itself having monitored the radio spectrum and application environment it is operating in.

that existing users can avail of high quality services, will be a key factor in the sector's development over the next 5 years.

Q.19 Do you have any comments on this analysis of trends in radio spectrum?

Q.20 What spectrum management policies do you think ComReg should adopt so as to foster infrastructure-based competition using spectrum?

11 Universal Service Obligation

11.1 Introduction

Universal service in telecommunications is defined in the Universal Service Directive¹¹¹ as “the provision of a defined minimum set of services to all end-users at an affordable price”. It includes the provision of access to the public telephone network at a fixed location, at an affordable price and is designed to ensure that all users are able to avail of telecommunications services, recognising their importance for participation in society¹¹². Some of the services included under USO are voice telephony, payphones, directory enquiry, and narrowband Internet access. In 2003 eircom was designated as the universal service provider (USP) in Ireland until July 2006¹¹³. USO requirements are set out under the Universal Service Regulations¹¹⁴. The European Commission is expected to review the scope of universal service during 2005. ComReg recently published a consultation paper on the requirement to provide access to the network which readers should refer to for more information¹¹⁵.

This document is concerned with future developments in the Irish telecoms sector over the next 5 years. Key developments in the areas of mobile communications and broadband have already and will continue to change the telecoms sector and the ways in which consumers utilise telecoms services. This also has potentially important implications for USO. Two potential scenarios for future USO requirements exist. One scenario is based on the possibility that there may in fact be no need for USOs, or a significant reduction in requirements, in a next generation network converged environment where all users can gain access to the telecoms services they need. Conversely in the other scenario USO may in fact be increased to include provisions for broadband services.

¹¹¹ Directive 2002/22/EC of the European Parliament and of the Council, of 7 March 2002, on universal service and users' rights relating to electronic communications networks and services.

¹¹² While generally thought of as a political intervention in the market to protect consumers, the phrase was in fact coined by Theodore Vail, the head of the Bell system in the early years of the twentieth century, when it was undergoing financial troubles. Vail “offered to end his competitive wars with independent telephone companies, to interconnect with them, and to accept a framework of exclusive franchises and government regulation (Mueller 1997, p. 108). By his motto, “One System, One Policy, Universal Service”, Vail meant that the system would be “universal” only in the sense that any subscriber could place a call to any other subscriber, because networks would be interconnected (Mueller, 1997, p. 157).”

¹¹³ www.ComReg.ie/fileupload/publications/ComReg0368.pdf

¹¹⁴ European Communities (Electronic Communications Networks and Services)(Universal Service and Users' Rights) Regulations 2003, S.I. 308 of 2003 (www.dcmnr.ie/NR/rdonlyres/02EC83AC-5574-4D7C-9FE1-95BB649F69C6/0/CommsReg_USO_final.doc), which transposes the Universal Service Directive, Directive 2002/22/EC (www.dcmnr.ie/NR/rdonlyres/AEE3D352-4B8D-4CE3-A4FD-CB043DC2A9C0/0/Comms_Reg_Directive_2002_22_USO.pdf)

¹¹⁵ Universal Service Requirements, Provision of access at a fixed location – connections to public telephone network and provision of functional internet access. <http://www.comreg.ie/fileupload/publications/ComReg0517.pdf>

11.2 Review of Universal Service Obligation

Government policy for social inclusion through telecoms and the information society is an influential factor in the telecoms sector¹¹⁶. From a regulatory perspective, ComReg must carry out the designation of universal service providers and ensure that the obligations are met.

In some cases the benefits of the provision of universal service, such as marketing (i.e. the appearance of ubiquity) and the network effects (connecting a larger customer base), off-set any additional cost associated with providing services to less profitable areas or groups of customer's. In Ireland USO is currently carried out by the USO operator eircom under their normal activities.

Universal service is really all about social inclusion, allowing people in marginal areas or circumstances to avail of basic telecoms services that most of us take for granted. Traditionally this meant voice telephony and related services (e.g. fax), however as the Internet became socially important basic internet access was specified as part of USO. ComReg has identified 28.8kbit/s as a reasonable minimum narrowband data rate that users should expect¹¹⁷. In the future, as society becomes more reliant on high speed communications, it is possible that services requiring broadband Internet may be considered as socially important (e.g. educational, health, government services), possibly leading to a revised European directive requiring broadband availability to be made a USO.

Technological advances in delivering telecommunications access are likely over the period considered in this report, which have important implications for the delivery of USOs and more advanced services. Advancements in DSL technology that can increase its reach to customers currently located too far from their local exchange are likely. Fixed wireless access, cable and advanced mobile technologies could also be used to provide universal service in some areas.

11.3 Analysis of potential developments

In this section two scenarios for the future development of USO obligations are considered. First, the case where USOs are phased out in certain instances due to the increased availability of competitive equivalent services. The second case considered is where the scope of USO is broadened to include access to broadband services. The potential implications of next generation network technologies are also considered in this section.

11.3.1 Universal Service Obligations are reduced

USOs could become less important if sufficient access to communications services can be provided through normal market mechanisms. This scenario could result if many of the developments presented in this document come to pass.

¹¹⁶ See <http://www.euractiv.com/Article?tcmuri=tcm:29-134976-16&type=News> for details of the i2010 initiative under the renewed Lisbon agenda.

¹¹⁷ A specific minimum data rate has only been specified in two other European countries: UK (28.8kbit/s) and Sweden (20kbit/s).

This could eventually lead to a situation where USOs could be altered or abrogated, following a review of USO designations. Such developments could only occur after it had become certain that vulnerable users would still be able to gain access to services necessary for social inclusion and equality.

11.3.2 Universal Service Obligations are broadened

The extension of USO to include a broader range of services, such as broadband, is a potential way of increasing broadband access and helping to meet social policy agendas (eSociety). On the other hand such intervention can be considered a distortion to natural market conditions, and could prevent the natural development of competitive services. The drivers for this type of increase could be:

- EU or government policy aimed at increasing access to broadband services.
- An increase in the number of public services requiring broadband for access to basic information (e.g. health, education, etc.).
- Fulfil broadband demand in the regions.
- Add to the utility of broadband connection by increasing the size of the community connected.
- Reduce urban congestion by facilitating greater participation in teleworking.

Some of the challenges for this scenario are:

- Providing access in all situations could be costly with implications for competition and funding.
- There could be implications for geographic averaging of pricing where different platforms are used to provide access.
- Penetration rates would have to be far higher before broadband could be considered important for social inclusion.

Any USO related to broadband would be likely to become outdated very quickly due to the speed at which the market and technology is developing (i.e. what passes for broadband today is likely to be far slower than a renewed definition in 2010).

11.3.3 The Effect of NGNs on USO

The impact of technological and market changes brought about by the migration to next generation networks, and changing needs in terms of basic communications services will alter the environment in which USOs are applied. Some aspects of USO are likely to become less important while others or new aspects are likely to emerge. As with other elements of the telecommunications sector, such changes will need to be monitored with respect to their effect on social needs. It is expected that the scope of USO will be reviewed at a European level on a regulatory basis.

The migration process to next generation networks will leave some areas still dependent on traditional networks during the transitional phase. With reduced numbers of customers but still high fixed costs these sections will become increasingly expensive to maintain, which could have implications for the implementation of USO. Operators may find it increasingly difficult to maintain certain products or functions where the majority of their customers are migrated to more advanced next generation equivalents.

VoIP has important implications for USO in that although it may not meet all of the regulatory requirements to be classified as a Publicly Available Telecommunications Service (PATS)¹¹⁸ it may be broadly considered a substitute. It is possible that a scenario could emerge where VoIP could contribute to USO.

There are also potentially positive implications to being designated with USO including the network effects of an increased number of customers (i.e. ‘network externalities’) and positive marketing in appearing to have greater coverage. For these reasons it is possible that multiple operators may apply for USO provider status leading the regulator to a selection process (e.g. beauty contest, auction, etc.).

11.4 Conclusion

Recent developments and trends in the area of voice communications are changing the environment that universal service obligations were initially set up to operate in. Mobile communications networks provide voice services with near ubiquity and lower priced alternative voice solutions are likely to become increasingly available as VoIP services emerge. The increasingly important role of broadband in meeting the needs of an eSociety and social inclusion brings some to believe that broadband service provision should be included under universal service obligations. Developments such as these call for a reassessment of universal service obligations.

Q.21 Do you have any comments on these developments considered by ComReg on universal service obligations (USO)?

Q.22 Do you expect these developments to lead to an increase or a decrease in retail obligations on operators with SMP in retail markets? How do you expect them to affect the level of retail obligations on all operators, including those without SMP?

¹¹⁸ Some of the elements of PATS that may be difficult for VoIP systems to meet include: providing location information to emergency services, itemised billing, CLI, continued service under exceptional circumstances, number portability.

12 Conclusions

Recent economic conditions and trends are positive indicators for the future development of the telecoms sector in Ireland. High GDP per capita, low unemployment, an educated workforce, and a relatively young population are all key positive factors. The strong growth currently seen in broadband access is expected to continue over the next five years leading to further innovations in new telecoms services. 3G mobile technology will help to begin mobilising higher speed data services.

Some operator strategies have already begun to focus on the implementation of IP and next generation networks, now that this approach is no longer such a new and risky investment strategy, the risk of operators being left behind has emerged. Such developments will enable them to reduce costs and create new revenue generating services that can be fine tuned to meet the needs of smaller customer segments. Next generation networks will create new opportunities for new and existing operators alike, reducing traditional barriers to entry through the emergence of less vertically integrated structures. Investment is needed in both access capacity and in next generation network architecture (e.g. IP/MPLS/IMS) in order for the true benefits to be realised. Some consideration is given to the separation of eircom's wholesale and retail businesses to help increase equality of access and therefore innovation and competition in the telecoms sector.

Next generation networks bring new opportunities for convergence between telecoms markets, operators, and technologies. Nomadic wireless technologies in particular are likely to be a catalyst for convergence between fixed broadband and mobile systems. Convergence will bring some telecoms markets together, increasing competition and reducing the need for regulation. However, with these advances come potential new barriers to entry in the form of 'control points' which will need close regulatory attention. New regulatory products are likely to be needed to help competition develop on these networks.

Particular market conditions and demographics in Ireland are likely to lead to continued growth in the economic and social importance of radio spectrum¹¹⁹. Emerging trends in areas such as spectrum trading and spectrum liberalisation are likely to be important here. Finally, continued change in the area of telecoms creates a different environment to consider important social needs such as universal service obligations. These obligations will need to be re-assessed as the pace of change accelerates.

ComReg would welcome any responses to this consultation to help inform the debate on these forward-looking issues.

¹¹⁹ ComReg recently issued a consultation on spectrum management strategy - ComReg Doc. 01/05.

Annex 1 – Key Milestones in the Irish Telecoms Sector

The following tables were prepared by Analysys for ComReg. The tables through this section highlight what Analysys consider to be the key milestones in both the fixed and mobile markets. Where appropriate, the impact of these milestones on the market is discussed.

A1.1 Fixed market – Key Milestones

In 1984 Telecom Eireann was created as a quasi-state company following the division of the postal and telecommunication services, and was granted an exclusive licence to provide all telecommunications services within the Republic of Ireland. It was also granted a licence to provide international services. In 1990, Telecom Eireann bought 60% of Cablelink from RTE. In March 1992 the market for value added services was liberalised.

- 1994 to 1997

The years 1994 to 1997 marked a period of liberalisation within the Irish fixed telecommunications market, with many key areas of the market liberalised and a dedicated telecommunications regulator established.

<i>Date</i>	<i>Event</i>
1994	
November	Regulation on the provision of leased lines adopted
1996	
May	Ireland requested derogations from liberalisation timetable from European Commission (voice telephony and public telecoms network to 1 Jan 2000; alternative infrastructure to 1 July 1997; interconnection of mobile networks with foreign networks to 1 January 1999). Approved in November 1996.
1997	
January	Price cap regime introduced, provided for by Telecommunications (Miscellaneous Provisions) Act, 1996: CPI ¹²⁰ -X method applied to a basket of services. X set at 6% by the Minister
June	Under the Telecommunications (Miscellaneous Provisions) Act, 1996, the Office of the Director of Telecommunications Regulation (ODTR), the Irish regulator, was established, to be funded by a levy on industry Esat and Coras Iompair Eireann ¹²¹ formed a joint venture to build a national fibre optic telecoms network
July	Liberalisation of the alternative infrastructure market
November	Esat acquired EUnet Ireland, the largest corporate ISP in Ireland, and was floated on the stock exchange

¹²⁰ Consumer Price Index

¹²¹ Ireland's national railway operator

1998

January	EU Interconnection Directives enacted
June	Liberalisation derogation for voice telephony announced to be removed on 1 December 1998
November	Esat launched a pay-as-you-go Internet service
December	Liberalisation of the public telephony market; 29 new telecommunications licensees allowed to compete in the telecommunications services market Esat launched Esat Clear, a telephony and Internet service targeted at residential customers

Table A1: Key milestones in the fixed market 1994–97 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

- *1999 to 2000*

In the period 1999 to 2000, regulatory actions vital to the promotion of competition within the fixed telecoms market were introduced, including carrier pre-selection (CPS), non-geographic and geographic number portability and the introduction of local loop unbundling (LLUB).

<i>Date</i>	<i>Event</i>
1999	
January	Telecom Eireann reduced peak rate Internet access cost by 35% with calls charged in 7.5 minute intervals rather than 5
February	Competition for eight Fixed Wireless Point to Multipoint Access (FWPMA) licences launched (four broadband, four narrowband). Seven companies applied in total
March	Regulations providing for digital cable and MMDS introduced
May	Telecom Eireann designated universal service provider by the ODTR
July	eircom (previously Telecom Eireann) listed on the Irish, London and New York stock exchanges Cablelink sale to ntl completed
September	Esat acquired ISP PostGEM and its residential ISP subsidiary Ireland On-Line
December	Carrier pre-selection (CPS) and non-geographic number portability made available Esat I, a submarine cable between Dublin and Landsend, became operational; Esat commissioned the installation of Esat II between Dublin and Southport

2000

January	X in CPI-X formula changed to 8% (first price cap set by ODTR)
March	BT acquired Esat following the EC's approval of the acquisition
April	ODTR announced the introduction of bitstream access with a framework for full local loop unbundling by April 2001
June-July	Chorus, eircom and Esat awarded narrowband FWPMA licences valid for ten years. Chorus, Esat, eircom and Formus Communications awarded broadband FWPMA licences valid for ten years
October	eircom cut telephone tariffs – average call bill reduced by 16%, with a 56% reduction in minimum call charge from 11.5p to 5p
November	Geographic number portability made available Competition for three further FWPMA licences announced (two broadband, one narrowband)
December	Local loop unbundling (LLUB) launched eircom agreed Vodafone offer to acquire Eircell

Table A2: Key milestones in the fixed market 1999–2000 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

- *2001 to 2002*

2001 to 2002 saw the launch of wholesale and retail broadband products through the revision of both wholesale bitstream ADSL and LLUB pricing. In December 2002, the ODTR was replaced by the Commission for Communications Regulation, ComReg.

<i>Date</i>	<i>Event</i>
2001	
March	Formus Communications went into voluntary liquidation, shortly afterwards Esat handed back their narrowband licence
April	ODTR set LLUB prices at EUR13.53 per month following unsatisfactory responses by eircom – challenged by eircom
May	eircom demerged Eircell and subsequently sold the new company to Vodafone
June	ODTR issued consultation on fixed wireless access (FWA) following the voluntary liquidation of Formus Communications; proposed new national broadband licence and extension of spectrum available to licence holders
September	The ODTR directed eircom to submit revised wholesale ADSL pricing
November	eircom purchased by Valentia Telecommunications Ltd
December	eircom delisted from the Irish, London and New York stock exchanges

2002

February	<p>The ODTR issued a consultation paper on FWA covering potential local area licences; use of licence exempt spectrum for public access to data networks; and measures relating to existing licences</p> <p>eircom registered as a private company</p>
Mar	<p>Government set aside EUR200 million under the National Development Plan (NDP) to enable the provision of telecoms services by the public sector.</p>
April	<p>ODTR approved eircom's wholesale ADSL prices and LLUB charging (EUR16.81 from Jan 2001 to Mar 2003) and services became available across the country</p> <p>eircom announced EUR125 million investment in DSL services over five years and a plan to equip 100 exchanges with DSL to connect one million customers within two years</p> <p>Esat launched DSL services in Limerick via LLUB</p> <p>ntl entered Chapter 11</p>
May	<p>eircom began accepting orders for retail DSL connections</p> <p>The ODTR launched a consultation into the CPS market</p>
July	<p>ODTR directed eircom to implement CPS single billing products through WLR and Agency Rebilling by Jan 2003, later revised to Apr 2003 and Jun 2003</p>
December	<p>The ODTR announced the revocation of Chorus' broadband FWA licence on 31 March 2003 and their narrowband licence on 15 June 2003, and the amendment of the licences of eircom and Esat to increase coverage and relocate base stations</p> <p>eircom reduced price of national peak calls by 13% and national off-peak calls by 20%</p> <p>The ODTR was dissolved and replaced by the Commission for Communications Regulation (ComReg)</p>

Table A3: Key milestones in the fixed market 2001–02 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

- *2003*

2003 marked increasing competition within the broadband market, as well as continued revision of LLUB prices, and the launch of flat rate Internet access call origination (FRIACO) products.

<i>Date</i>	<i>Event</i>
2003	
January	nevada.telecom rebranded Energis ntl emerged from Chapter 11
February	X in CPI-X formula changed to 0% Esat launched WLAN services The DCMNR launched the rollout of a EUR65 million national broadband scheme (Regional Broadband Programme) to deliver high-speed Internet access to 19 key towns around the country.
March	ComReg announced the introduction of a first come first served licensing scheme for FWA licences in the 10 and 26GHz bands
April	eircom launched 'eircom broadband Starter', a low cost ADSL service
May	ComReg lowered LLUB prices to EUR14.67 – challenged by eircom
June	eircom required to offer Wholesale line rental (WLR) product following direction from ComReg (allowed for single billing) Wholesale FRIACO (Flat Rate Internet Access Call Origination) product launched Esat launched a FRIACO based service targeted at residential customers
July	EU regulatory framework introduced in Ireland
August	ComReg approved eircom's partial private circuit (PPC) pricing
September	ComReg adopted a number of measures regarding CPS including a "no contact" period for winback activities eircom introduced new retail FRIACO products Esat rolled out ADSL in Wexford via LLUB ComReg and eircom agreed to an interim LLUB price of EUR16.81 until March 2004
October	eircom launched 3 month promotions to stimulate broadband take-up
November	ComReg granted 32 FWA licences split between seven companies in the 3.5GHz band following 128 applications from 12 companies
December	Broadband Action Plan (BAP) launched by the Government to drive the broadband market in Ireland. EUR140 million of Exchequer funding is to be invested up to 2007 (EUR35 million per annum) to provide high-speed, open access broadband infrastructure in all cities and towns in the State with a population greater than 1500. The DCMNR announced a deal with ESB for connectivity for the regional MANs at rates that were eight times lower than those commercially available on the market at the time.

Table A4: Key milestones in the fixed market 2003 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

- 2004

2004 saw rapid growth in the broadband market, coupled with further reductions in broadband and fixed rate Internet prices.

<i>Date</i>	<i>Event</i>
2004	
January	<p>ComReg directed eircom to offer a Port Transfer service to broadband operators¹²²; similar direction applied to leased lines</p> <p>eircom launched commercial WLAN services following trials during 2003</p> <p>Esat launched a number of broadband and telephony service packages</p>
February	<p>eircom reduced wholesale and retail broadband prices as well as PPC prices</p> <p>eircom announced increase in telephone line rental</p> <p>Launch of broadband trigger level scheme by eircom for 150 communities of less than 1500 population</p> <p>The first of the MANs, in Cork, was launched by Dermot Ahern.</p> <p>Announcement of launch of EUR18 million scheme to bring broadband to all 4100 primary and secondary schools in Ireland by the end of 2005 (Broadband for Schools).</p> <p>ComReg directed eircom to provide a SB-WLR product by the end of March 2004</p>
March	<p>Formal release of 38 FWA licences in the 3.5GHz band to 8 companies</p> <p>eircom introduced low priced entry level ADSL product and revised other packages</p> <p>eircom shares listed on the London and Dublin stock exchanges</p> <p>Esat launched a new entry level ADSL product</p> <p>DCMNR announced details of a EUR25 million Group Broadband Scheme to deliver high-speed broadband into smaller communities over three years. The local community, comprising of local community organisations, development groups or businesses will take a leading role in driving the Group Broadband Scheme project in partnership with a broadband Internet service provider.</p>
May	<p>eircom launched flat-rate upgrade promotion until July 2004 to encourage dial-up customers to upgrade to broadband</p> <p>Esat launched a VoIP service for corporate, government and SME customers</p> <p>(continued overleaf)</p>

¹²² This service allows for the movement of a customer's DSL line from one operator to another without physical rewiring in the eircom network. This reduces the time for which the customer has their DSL service disconnected during the process.

<i>Date</i>	<i>Event</i>
2004 (continued)	
June	<p>ntl Ireland announced EUR100 million investment in upgrading its cable network to provide broadband services to more than 100 000 homes by the end of 2004 and the rest of its network by the end of 2006</p> <p>eircom launched enhanced CPS single billing through WLR</p> <p>The DCMNR announced the next phase of the Regional Broadband Programme (MANs). All 92 towns with a population of 1500 and over that do not have adequate broadband provision from the private sector will be targeted as part of a three year programme with a budget of EUR35 million per year.</p> <p>The DCMNR also announced the tender process for the Broadband for Schools scheme.</p> <p>It was announced that e-Net had been awarded the 15-year concession contract to manage to MANs after an open procurement process.</p>
July	<p>The DCMNR announced that Kilbeggan and Kinnegad, both in County Westmeath and Gweedore in County Donegal were the first three towns to benefit from the EUR25 million Group Broadband Scheme.</p>
August	<p>The DCMNR issued a call for proposals to build advanced broadband networks in 41 towns as part of Phase II of the Regional Broadband Programme</p> <p>ComReg proposed setting LLUB prices at EUR14.65 in real terms until Dec 07.</p>
September	<p>eircom reduces co-location charges for LLUB by 45%</p>
October	<p>ComReg sets out a framework for VoIP, including specification of the '076' prefix for VoIP numbers</p> <p>Esat launched WLR based product for enterprise customers</p>
November	<p>ComReg directed eircom to reduce full LLUB line rental to EUR14.65 and indicated they are to be kept fixed in real terms until December 2007; proposed cut in shared LLUB line rental</p> <p>eircom announced plans to deliver 500 000 DSL connections by December 2007 and 90% coverage by May 2006, calling on the Government to deliver the remaining 10%</p>
December	<p>ComReg announced the reduction of LLUB process charges by up to 50%</p> <p>The DCMNR announced a further five towns to benefit from the Group Broadband Scheme, as well as the closure of Phase I of this scheme. Phase II was targeted for early 2005.</p> <p>The DCMNR approved outline broadband infrastructure investment plans for 35 regional towns and a North West Digital Corridor link between Letterkenny and Derry as part of the next phase of the Regional Broadband Programme. The Department also announced that they were examining a further 10 project proposals received in Phase II and an announcement would be made in the New Year.</p>

Table A5: Key milestones in the fixed market 2004 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

- *Early 2005*

Early 2005 has seen further announcements regarding the Government's MAN and Broadband for Schools programmes, along with directions to eircom regarding the provision of LLUB.

<i>Date</i>	<i>Event</i>
2005	
January	<p>Ferbane, Co. Offaly has been approved under the 1st Phase of the Group Broadband Scheme</p> <p>The DCMNR launched the second phase of the County and Group Broadband Scheme, with up to EUR4 million available which could bring broadband to over 150 communities or 100 000 people nationwide. At Jan 2005, the first phase of the Group Broadband Scheme covered twenty four broadband projects and a population of about 20 000 people with an investment of over EUR800 000, of which over EUR375 000 was grant support. Seventeen further projects were being considered for support under the first call.</p> <p>The DCMNR announced results of the Broadband for Schools tender. The winning tenders were Digiweb (1428 schools); Smart Telecom (1041); Irish Broadband (592); Esat BT (585); Last Mile (215); and HS Data (87). eircom won a contract to provide the routers in each school and wholesale support over its network for fixed line broadband proposals.</p> <p>There is a target date of end 2005 for full completion, with the aggregate value of the contracts over three years of approximately EUR20 million</p> <p>ComReg issued directions to eircom to bring in a number of LLUB products and processes to encourage investment by alternative operators</p>

Table A6: Key milestones in the fixed market 2005 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

A1.2 Mobile market – Key Milestones

- 1995 to 1999

In 1985, Eircell launched an analogue TACS-800 service, followed by a GSM-900 network in 1993. The period 1995–99 marked the end of the monopoly held by the incumbent mobile operator eircell, through to the introduction and establishment of Esat Digifone.

<i>Date</i>	<i>Event</i>
1995	
October	Second GSM licence awarded to Esat Digifone with a 15-year duration
1996	
May	The mobile telephony and paging services markets opened to competition
1997	
March	Esat Digifone launched GSM network
October	Eircell launched prepaid service, 'Ready To Go'
1998	
June	ODTR announced that Meteor would be awarded third GSM licence (in both 900 and 1800 bands); Orange subsequently appealed the decision to the High Court
November	Esat Digifone announced launch of prepaid service, 'SpeakEasy'.
1999	
September	Digifone launched a mobile Internet service, 'Dot Digifone' Esat Digifone granted GSM 1800 licence by the Irish regulator, ODTR
October	High Court decision announced requiring the ODTR to review decision to award the third GSM licence to Meteor instead of Orange ODTR appealed to the Supreme Court against the decision
November	Eircell (with its parent Telecom Eireann) granted a general telecoms licence by the regulator, allowing Eircell to provide a full range of telecoms services

Table A7: Key milestones in the mobile market 1995–99 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

- 2000 to 2001

The introduction and establishment of Meteor Mobile Communications in the period 2000 to 2001 marked the end of the duopoly in the Irish mobile telecoms industry. This period was also highlighted by the acquisition of Eircell and Esat Digifone by the multinational mobile operators Vodafone and O₂.

<i>Date</i>	<i>Event</i>
2000	
March	Eircell launched GSM 1800 network
April	ODTR announced that 3G licences were planned to be awarded in February 2001
	Eircell launched HSCSD (high-speed circuit switched data) services
May	Eircell launched mobile ISP services
June	Meteor issued with GSM licence following court action
July	ODTR decided that the 3G licences would be awarded through a beauty contest
	ITG Telecoms brought legal action against Eircell for allegedly abusing its dominant position in the market by failing to provide ITG with access to Eircell airtime vouchers; ITG Telecoms subsequently lost the case
October	ODTR launched a competition for the award of a single national TETRA PAMR licence
2001	
January	Eircell launched an ecommerce billing service
February	Meteor launched GSM network covering Dublin, Cork, Limerick, Waterford and Galway
April	BT took full ownership of Esat Digifone
May	Vodafone acquired Eircell
July	Following from the SMP review by ODTR, both Eircell and Esat Digifone remained designated SMP in the mobile public telephony market and the national interconnection market
	Eircell closed its TACS analogue network
October	Eircell Vodafone, in partnership with Microsoft and Compaq, launched 'WorkAnywhere' for business users offering data speeds of 43.2kbit/s
November	Digifone rebranded O ₂
December	ODTR launched competition for award of four 3G licences

Table 8: Key milestones in the mobile market 2001–02 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

- 2002 to 2003

2002 and 2003 saw heightened competition within the mobile telecoms market, with Meteor slowly eroding Vodafone Ireland's and O₂ Ireland's market share due, in part, to the introduction of mobile number portability (MNP), and the award of the 3G licences and subsequent launch of trial services.

<i>Date</i>	<i>Event</i>
2002	
January	ODTR allowed enhanced SMS service to be offered by both mobile operators and service providers O ₂ launched its GPRS services Eircell Vodafone launched GPRS services
February	Eircell Vodafone rebranded Vodafone
March	Three companies submitted bids for the four available 3G licences: namely Hutchison Whampoa Group (A licence), O ₂ (A and B licence) and Vodafone Ireland (A and B licence) Vodafone launched commercial European GPRS roaming service in 12 European countries
June	Hutchison won the 3G A licence competition
July	Three 3G licences awarded
August	Hutchison accepted Class A UMTS licence with O ₂ receiving a Class B UMTS concession O ₂ introduced prepaid GPRS in Ireland
September	Vodafone accepted Class B UMTS licence
2003	
February	O ₂ launched WLAN service across 12 hotspots nationwide
March	The Code of Practice for Sharing of Radio Sites was agreed and signed by all three of the 3G licensees
May	Vodafone launched limited 3G service
July	Mobile number portability introduced Hutchison 3G trialled its UMTS network
October	Vodafone launched Wireless Office solution for business customers offering unlimited free mobile national calls between all participating employees Meteor launched GPRS network
December	O ₂ soft launched 3G

Table 9: Key milestones in the mobile market 2002 and 2003 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

- 2004

2004 saw the full launch of Vodafone’s 3G services, with Meteor continuing to slowly eat into Vodafone Ireland’s and O₂ Ireland’s market share. Early 2005 saw the approval by the European Commission of ComReg’s proposal to open up Vodafone and O₂’s networks to MVNOs and ComReg has announced that they will act immediately to implement this remedy.

<i>Date</i>	<i>Event</i>
2004	
January	3 signed national roaming agreement with Vodafone Ireland on its GSM network
February	ComReg published details of 3G licence commitments
April	Vodafone launched Blackberry in Ireland
May	O ₂ introduced Blackberry
June	ComReg ruled that all four mobile operators had SMP on their own networks Vodafone soft-launched 3G services, offering GSM/GPRS laptop card to business users, with the promise of facilitating 3G handsets by the end of the year
August	Meteor announced a national roaming agreement with O ₂ Ireland
September	Vodafone offered 3G services to customers
November	ComReg permitted use of mobile phone interceptor base stations by licensed mobile network operators (MNO)
December	ComReg proposed allowing mobile virtual network operators (MVNOs) access to Vodafone and O ₂ ’s networks
2005	
January	European Commission backed ComReg’s proposal to allow MVNOs to access Vodafone and O ₂ ’s networks. ComReg stated that it would act immediately to implement this remedy.

Table 10: Key milestones in the mobile market 2004 [Source: Analysys, operator Web sites and annual reports, ComReg/ODTR]

- *Early 2005*

September 2005 has been proposed as the introduction date for a new structure governing mobile call termination rates.

Annex 2 - Submitting Comments

All comments are welcome, however it would make the task of analysing responses easier if comments were referenced to the relevant question numbers from this document.

The consultation period will run from 5th of April to 13th of May during which the Commission welcomes written comments on any of the issues raised in this paper.

Having analysed and considered the comments received, ComReg will prepare the draft strategy statement.

In order to promote further openness and transparency ComReg will publish all respondents submissions to this consultation, as outlined in ComReg 05/24.

Please note

ComReg appreciates that many of the issues raised in this paper may require respondents to provide confidential information if their comments are to be meaningful.

As it is ComReg's policy to make all responses available on its web-site and for inspection generally, respondents to consultations are requested to clearly identify confidential material and place confidential material in a separate annex to their response

Such Information will be treated subject to the provisions of ComReg's guidelines on the treatment of confidential information – ComReg 05/24

<p>Q.23 Please provide any further comments which you feel are relevant to this Consultation.</p>
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Annex 3 – List of Consultation Questions

- Q.1 Do you agree with ComReg’s assessment of the current state of telecoms in Ireland? What other factors could ComReg consider in assessing the current state of telecoms in Ireland?
- Q.2 Do you agree that these represent developments, which could impact on the sector in the period under review? Are there others? If yes what impact do you believe they may have?
- Q.3 How can ComReg best incentivise infrastructure-based competition in the Irish market?
- Q.4 Do you agree with ComReg analysis that further improvement is necessary at the wholesale level to facilitate the development of a fully competitive market place here in the interests of Irish Consumers? If so, what would be the best way to ensure equal treatment between OAOs and eircom’s own downstream retail arm?
- Q.5 How can ComReg achieve the right balance, at the retail level, between light-handed regulation and the prevention of abuses of dominance? Can the availability of wholesale inputs on a non-discriminatory basis allow the relaxation of retail regulation?
- Q.6 Will substitution and convergence between fixed and mobile services reduce or eliminate the need for retail controls on a dominant operator?
- Q.7 What, if any, retail controls should be applied to all operators providing voice services to consumers?
- Q.8 Do you have any comments on the Fibre-nation and Hiber-nation scenarios presented above? What other scenarios do you think would be useful to explore?
- Q.9 Do you agree with this assessment of trends in operator strategies?
- Q.10 Do you agree with ComReg’s assessment on the evolution of voice markets? What other options do you see emerging?
- Q.11 What effect do you expect these trends to have on the need for regulation at the retail level in future? What form do you expect such regulation, if any, to take? (For instance, should regulation focus on preventing abuses of dominance/SMP, or on general consumer protection measures applicable to all operators?)
- Q.12 Do you have any comments on this analysis of the migration to next generation networks? Are there any other issues that ComReg needs to consider?

- Q.13 What effects do you expect Next Generation Networks to have on the prospects for infrastructure-based competition in the 2005-2010 timeframe?
- Q.14 If infrastructure-based competition develops, what markets will it affect and in what timeframe? Are there any areas where this could be expected to lead to the withdrawal of wholesale regulation /access requirements?
- Q.15 Are there areas where the development of Next Generation Networks could lead to the development of new bottleneck facilities or control points? If so, what are they, and how could regulation address them?
- Q.16 Do you have any comments on this analysis of trends in user access and content delivery? Are there any other issues that you think ComReg should consider?
- Q.17 What effects do you expect these trends to have on the prospects for competition (whether infrastructure-based or service-based) in the 2005-2010 timeframe?
- Q.18 Are there areas where these trends in User Access and Content Delivery could lead to the development of new bottleneck facilities or control points? If so, what are they, and how could regulation best address them?
- Q.19 Do you have any comments on this analysis of trends in radio spectrum?
- Q.20 What spectrum management policies do you think ComReg should adopt so as to foster infrastructure-based competition using spectrum?
- Q.21 Do you have any comments on these developments considered by ComReg on universal service obligations (USO)?
- Q.22 Do you expect these developments to lead to an increase or a decrease in retail obligations on operators with SMP in retail markets? How do you expect them to affect the level of retail obligations on all operators, including those without SMP?
- Q.23 Please provide any further comments which you feel are relevant to this Consultation.