

UPDATE

on TELECOMMUNICATIONS
in the WESTERN REGION

December 2002

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Western Development Commission

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Any errors and omissions are the responsibility of the authors.

Foreword

The information and telecommunications revolution is having a profound effect on the lives of all citizens, whether schoolchildren, shopkeepers or the executives of multinational corporations. How we communicate, are entertained, organise our lives, access services and do business is driven nowadays by developments in information and communication technology (ICT) and we increasingly refer to this as the information society. One of the key attributes of ICT is that it can make space and distance irrelevant. Whether we access the internet in Tokyo, Dublin or Belmullet, the information will be the same and, in theory, the potential for communication unlimited by location.

However, the accessibility, quality, speed and flow of data from place to place are determined by the availability of infrastructure and services on the ground. Just as roads and modes of transport provide us with the means to travel in physical space, broadband infrastructure and services enable us to travel in cyberspace. The quality of infrastructure and services is what counts; they make us more or less competitive, they make physical distance more or less critical to development, and they widen or lessen economic and social disadvantage.

In *The State of the West*, published last year, the Western Development Commission (WDC) drew attention to the impact of deregulation on infrastructure provision in the Western Region, and argued strongly for government intervention to redress emerging regional imbalances. Since then, the Government has endeavoured to address many of the WDC's recommendations and is committed to securing the widespread availability of affordable, broadband infrastructure to businesses and citizens within three years. However, the challenge of narrowing the regional gap in the provision of communications and services continues, and new issues have emerged in what is a very fast moving business, regulatory and technical environment.

In this bulletin, the WDC provides an update on the current status of telecommunications infrastructure and services in the Western Region, including a review of government policy and its implementation. We set out the key issues and make practical recommendations for action. We have striven to provide a user-friendly source of information to regional and national interests and to the general public. It is the WDC's firm conviction that quality broadband infrastructure will provide a unique opportunity for the Western Region to catch up, and to be on a par with the rest of Ireland in the knowledge-based society of the future. The case studies in this bulletin show that firms in the region are capable of competing internationally. They also demonstrate that, unless the issues outlined are tackled, the West will be further disadvantaged. The WDC is committed to helping to ensure that this does not happen.

Michael Farrell
Chairperson
Western Development Commission
December 2002



Telecommunications Overview

1.1 Introduction

Telecommunications infrastructure and services are critical to economic growth. Developments in information and telecommunications technology have transformed both voice and data communication methods. Up to relatively recently, the predominant means of communication were via fixed telephone (voice), fax and the postal system (data). Now, technological developments mean that communication via mobile phone and e-mail are commonplace. The internet revolution has further transformed communication across the globe. A quality telecommunications infrastructure is fundamental to the delivery of services required by modern businesses, such as on-line access to the internet and sufficient capacity to support their voice and data transfer requirements. In turn, growth in eBusiness¹ drives demand for additional telecommunications services.

As information and knowledge are key drivers of modern industrial growth, the availability of a modern telecommunications infrastructure has become essential to attracting and sustaining investment and maintaining competitiveness. It also underpins the development of eGovernment² and eLearning³. While the focus of this bulletin is on commercial and business infrastructure needs, it must be noted that entertainment applications such as interactive games will increasingly be key drivers of demand for improved infrastructure, particularly to the home.

The availability of quality telecommunications infrastructure and services at a competitive price is as crucial to regional development today as rural electrification was in the 1940s and 1950s.

The deployment of telecommunications infrastructure has a spatial character and some regions and locations are better served than others. Access to, cost and quality of services in Ireland is very much related to location suggesting an emerging 'digital divide' or 'broadband gap'.

Recent data⁴ on internet usage and connectivity suggest considerable regional variation (see Table 1.1). Within the SME⁵ sector, Sligo and Ballina have a higher dependence on PSTN and ISDN lines, than either Galway or Limerick. Data from the same survey also show that Sligo and Ballina have a lower internet penetration rate (74%), compared to either Galway (89%) or Limerick (93%).

Table 1.1 Type of Internet Connection by Regional Centre

	Standard 'phone %	ISDN %	Leased Line	Cable %
Sligo/Ballina	42	54	4	0
Galway	35	49	13	1
Limerick	29	45	16	3

Source: Chamber SME E-Business Survey 2002.
Note: Row totals may not sum 100 due to rounding.

Other surveys⁶ have identified significant user-demand for additional capacity. Approximately 45 per cent of businesses nationally believe they will need additional broadband access within the next year.

¹ eBusiness refers to business and commercial transactions conducted electronically. Technical terms are explained in the glossary (p.41) at the end of the Bulletin.

² eGovernment is the use of internet technology to transform the internal and external government processes, the way in which governments work and trade, and improving access to their public services.

³ eLearning is the delivery of education electronically. It can promote distance learning through video-conferencing etc.

⁴ Chamber SME E-Business Survey 2002. It should be noted that this differential may in part be related to turnover, as a greater proportion of companies interviewed (in terms of 'turnover') were located in the Galway and Limerick regions. The Chambers of Commerce represent the interest of small to medium sized businesses in Ireland, most of whom have less than 50 employees.

⁵ Small and Medium Sized Enterprises.

⁶ The Irish Communications Market, Quarterly Review, June 2002. p.8.



Telecommunications Overview

In Connacht/Ulster, 38 per cent of SMEs reported that the lack of a broadband connection has proved a constraining factor in their business development.⁷ Those working in organisations involved in attracting foreign direct investment (FDI), point to two key requirements sought by those seeking to invest in Ireland, namely broadband availability and a plurality of providers to provide a competitive environment.

Government policy has been to position Ireland as an e-commerce hub with the telecommunications infrastructure capacity to compete for foreign direct investment, and to help sustain both foreign and indigenous ICT (information and communications technology) industries. Despite this, in 2001, Ireland was ranked 27th out of 30 OECD countries in terms of broadband access, availability and use.⁸

1.2 Why this Bulletin?

In July 2001, The Western Development Commission published *The State of the West, Recent Trends and Future Prospects*, which included an analysis of the rollout of telecommunications infrastructure in the Western Region⁹ and the implications of the liberalisation of the telecommunications sector. *The State of the West* noted that

as the deregulation process is evolving, rollout is proceeding in areas with high-density business and residential usage. It is the free market that is largely determining supply and provision. If free market principles continue to determine rollout, then much of the Western Region will have extremely limited provision and capacity.

(p.114)

Since then, there have been significant developments in telecommunications markets and in government policy and these have prompted the preparation of this bulletin. The purpose of this work is to provide an update on current telecommunications capacity in the Western Region and to identify and discuss the key issues of access, cost and capacity.

This bulletin has been prepared to inform policy-makers of the current situation in relation to telecommunications infrastructure and services in the Western Region and to highlight the urgency of tackling the deficits there. It is also intended to facilitate telecommunications users in their understanding of the current services available and the likely developments in the future. Finally, it is designed to help the general public understand the implications of the information and telecommunications revolution for the Western Region.

1.3 Structure of the Bulletin

The bulletin is structured to facilitate as cogent a review as possible in a relatively short document. Section Two provides an overview of telecommunication infrastructure, including the broadband network and a description of the different technologies used to deploy broadband.

The current telecommunications network in the Western Region is discussed in Section Three. Section Four provides an overview of telecommunications services, (both narrowband and broadband) and those that are available in the Western Region.

Section Five is a summary of national policy on telecommunications infrastructure and includes a description of the latest funding programme for the construction of telecommunications infrastructure around towns (Metropolitan Area Networks). The implication of this funding for the rollout of services is also discussed.

In Section Six, key issues are summarised and a set of recommendations are presented.

A series of case studies from the Western Region are included throughout the bulletin. These case studies reflect the experiences of companies and organisations and identify some of the problems encountered in accessing telecommunications infrastructure and services.

⁷ MRBI Survey for the ODTR, August 2002.

⁸ Broadband allows for high-speed telecommunications. *The Development of Broadband Access in OECD Countries*, OECD, November 2001.

⁹ The term Western Region is used to delineate the seven western counties (Donegal, Sligo, Leitrim, Roscommon, Mayo, Galway and Clare), within the remit of the Western Development Commission.

Telecommunications Infrastructure



2.1 Introduction

In this section, the main features of telecommunications infrastructure and the technologies involved in delivering services are outlined.

2.2 What is Broadband?

Broadband connections allow for high-speed telecommunications transfer (both voice and data). Broadband connectivity is the tool that delivers fast internet access, as well as video on demand, video conferencing and web hosting.¹⁰

Broadband capacity is measured by the rate of transmission or bandwidth in bits per second. The minimum capacity for a broadband connection is 2Mbit/s.¹¹ However, customers can require bandwidths of between 34Mbit/s and 155Mbit/s. High technology companies such as internet data centres (IDCs) frequently require in excess of this.

2.3 The Broadband Network

The broadband network can be viewed in the same way as a road network. The more users there are, the greater capacity that is required so that more traffic can be carried. There is a primary, secondary and tertiary road network and the broadband network over fibre or copper wires can be viewed in the same fashion. There are four main components.

1. **International Links** – direct international links, connecting international locations. The completion of two transatlantic fibre cable projects (Global Crossing and 360 Networks) means that Ireland has what is regarded as world-class international connectivity at a competitive price.
2. **Backbone Network** – high capacity networks (usually fibre) connecting cities and towns. This can be seen as analogous to national primary roads. The backbone network is quite extensive and will be examined in detail in the next section.

3. **The Backhaul Network**¹² – connections between the national backbone and local telephone exchanges (approximately 1,100). The equivalent here are the secondary and tertiary road networks. The quality of the backhaul network helps determine broadband access to small and medium sized enterprises (SMEs) and residential users. The type of exchange (with fibre or copper) will help determine the possibility of delivering new technologies.¹³ For example, approximately 25 per cent of the trunk network in Ireland is based on copper networks rather than fibre.¹⁴
4. **Local Access Network** – access from each business and home to the backbone via the backhaul network. This level of the network is comparable to each driveway connecting every business and home to the road network. This has been the weakest link in the infrastructure within the Western Region because it consists mainly of copper cables, the capacity of which is restricted to 2Mbit/s. There are various technologies which can be used to deliver broadband services and these are outlined below.

2.4 Broadband Technologies

Broadband services can be provided in a variety of ways and as technological developments take place these methods are extending and improving. As noted above, technically the minimum capacity for a broadband connection is considered to be 2Mbit/s although there are some variations on this view. Some commentators refer to technologies below this level (such as ISDN and 3G i.e. Third Generation mobile phone technology) as broadband and hence their inclusion this bulletin.¹⁵

¹⁰ This is in contrast to narrowband, which typically supports traditional telephone lines and much slower internet access.

¹¹ A 'bit' is a unit of information, and 'bits' per second is the standard measure of data transmission speeds. 1 Mbit/s is one million bits per second.

¹² This is also termed the trunk network.

¹³ DSL technologies require a fibre link (rather than copper) between the national backbone and the local telephone exchange.

¹⁴ These copper networks are more likely to be located in the rural regions. For example in the Gaeltacht approximately 50 per cent of the trunk network is composed of copper.

¹⁵ Below the 2Mbit/s level is normally termed narrowband. However Forfás 2002, defines broadband as anything higher than Basic Rate ISDN (144k/bits). This same report defines narrowband as anything lower than 64kbit/s. The ODTR Report 02/79 defines the minimum threshold for broadband as 512kbit/s.



Figure 2.1 (on page 10) and the text below summarise the key attributes of the various technologies. The technologies detailed in the text are in order of use, that is those technologies which are more widely deployed are examined first. Table 2.1 (on page 11) details the cost of these technologies.¹⁶

2.4.1 Copper Cable/PSTN

The general telephone services network is based on a single copper cable and is termed the Public Switched Telephone Network. It is a single channel with dial-up,¹⁷ therefore voice and data cannot be transmitted simultaneously. It transmits voice at a speed of 64kbit/s and data at speeds of up to 56kbit/s. As such this technology is limited to transmitting small amounts of data at slow speeds for example e-mail and small file downloads. PSTN is available throughout Ireland and is used for all fixed line voice calls. Most home internet use in Ireland is still accessed through this technology.

2.4.2 ISDN

ISDN refers to integrated services digital network. Instead of the normal single copper cable as in PSTN above, ISDN provides two channels thereby allowing voice and data transmission simultaneously. This technology is also dial-up. ISDN can provide data transfer of up to 2Mbit/s depending upon the type of service.¹⁸ To avail of the service, customers must be located up to a distance of six kilometres from the nearest exchange. Apart from this limitation it is widely available. There are several different types of ISDN package available depending on the provider and the user – home or business.

2.4.3 Leased Lines

A leased line is a copper or fibre circuit that has been leased for private use.¹⁹ It is always-on and provides dedicated bandwidth to the user. Leased lines can provide access speeds of up to 2.5Gbit/s,²⁰ but typically provide speeds of up to 2Mbit/s. There are approximately 31,500 leased line circuits in use in Ireland of which 95 per cent are under 2Mbit/s.²¹ Large companies often use leased lines to connect to different sites of the business.

2.4.4 DSL (Digital Subscriber Line technology)

DSL allows customers to access the internet and use the telephone simultaneously over existing copper telephone lines. DSL requires the installation of equipment at both ends (the user's premises and the local exchange) with digital technology. It is always-on and access speeds are up to 30 times faster than a standard telephone line.

The DSL services in Ireland provide a capacity of up to 2Mbit/s. Access speeds depend upon the length of the copper line to the exchange, so that in general, the longer the distance the slower the speed. The availability of this technology is also limited by a distance of approximately three kilometres from the nearest DSL equipped exchange.

Services were launched in Ireland in May 2002 and there are approximately 1,200 DSL lines in operation.²² To date DSL is only available in larger centres. By the end of January 2003 in the Western Region, services will be offered in Galway, Athlone, Sligo, Ballina, Ballinasloe and Westport. Apart from the distance from the exchange limitation, providers argue that with present technologies, there is no commercial case for rolling out DSL services to smaller centres where it is perceived that there will be a limited take-up. DSL is most appropriate for the SME and home user.

¹⁶ The technologies discussed below are ordered from those with the most widespread usage to those with the least. Please note the costs cited in table 2.1 are approximate only and are subject to change by the providers.

¹⁷ 'Dial-up' requires dialling up for an internet connection and is in contrast to always-on.

¹⁸ ISDN Primary provides 30 channels with a capacity of 64kbit/s (30 x 64).

¹⁹ It is sometimes called a dedicated line.

²⁰ 1 Gigabit/s = 1,000 Mbit/s.

²¹ There are approximately 22,000 retail leased lines and 9,500 wholesale leased lines. (ODTR, 2002, Document 02/76b.)

²² As at August 2002. (ODTR, 2002, Document 02/76b.) The DSL service that is currently available in Ireland is ADSL (Asymmetric Digital Subscriber Line).



2.4.5 Cable Modem (Cable TV)

A cable modem is a device that connects a computer to an existing cable TV line that can transmit data at high speeds. In theory access speeds of 30Mbit/s are achievable but this would require a significant upgrade of the cable networks in Ireland. In practice speeds of 1-2Mbit/s are realisable.

Currently there are only around 1,000 cable modem subscribers in Ireland²³ and the internet service is as yet only available in Dublin (on trial). There are an estimated half-million households with cable TV in Dublin, Cork, Waterford, Limerick and Galway and internet services are expected to be rolled out very gradually to these centres. Cable modem access is designed for the home user and services in the short to medium term are likely to be concentrated in the urban centres listed above.

2.4.6 Fibre Optic Cable

Fibre optic cable can provide access speeds of up to 80Gbit/s and is the most future proof of all transmission methods. Most of the backbone network is composed of fibre. Telecommunications providers are gradually extending the reach of the fibre network into the backhaul network. Fibre is one of the more expensive technologies to deploy widely as it requires laying cables underground. It is widely available to larger users such as government, very large business and higher education establishments. Most IDA business parks have fibre installed.

2.4.7 Broadband Wireless Local Loop (or Fixed Wireless Access)

This technology transmits high-speed internet services via radio waves and is relatively new. BWLL can provide access speeds ranging from 64kbit/s to tens of Mbit/s. It is limited by distance of between one and 35 km depending upon the frequency used. It is currently not widely deployed in Ireland. There

are three companies licensed to provide fixed wireless access, but only two are operating a very limited service. It is estimated that the number of customers is less than 200.²⁴

Chorus was awarded a licence to provide such services in the BMW region but its licence is being revoked as it has failed to deliver this service.²⁵ This is due to the current poor commercial environment. This company was to receive NDP funding for this rollout.

2.4.8 Wireless LAN (Wireless Local Area Network)

WLAN technologies can provide broadband connectivity deployed over radio waves.²⁶ In theory access speeds of up to 54Mbit/s are attainable,²⁷ however the most widely adopted standard in Europe provides 11Mbit/s of bandwidth shared between users.²⁸ In practice, always-on services can be provided with access speeds of up to 2Mbit/s both up and downstream. It can be installed relatively quickly and cheaply. It is designed to link computers and other data processing devices within a small geographic area because of its short range, up to 10 km. WLANs have been deployed in public areas such as airports, hotels and conference centres allowing users access to the internet. They have also been used in office environments.

WLAN is not widely deployed in Ireland. However, the Department of Communications, Marine and Natural Resources has invited applications for pilot projects in order to ascertain the benefits of this technology. Funding of €300,000 is available, and five projects are expected to be announced before the end of 2002. Typical users are likely to be small businesses and home users. This technology is likely to develop in areas where alternative broadband access is not available.

²³ This service, delivering 512kbit/s is offered by NTL.

²⁴ These are Esat BT and Eircom. ODTR 02/79 p.16.

²⁵ On foot of this revocation of the licence it is likely that the ODTR will offer local area licences without the stricter rollout obligations which are attached to national licences. Another licensed FWA operator, Formus Communication Limited received funding under the NDP but has since gone into voluntary liquidation.

²⁶ WLAN uses licence exempt spectrum (providers do not require a licence).

²⁷ Call for WLAN Proposals, DCMNR, 5th August 2002.

²⁸ Ovum 2002, p.59.



2.4.9 Satellite (VSAT)

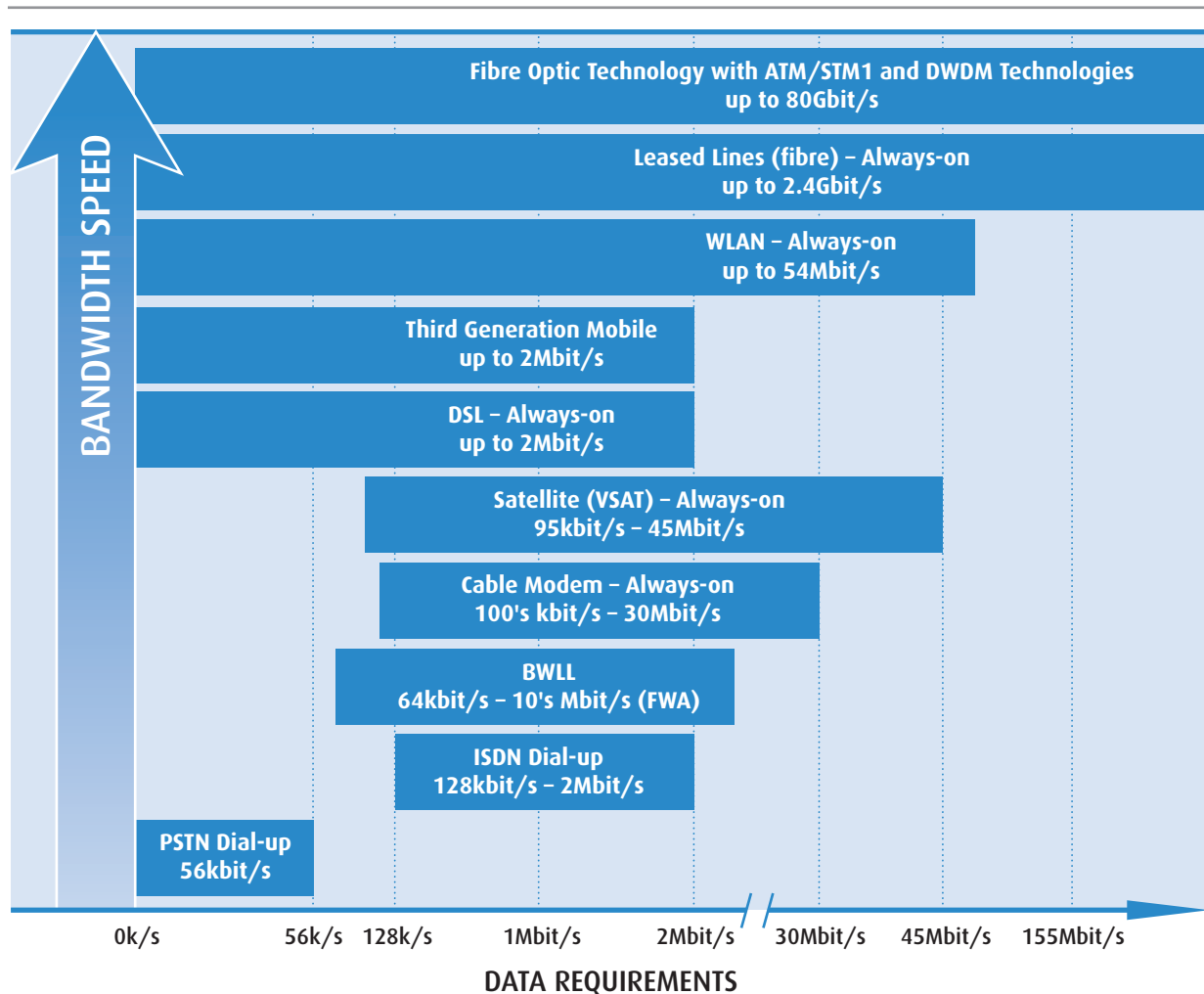
VSAT²⁹ refers to one form of satellite transmitted internet access. It is always-on and is suitable for voice and data transmission. Transmission speeds are asymmetric with download capacity greater than upload capacity. In theory, VSAT can provide access speeds in the range of 9.6kbit/s to 45Mbit/s³⁰ but typically speeds are between 100kbit/s and 350kbit/s upstream and between 100kbit/s and 2Mbit/s downstream.³¹

Transmission requires line of sight between the user and the satellite. In addition, longer distance satellite communications can cause a slight delay and therefore may be unsuitable for interactive

internet applications such as games and videoconferencing. However, unlike terrestrial broadband, it is particularly suitable for more remote regions, as it does not require expensive cabling.

VSAT networks are not widely available in Ireland however trials have just been concluded. One of these in Co. Mayo, is included as a case study in this bulletin. VSAT is particularly suitable for transmission between, for example, a head office and branch locations due to the asymmetric transmission speeds and is therefore suitable for business use.

Figure 2.1 Defining Narrowband and Broadband



²⁹ Very Small Aperture Terminal.

³⁰ www.t4eb.com. p.127.

³¹ ODTR, 02/79. p.64.



2.4.10 Third Generation Mobile

Third generation mobile (or 3G) is based on mobile phone technology. It is not yet available but is expected to provide data speeds of up to 2Mbit/s. This will allow the transmission of voice and data services such as e-mail and web browsing. The ODTR has awarded licences to three providers, however services are not expected to be widely available until 2004. Two of the licensees

will be providing services to a minimum of 53 per cent of the population, which corresponds to the five major cities. The other licensee is required to provide services to 80 per cent of the population. This means that there will be only one provider of 3G services in most of the Western Region and consequently there will be limited competition in the provision of services in the West.³²

Table 2.1 Summary Table of Currently Available Narrowband and Broadband Technologies³³

TECHNOLOGY	TYPICAL SPEED	COST	AVAILABILITY
Copper / PSTN	56kbit/s (Dial-up)	Monthly rental charge €15-€16. Metered charges vary by provider	Widespread
ISDN	ISDN Basic - 2 x 64kbit/s (Dial-up)	Installation - €244.99 + modem - €121+ monthly rental fee ranging from €20.00-€37.50. (Esat - Eircom)	Widespread within 6km of nearest exchange
	ISDN Primary 30 x 64kbit/s (Dial-up)	Installation - €3,958 incl vat, + monthly rental fee €70-€264.11 (Esat - Eircom)	
Leased Line Copper ³⁴	Up to 2Mbit/s (Always-on)	2Mbit/s (2km circuit). National average = €651 per month ³⁵ 2Mbit/s (5 km circuit). National average = €1,461 per month	Widespread
Leased Line - Fibre Optic Cable	Up to 80Gbit/s (Always-on)	Price varies depending upon capacity. Ireland positioned 7th out of OECD countries for national leased line costs	Limited to large data users
DSL Basic	DSL 128kbit/s upstream & 512kbit/s downstream. (Always-on)	€125 - €165 installation + modem €145 + rental €89 per month for 3Gbit quota. (UK €46.80)	Designed for SMEs/home. Limited by approx. 3 km from exchange
DSL 2Mbit/s	DSL 512kbit/s upstream & 2Mbit/s downstream. (Always-on)	€1500 installation + rental €400 per month.	Designed for SMEs. Limited by approx. 3 km from exchange
Cable Modem	128kbit/s - 1Mbit/s (Always-on)	€100 installation + rental, 128kbit/s €30 per month, 512kbit/s €40 per month	Not widely deployed but trials under way
Satellite VSAT	95kbit/s - 45Mbit/s (Always-on)	€1,500 installation, 128kbit/s upstream & 400kbit/s downstream = €100-€170 per month	Not widely deployed but trials under way
Wireless LAN	256kbit/s - 54Mbit/s (Always-on)	256kbit/s upstream & 512kbit/s downstream. Business users - €100 per month + installation €1,500. Home users - €30-€50 per month	Limited by up to 10km
BWLL or FWA	64kbit/s - 10's Mbit/s	Broadband services not widely deployed	Limited by distance 1-35km

³² The ODTR has stated that there are no plans at present to regulate 3G pricing.

³³ The prices quoted are approximate and are those prevailing in November 2002.

³⁴ In practice 5% of LL are greater than 2 Mbit/s, another 5% are between 256 kbit/s and 2 Mbit/s and 90% have a capacity of less than 256kbit/s. These are analogue based and can only provide voice or dial-up modem services. As such they are not considered broadband.

³⁵ These costs represent the national average and there are significant price variations, in part depending upon the distance of the user from the local exchange. In more rural areas the distance to the exchange is likely to be greater than in urban areas. Source: Total Research - Teligen. Cited in Forfás, 2002, p.30.



Summary of the Telecommunications Infrastructure

- Broadband is the medium that allows data to be transmitted at fast speeds. The broadband network is analogous to the national road network with primary routes (the backbone network), secondary routes (the backhaul network) and tertiary routes (the local access network).
- There are many different technologies which deliver broadband, some of which are just being developed. In practice however, only a few broadband technologies are widely available in Ireland.
- Within the Western Region the broadband technologies that are currently available include fibre, DSL and satellite. However there are limitations with each of these technologies.
- While fibre has the greatest capacity and is the most future-proof, it is also the most expensive.
- DSL, while less expensive to install, requires a significant take-up to enable it to be deployed commercially. Outside of the main urban centres within the Western Region, there is a weak commercial case for DSL rollout with present technologies, as charges to customers would be prohibitive. Deployment of DSL is also limited by the requirement for proximity to the local exchange.
- While there is a limited rollout of satellite technologies, it is likely that in the current commercial environment, these are one of the most appropriate technologies to deliver broadband to rural areas in the Western Region.



Case Study

Lionbridge Technologies, Ballina Co. Mayo

Lionbridge Technologies employ over 100 people at their Ballina, Co. Mayo, operation. Much of their work involves certifying and testing software (under the 'VeriTest' division). They are the only company worldwide who are authorised to certify software developed by software vendors for use on all Microsoft operating systems.

Since their establishment in Ballina in 1997, their data transfer needs have been served by copper based technology (ISDN) and they have now reached the capacity of that technology (2Mbit/s bandwidth). The work they are doing requires increasingly higher bandwidth capacity. They estimate that within two years they will need capacity of at least 10Mbit/s – five times their current capacity, to run their business operations. Without this, they risk losing competitiveness and specific bandwidth intensive service functions to the firm's other operations in the US and Europe.

The cost of a fibre-based connection from Eircom was considered too high by the company (approximately five times the price of an equivalent US based installation). Transmission via the ATM network was considered too

expensive because the price quoted related directly to Lionbridge's distance from the nearest ATM PoP on the Eircom network. The nearest ATM PoPs are in Galway or Sligo.

Lionbridge's search for broadband connectivity at a competitive price coincided with the commencement of Local Loop Unbundling (LLU) by which other licensed operators are given access to Eircom's exchanges in order to deliver services such as broadband (DSL). Ballina is one of the first exchanges to be unbundled so that Esat BT (and in theory other providers) now have access to Eircom's networks and can offer a DSL service to customers in Ballina.

Esat BT have offered Lionbridge a service at a more competitive price based on fibre optic technology. Meanwhile, a publicly funded Metropolitan Area Network (described in Section Five below) is being built in Ballina. In the medium term Lionbridge can have a direct link to the national fibre backbone via this local fibre network.

Case Study

E-Training International, Scariff, Co. Clare

E-Training International provide a range of software development and training services to technology based businesses. They operate through a network of skilled home-based eWorkers.³⁶ The company has over 135 eWorkers on its database along with 250 translators available to its translation agency. The office is located in Scariff, Co. Clare, where eWorkers are provided with training, management and technical backup.

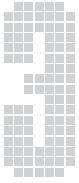
The company relies increasingly on file transfers and on-line access to client servers. It also has identified a need for high quality videoconferencing facilities. The existing telecommunications services available to the company (ISDN) are inadequate in terms of bandwidth and costs for it to operate effectively. As a consequence, it has not

been possible for it to undertake some development contracts, which would have resulted in increased employment in the area.

The key issues for E-Training International are the need for always-on connectivity and broadband capacity. The company's current traffic levels are between 10 and 50 Mbits per day, however with always-on broadband connectivity, it is estimated that this will increase considerably.

The company is now looking into the feasibility of using satellite as a transmission method, as other options such as DSL are not likely to become available in the area in the near future, and the cost/performance ratio of leased lines does not make commercial sense for the company.

³⁶ eWorking is a way of working using information and communication technologies in which work is carried out independent of location.



The Networks in the Western Region

3.1 Introduction

In this section the backbone network is examined in some detail – nationally and in the Western Region. The extent to which users have access to broadband services is determined by their distance from both the fibre backbone and the local telephone exchanges. For ease of presentation, the networks are identified by ownership, though in reality each operator uses elements of another's network.

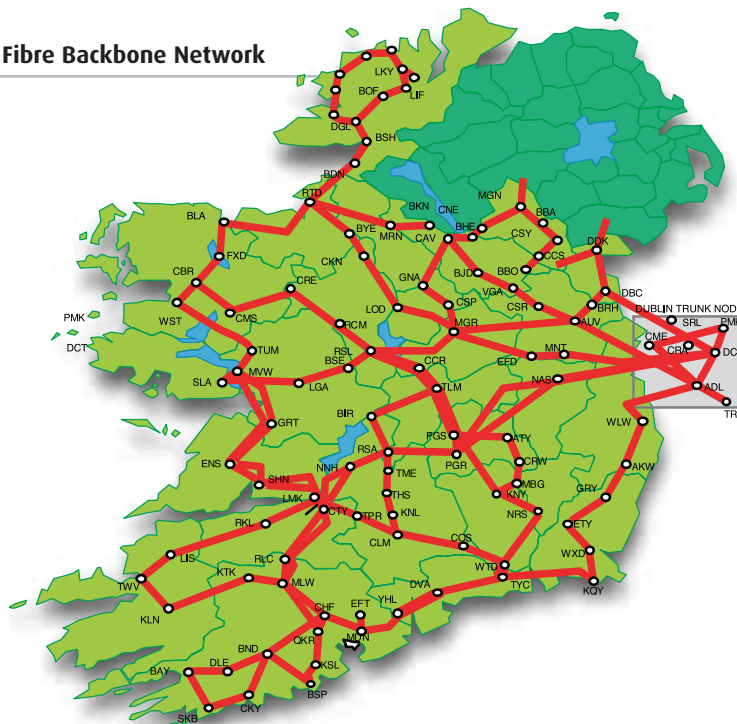
3.2 Eircom's Backbone Network

Prior to deregulation there was only one provider of telecommunications services in Ireland. Accordingly, Eircom's (now termed the 'incumbent') network is the most significant and pervasive. The map below illustrates the incumbent's fibre network. In 2002, it consists of over 200,000 kilometres of fibre extending from Dublin to the regions.

While there is a fibre backbone throughout the Western Region, there are many areas, particularly the western parts of counties Mayo, Galway and Clare, which are significant distances from the backbone.

While the entire network displayed is operational there is some spare capacity (fibre), which is not yet operational.³⁷ This is to allow for the expansion of services as required. In addition, while parts of a transmission route may be fibre other parts of the route are composed of copper. The copper network can only transmit data at access speeds of up to 2Mbit/s, whereas the fibre network can deliver capacity at much higher speeds. Eircom maintains that as over 90 per cent of the demand is for services at 2Mbit/s or less, these can be delivered more than adequately over the copper network.

Map 3.1 Eircom's Fibre Backbone Network



³⁷ The term 'lit' is used to describe a network which is operational.

The Networks in the Western Region

However this situation is not adequate in two respects. Firstly, in parts of the region, the network does not have sufficient capacity to attract new foreign direct investment, particularly those companies in the ICT sector. Data intensive companies require greater capacities and many locations within the Western Region could not currently support these on the copper network. Secondly, future demand will require greater capacity at a competitive price. This applies to the indigenous sector as well as foreign companies and is illustrated in the case studies. Just as a road network to a town is required before it can be developed, similarly telecommunications infrastructure is required before broadband can be delivered.

3.3 Fibre Connection to Eircom's Core Network

The towns listed in the first column in Table 3.1 are those towns which are either on Eircom's national backbone, or are connected via fibre to the national backbone. This fibre connectivity is important because, as noted in Section Two, it enables higher capacity broadband transmission for business users and allows the delivery of modern technologies such as DSL to businesses and home users located within a certain distance from the local telephone exchange.

3.4 Access Fibre in Towns

The second column in Table 3.1 indicates the presence of fibre in the local access network in each of the towns listed. This network is operationalised or lit on the basis of commercial returns to the providers. The Metropolitan Area Networks to be built in Phase I of the latest government initiative are designed to complete some of the towns' infrastructure on the basis of open access to fibre networks. This is discussed further in Section Five.

3.5 Eircom PoPs

A point of presence (PoP) is an access point to the internet. The third and fourth columns of Table 3.1 illustrate the location of Eircom PoPs within the Western Region. There are different types of PoPs which, depending on the network they serve can deliver varying access speeds for the transmission of data. For example, 'internet PoPs' provide dial-up access to the internet at local call rates. The locations of these internet PoPs are illustrated in the third column of Table 3.1.

The ATM network provides one option for those who require higher capacity transmission. Access to this network requires connection to ATM nodes (also referred to as ATM PoPs).³⁸ The ATM network provides managed bandwidth of up to 155Mbit/s of traffic. Including Athlone, there are six locations in the Western Region that have an ATM node and these are illustrated in the final column of Table 3.1.

(see overleaf for Table 3.1)...

³⁸ Provides for access speeds of 34 and up to 155 Mbit/s. Asynchronous Transfer Mode – a fast switching and multiplexing technique that allows voice, data, audio and video to be carried on the same network.



The Networks in the Western Region

Table 3.1 Eircom's Telecommunications Infrastructure 2002

Town	Fibre Connection to Eircom's Core Network	Access Fibre in Towns	Eircom Internet PoPs	Eircom ATM Nodes (PoPs)
Athenry	●	—	—	—
Athlone	●	●	●	●
Ballina	●	●	—	—
Ballinasloe	●	—	—	—
Ballybofey	●	—	—	—
Ballyshannon	●	●	—	—
Boyle	●	—	—	—
Buncrana	●	●	—	—
Bundoran	●	—	—	—
Carndonagh	●	—	—	—
Carrick-on-Shannon	●	●	—	●
Castlebar	●	●	●	—
Castlerea	●	—	●	—
Claregalway	—	—	—	—
Claremorris	●	—	—	—
Donegal	●	●	—	—
Ennis	●	●	●	—
Ennistymon	—	—	—	—
Falcarragh	—	—	—	—
Galway	●	●	●	●
Gort	●	—	—	—
Kilrush	●	—	—	—
Letterkenny	●	●	●	●
Lifford	—	—	●	—
Loughrea	●	—	—	—
Newmarket-on-Fergus	●	—	—	—
Roscommon	●	—	—	—
Shannon	●	●	—	●
Sligo	●	●	●	●
Tuam	●	—	—	—
Westport	●	—	—	—

Source: Eircom 2002.

The Networks in the Western Region

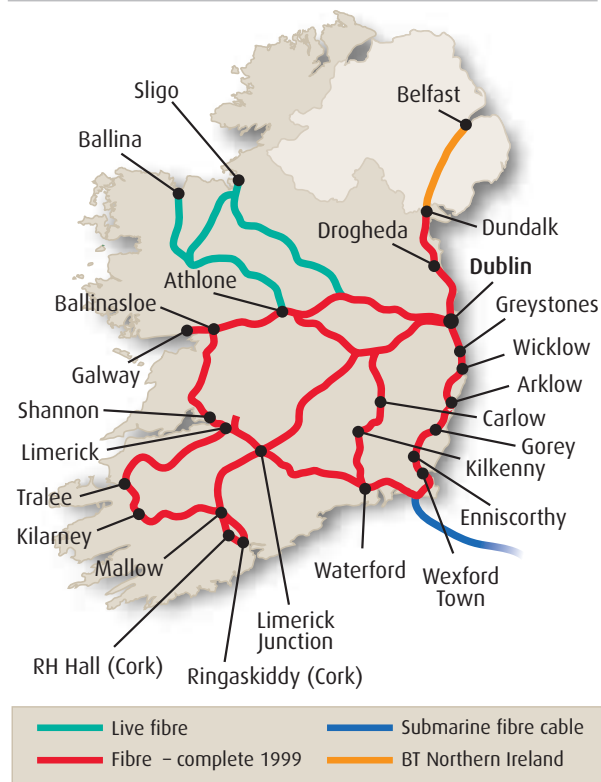
3.6 Esat BT's Network

The second major provider in Ireland is Esat BT. In 2000, British Telecom bought Esat Telecom. Prior to this Esat had engaged in a joint venture with CIE to build additional fibre networks along its railway infrastructure.

Esat BT's national network is illustrated below. Two routes serve the Western Region, one emanating from Mullingar, the other from Athlone.³⁹

The Esat BT network is routed through the following towns within the Western Region – Athlone, Ballymote, Ballina, Ballyhaunis, Boyle, Carrick-on-Shannon, Castlereagh, Claremorris, Collooney, Foxford, Roscommon, and Sligo.

Map 3.2 Esat BT's Network



As is evident from the map, there is coverage in counties Sligo, Roscommon, Leitrim, Mayo and Clare but Donegal is not served. The more western parts of counties Mayo, Galway and Clare are poorly served.

³⁹ Route 1; Dublin – Mullingar – Longford – Carrick-on-Shannon – Boyle – Ballymote – Sligo.
Route 2; Dublin – Mullingar – Athlone – Roscommon – Castlereagh – Ballyhaunis – Claremorris – Balla – Ballina – Tobercurry – Sligo.

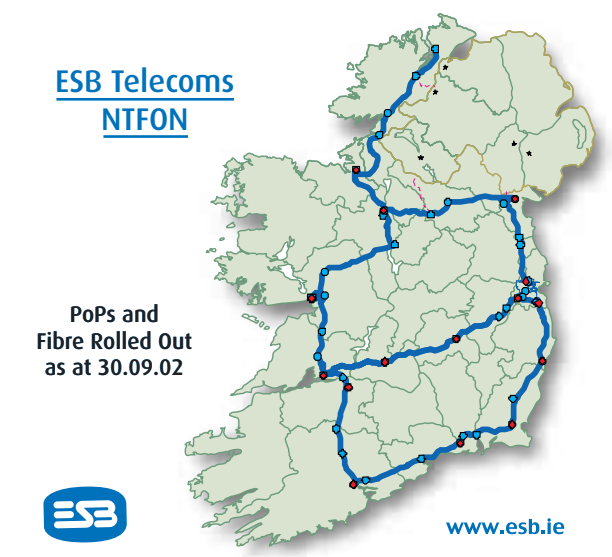
3.7 Other Backbone Networks

The backbone network in Ireland consists primarily of that owned by the two major providers. However since deregulation, and with the assistance of National Development Plan funding, some other backbone networks are being rolled out.

ESB

ESB was awarded funding under the National Development Plan 2000-2006, to build a national backbone infrastructure. Fibre will be deployed around the existing ESB network and rollout is expected to be quicker and cheaper as it does not require underground cabling. The network will consist of cables made of 48 separate fibres, each with 2.5Gbit/s of connectivity. This will provide additional capacity on the backbone and it is hoped that it will enable other operators to enter the market. ESB will manage the network as a 'carriers carrier' meaning it will lease capacity to other operators rather than engaging in the market itself.

Map 3.3 ESB Telecoms National Fibre Optic Network



The ESB network will comprise a Southern ring and a Northern Ring as shown in Map 3.3 above. The Southern Ring which runs from Dublin to Shannon, Limerick, Cork, Waterford, Wexford, Arklow and back to Dublin has been constructed and will be made commercially available in late October 2002.



The Networks in the Western Region

The Northern Ring will extend from Buncrana in Co. Donegal to Sligo, Carrick-on-Shannon, Cavan, Dundalk, Dublin, Shannon, Galway and back to Carrick-on-Shannon. There will be no rollout in Co. Mayo and there will be limited rollout in Co. Galway. On the Northern Ring, Shannon – Ennis – Galway – Tuam – Lanesboro has been constructed. In addition, the section of network between Buncrana and Bundoran has been constructed.

The entire Northern Ring is not due to be completed until the end of Summer 2003. The entire network will be 'lit' (made commercially available) on a staged basis as different parts of the network are completed. The entire northern ring is expected to be made commercially available by October 2003. The development of the ESB network will result in extra capacity nationally but once more there will be a limited impact in much of the Western Region.

CIE

CIE have built a telecommunications network along the railway network.⁴⁰ It is currently unlit and there are no immediate plans to make it operational. This is separate to Esat BT's network which also runs along the railway routes. It consists of 900 kilometres of four fibre-optic pairs encircling Dublin and extending to Sligo and Galway as well as to the south-east of the country. This network could be sold or leased to other telecommunications providers or alternatively it could be managed as a separate division within CIE.

Bord Gáis

Bord Gáis had planned to install a fibre optic network along its gas pipeline routes. It has already installed the ducting for this cable along the network from Dublin to Galway and to Limerick and plans to install it along the proposed pipeline network to the north-west. However because of the downturn in the telecommunication sector the company decided not to install any fibre at the present time.

3.8 Significance of the Backbone Networks

The extent of the fibre backbone networks is in part due to the liberalisation of the market leading to the entry of new providers. It is also due to NDP funding which has enabled other providers, such as ESB, to develop fibre networks.

The significance of the backbone networks is that towns on them are potentially in a position to avail of high capacity services. (Other issues such as the cost of services are examined in the next section). Accessing the fibre backbone via copper limits the availability of broadband services. In addition, distances from the backbone can incur extra costs when tariffs are based on proximity to the nearest point of presence (PoP), as we shall see below.

The backbone networks can be categorised into two groups; the first are those owned by Eircom and Esat BT and are illustrated in the maps. The second group includes all others and much of this fibre can currently be described as 'dark' or 'unlit', in that it has not been made commercially available.

The Eircom and Esat BT networks are those that are most widely used by the consumer; be they large businesses, SMEs or home users. Within the Western Region, Eircom's network is the most ubiquitous and in practice the majority of customers will access this network. It is also the case that most centres within the Western Region do not have a choice of provider.

As illustrated on Map 3.2, there are several towns in the Western Region along the Esat BT network. In practice, this does not mean that businesses in these towns will have access, as deployment will depend on the extent of local demand and the commercial viability of providing a service.

Therefore, there are only a few towns in the Western Region with a choice of provider, namely Athlone, Galway, Ennis/Shannon, Sligo, Ballina, Claremorris and Ballinasloe. Even where there is a choice of provider, many users maintain that an effective duopoly exists.

⁴⁰ The CIE network was built as part of Iarnród Éireann's new signalling system.

The Networks in the Western Region

3.9 Beyond the Backbone Networks

Apart from the backbone networks, the other key element in the delivery of broadband services is the local access network. This connects every home and business to the trunk and national networks and consists mainly of copper cables and is owned and controlled by Eircom. Other providers need access to this part of the network to deliver services.

The process of providing this access has proved contentious and is termed ‘local loop unbundling’ (LLU). This allows other telecommunications providers access to the incumbent’s local network which enables companies other than the incumbent to provide services directly to the customer.⁴¹

In the following section the services that are available in the Western Region are explored in detail.

Summary of the Backbone Networks in the Western Region

- The national backbone network has evolved from pre-liberalisation when there was only one provider (Telecom Eireann) to to-day where there are two major providers each with their own networks and another national network (ESB) is nearly complete.
- The additional investment in the backbone networks in the last five to ten years has been fuelled by liberalisation and the high expectations of the telecommunications market worldwide. However, in the current commercial environment where most of the telecommunications companies are saddled with debt and shareholders expect investment returns within a three-year time horizon, additional fibre networks will only be rolled out on the basis of commercial viability.
- The significance of the backbone networks is that towns on them are potentially in a position to avail of high capacity services. (Other issues such as the cost of services are examined in the next section). Accessing the fibre backbone via copper limits the availability of broadband services. In addition, distances from the backbone can incur extra costs when tariffs are based on proximity to the nearest point of presence, as we shall see below.
- The examination of the broadband networks illustrates their spatial dimensions. Higher capacity networks are invariably found in centres of greater population density, where there are more users with higher capacity requirements. The ‘digital divide’ or ‘broadband gap’ as mentioned in the introduction is reflected in the restricted access to telecommunications services outside of the main urban centres. Most of these larger urban centres are in the south and east of the country and it is there where the most developed networks are located.
- Within the Western Region, most users do not have a choice of backbone network. In some of the larger centres (e.g. Galway, Athlone, Sligo, Ballina, Ennis/Shannon) there may be another provider but many users maintain that in those centres an effective duopoly exists.
- A review of the backbone networks (both existing and planned) indicates much spare capacity. The reasons given for its lack of use are that there is insufficient demand, or that the prices at which it is offered to other carriers are too high, making the provision of services to customers unviable. Given that public funding has enabled some of these networks to be built, consideration should be given to making them available at a price which will entice new entrants into the market, particularly outside of the major centres. This would allow for greater use of the current infrastructure and could help reduce costs to the consumer.

⁴¹ This process has also proved problematic in many other European countries.



The Networks in the Western Region

Case Study

CMS Peripherals, Kiltimagh, Co. Mayo

CMS Peripherals is a wholesale distributor of data storage products with a facility in Kiltimagh since 1992. The company originated in London where its head office is still located. The Kiltimagh office, which employs 60, distributes data storage products to the Irish market place.

In 2001, it was decided to transfer more of the firm's functions to the Kiltimagh office, in particular to run back office functions for both offices. This meant that its telecommunications capacity – voice and data – needed upgrading. Up to then, they had been relying on frame relay⁴² with ISDN back-up, but now require always-on data services which would allow interactivity with the UK office. Their voice and data services also needed to be synchronised. The company have a 2Mbit/s capacity data requirement.

In 2002, the firm contacted several telecoms providers and asked them to quote for the provision of voice and data services. Each proposed different solutions claiming that it was the only one technically feasible. Following the company's own research, it became clear that the choice was either to provide fibre direct to the building, or to access the Eircom or Esat BT backbone via copper from Kiltimagh. No other technology options were feasible.

The company has adopted a solution based on Esat BT providing a link with their fibre backbone from Claremorris. The company's traffic will go via the Eircom copper network to the Bohola exchange, and onwards via the Eircom fibre network to Claremorris. There the company will access Esat BT's fibre network through an 'exchange'. All the traffic is then backhauled to Galway (to an ATM node – PoP) and charged for the distance from Kiltimagh to Galway.

The whole process has proved very time-consuming. If key personnel within the company were not committed to the Mayo site, the company would have moved back office functions to another location e.g. Wales.

The company believes it now has sufficient telecoms capacity for up to three years but they need resilience⁴³ and a much more competitive price. Redundancy⁴⁴ is also a critical issue.

The Mayo Metropolitan Area Network includes Kiltimagh. When this is completed, CMS Peripherals will then have a fibre connection at its premises, but from there the traffic will have to be transmitted via copper to a connection with the national fibre backbone.

This case study points up a series of weaknesses in the telecommunications infrastructure in centres such as Kiltimagh.

There is no fibre in Kiltimagh. The company can only access copper to the exchange at Bohola from which Eircom have a fibre network.

There is no ATM node (PoP) in Co. Mayo, consequently traffic on the ATM network must be routed through Galway or Sligo. The existing tariff structure is based on distance from an ATM node, making it very expensive for customers. All licensed operators apply this pricing structure.

Esat BT (or any other operator) who attempts to offer an alternative are still heavily dependent on the Eircom network.

Lack of real competition means that there is no redundancy. Accidental severance of the copper cable to Bohola in April/May 2002 meant that voice and data services to CMS were inoperable for eight days, so that fourteen staff were unable to work.

The company's experience of services from various providers has been unsatisfactory, involving delays, lack of adequate technical knowledge and confusion.

⁴² Form of data networking appropriate for organisations with three or more locations with mid to high bandwidth needs. Frame Relay is gradually being replaced by faster technologies such as ATM.

⁴³ Resilience refers to the strength of the system. The greater the resilience the less likely that there will be system failure.

⁴⁴ Redundancy refers to the availability of alternate systems in the event that the first (or primary) system fails.

Case Study

Nowcasting Limited, Kilrush, Co. Clare

Nowcasting is based in Kilrush since 1997, although its services did not commence until 1999. The company has developed a computerised system for sending meteorological information to ships via satellite and radio. Among the company's customers are the Irish Naval Service, passenger and cargo ferry companies and the RNLI. The company employs nine full-time staff as well as additional contract workers.

Soon after its establishment, the company found that the telecommunications service in Kilrush was not satisfactory. The issue was not one of bandwidth but of redundancy and reliability. Kilrush was located on a spur on the telecoms network, which means there was only one way in (for traffic to travel) and the same way out. This was via a radio transmitter from Ennis to Kilrush. This is quite normal in rural areas. When the radio link went down there was no service. This method of transmission – radio links – is still a common part of the fixed telecommunications network in some rural areas.⁴⁵

The company moved its telecoms capacity from Kilrush to Dublin in November 2001. In 2002 a second radio link was installed (via North Kerry) and this has provided some redundancy.⁴⁶ Prior to this, a request for weather information from a ferry at sea would be transmitted via a satellite to a ground station on land and then through

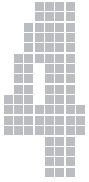
the fixed network public telephone system to Ennis. From Ennis to Kilrush it would pass via a radio link. The company was faced with one outage after another and could not supply a reliable service to ferry companies on this basis.

The company's current telecoms service is located in Kilcarberry Park (near CityWest), Dublin. It is an excellent facility with back-up systems for both telecommunications and electricity. There are two different fibre-optic systems and two different operators. It is totally resilient. In addition, the company has a service level agreement (SLA) with the data warehouse provider who guarantees 100% service. This means that, for any and every minute the network is down, the data warehouse will pay compensation.

Now all ship-to-shore traffic is routed to Kilcarberry, completely bypassing Kilrush. The company has a leased line from Kilcarberry to Kilrush, but this is just to monitor the Dublin operation. Nowcasting is paying more for telecommunications in Kilcarberry but the overall cost is comparable. The main component of cost in Kilrush was the retention of staff on a 24-hour call-out basis. This support is now outsourced to the data warehouse in Dublin.

⁴⁵ In the past telecoms operators would not have gone to the expense of putting in cable to the most remote of regions. Instead of a complete cabled network, the cable would have been routed to a hilltop and then transmitted via radio signals to another receiving mast (on another hill) and then back on to cable. All telecommunications traffic, including ordinary telephone calls, would be transmitted in this way.

⁴⁶ Nowcasting had decided to transfer its telecommunications service from Kilrush to Kilcarberry before this occurred. However even with this second radio link, the levels of redundancy are vastly lower than offered by Kilcarberry.



Telecommunications Services

4.1 Introduction

In this section the services that are currently available in the Western Region are outlined. ISDN, (a narrowband product), is first discussed and then issues raised by leased line services are examined. Following this the different DSL product offerings are described. The issue of flat-rate internet access is considered. The section concludes with an examination of the more likely services to deliver broadband in the Western Region. The key issues of access, cost and capacity of each of the services are then discussed.

4.2 ISDN

As noted in Section Two, ISDN is a narrowband product but is included here because of its widespread use. There are approximately 330,000 ISDN access channels in use throughout the country and this represents an increase of 28 per cent since last year.

While there is widespread use of ISDN, it has some significant drawbacks. The first, as noted in Section Two, is that to access ISDN the user must be within six kilometres from the nearest telephone exchange. The second is that this service is charged on a metered basis. This makes it expensive and discourages more widespread internet usage among SMEs and home users. SMEs increasingly require always-on access and ISDN because of its slowness and limited capacity, is now seen as a relatively dated service.

4.3 Leased Lines

As noted in Section Two, leased lines are currently a very common way of delivering broadband access to companies in Ireland. Leased lines are also called dedicated lines, i.e. if a company leases a line from a telecoms provider, that line is dedicated to that company for its use. Leased lines can be delivered via copper or fibre.

Copper is the most common and generally can provide capacity up to 2Mbit/s.⁴⁷ The current pricing structure is based on

- the distance from the user to the nearest local exchange;
- the distance from this exchange to the exchange at the leased line's destination (for many companies this will be in Dublin, with an onward connection for international traffic);
- the distance from the destination exchange to the final user.

As a consequence, businesses located in the Western Region will generally have higher transmission costs than those located for example, in Kildare or Mullingar. This is because the length of the circuit (to Dublin) is longer.

Companies with capacity requirements greater than 2Mbit/s (and particularly those with capacity requirements greater than 8Mbit/s), require fibre transmission and/or transmission over an ATM network.⁴⁸ To deliver traffic over the ATM network, connection to an ATM node is required.

In Ireland, ATM network tariffs are not regulated and whatever tariff structures are applied are not published. As is evident from the case studies, operators routinely charge customers on the basis of their distance from an ATM node (PoP). While services over the ATM network may be less expensive to the customer than a leased line, customers who are located significant distances from an ATM node will be charged on the basis of their distance from the nearest ATM node. These backhaul charges particularly affect customers in Mayo, who are charged for routing to the nearest ATM node – in Galway or Sligo.

⁴⁷ The capacity of this can be extended to 8 Mbit/s.

⁴⁸ Asynchronous Transfer Mode is a fast switching and multiplexing technique that allows voice, data, audio and video to be carried on the same network.

4.4 DSL

Many businesses currently availing of ISDN products would prefer an always-on connection at higher speeds. DSL technology can offer such a service. However there are some limiting factors to a widespread rollout of services. The first, as noted in Section Two, is that DSL services can only be provided if the user is located within approximately three kilometres from the nearest equipped exchange.⁴⁹ In addition, the longer the distance from the exchange the slower the access speeds. This has obvious consequences for those businesses located in more sparsely populated areas where the distance from the exchange may well be greater.⁵⁰

The second limitation is that in order to offer DSL services, the telephone exchange needs to be DSL enabled and the equipment required to do this can cost up to €250,000 (for each exchange). In the context of a de-regulated market, this investment will only be made on the basis of a commercial return over the short to medium term.

This commercial return is based on the expected take-up of the technology at each telephone exchange. Outside of the main urban centres in the Western Region, the lower population densities served by most exchanges, suggest that currently there is little or no commercial case for the rollout of DSL services.

However, new technological developments could make the deployments of DSL from the exchange much cheaper as well as allowing transmission over copper at greater speeds (up to 10Mbit/s). This would allow delivery to every home and business based on the existing copper infrastructure.

4.5 The Rollout of DSL Services

While DSL technology has been available for several years, the rollout of services was delayed in Ireland. This is in part because of delays in unbundling the local loop. Funding difficulties have beset the providers and this has further delayed rollout. Eircom and Esat BT's DSL services are detailed in the next section.

The cost of DSL services is proving to be a deterrent to take-up. The fact that a significant proportion of those currently using ISDN have not migrated to a DSL product is largely due to the high price at which it is currently being offered. Ireland is ranked 18th out of 19 countries in terms of cost for the most basic DSL service⁵¹ and 13th out of 17 countries for the type of DSL service targeted at medium sized firms.

The providers argue that the lower population densities in Ireland relative to other countries drive costs higher. They maintain that the key drivers in terms of DSL costs are the numbers of people on the network and the number of lines per exchange; it is a volume-based business. If this is so, the cost of rolling out DSL services to smaller centres with a perceived limited take-up is likely to remain unacceptably high. These factors are reflected in the rollout to date and this is discussed in the next section.

4.6 Eircom's DSL rollout

Eircom has three different DSL product offerings all of which are asymmetric.⁵² Currently there is DSL capability in 35 telephone exchanges covering approximately 500,000 customers in Dublin. A further eight exchanges in large cities and towns including Cork, Limerick, Galway, Athlone, Sligo, Tralee, Killarney and Westport are due to be DSL-enabled by the end of January 2003. By the end of 2003, Eircom will enable a further 57 telephone exchanges covering provincial cities, large provincial towns and the greater Dublin commuter area.

Within the Western Region, exchanges in Galway, Athlone, Westport and Sligo will be able to offer DSL services by the end of 2002. Operators state that there must be at least 100 customers on each exchange for the rollout of DSL services to be viable.

4.7 Esat BT's DSL rollout

Esat BT was awarded NDP funding to provide DSL in several regions including the Western Region. The available funding was €10.1 million and this is received on a post-expenditure basis. It is clear that in the current commercial environment the rollout

⁴⁹ The delivery of DSL is also dependent on the quality of the copper cable from the user to the relevant exchange.

⁵⁰ According to Eircom the average *rural* line route length is 3.5km and the average *very rural* line route length is 4.4km.

⁵¹ The countries include the EU, Canada, Japan, Korea and the USA.

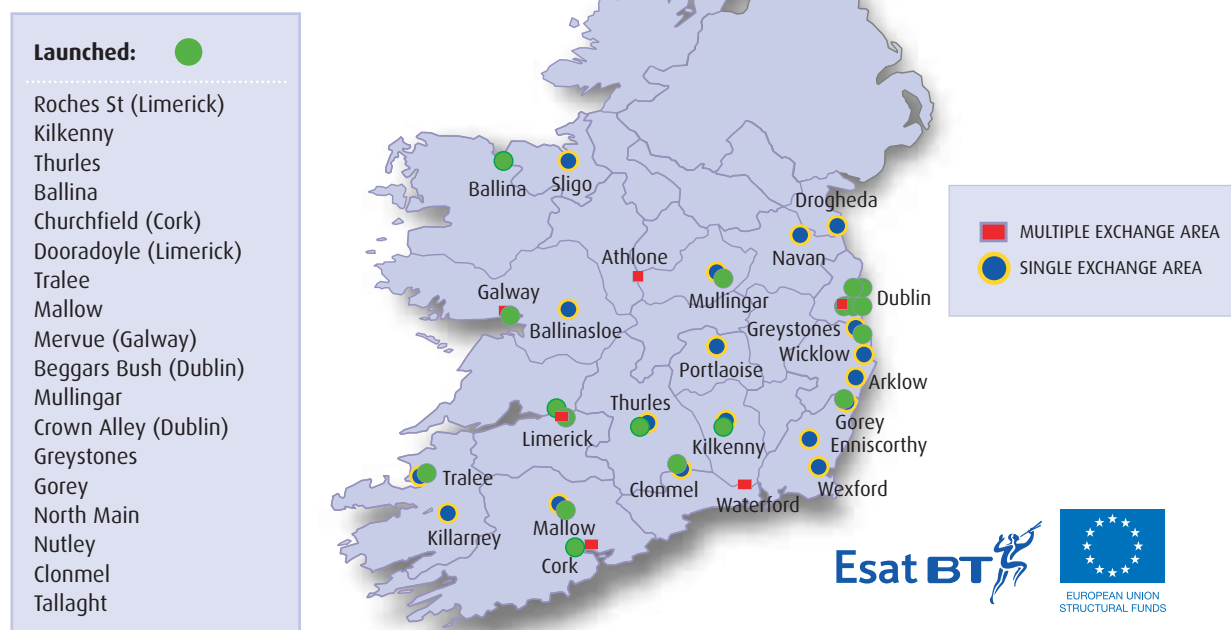
⁵² ADSL 512kbps/128kbps *Eircom I-stream solo*, ADSL 1MB/256kbps *Eircom I-stream multi*, ADSL 1MB/256kbps *Eircom I-stream enhanced*.

in the Western Region would not have been undertaken in the absence of Government grant support.

Esat BT currently offers a DSL service in 18 centres throughout the country, of which two are in the Western Region: Galway (Mervue) and Ballina.

By January 2003, Esat BT plans to have unbundled a total of 40 exchanges which will allow the company to offer services at the centres illustrated in the map below. Within the Western Region this includes an additional centre in Galway, and one each in Sligo, Athlone and Ballinasloe.

Map 4.1 Esat BT DSL Rollout



4.8 Flat-Rate Internet Access

This service allows for internet access at a flat-rate charge. It is seen as critical by some organisations such as Forfás, who argue that flat-rate access to the internet will increase usage and demand for further services, including broadband.⁵³ In the absence of a more extensive rollout of DSL services in the Western Region, a flat-rate service is essential.

The Minister for Communications, Marine and Natural Resources has directed the Commission for Communications Regulation (ComReg)⁵⁴ to introduce flat-rate internet access as an absolute priority.

Currently there is a very limited flat-rate service on offer in Ireland. Several providers have made announcements indicating they will offer additional services soon.

UTV are offering off-peak internet access (at evenings (6pm – 8am) and weekends) for a flat rate of €29.99 per month. However, the service is limited to less than 150 hours per month.

4.9 Concluding Comment

The widespread delivery of broadband services within the next five years is likely to be very costly. Much of the Western Region is unlikely to see delivery of such services in the absence of additional targeted funding.

Of course, the delivery of broadband services is not dependent on public expenditure and most of the finance would be expected to come from the private sector. Nonetheless, as we have seen, the rollout of broadband services to the more sparsely populated areas of the Western Region is likely to be unattractive in purely commercial terms to the private sector.

⁵³ *Broadband Investment in Ireland, Review of Progress and Key Policy Requirements*, Update 2002. Forfás.

⁵⁴ The Commission for Communications Regulation (ComReg) assumed the functions of the ODTR in December 2002.

Summary of Services in the Western Region

- ISDN services are widely available but are increasingly considered inadequate.
- As a result of the tariff structure, companies in the Western Region pay more for leased lines than their counterparts in the east of the country.
- Businesses accessing the ATM network are billed on the basis of their distance from an ATM node. Tariffs on the ATM network are not regulated.
- DSL services are being rolled out and will probably be limited to relatively few centres in the Western Region. DSL is not likely to be extended to many other locations within the Region in the foreseeable future.
- Widespread unbundling of the local loop is a prerequisite to the further rollout of DSL services and allows other operators entry into the market. This process should be accelerated.
- Flat-rate internet access is likely to be introduced in the next year. In the absence of other services, such as DSL, it is a necessity.
- The widespread delivery of broadband services within the next five years will be driven by providers' perceptions of commercial viability. Much of the Western Region is unlikely to see delivery of such services in the absence of additional targeted funding.

Case Study

ANU Internet Technologies, Galway City.

ANU Internet Technologies, an internet services company, employing eight people, moved from Westport, Co. Mayo to Galway city in 2002. According to the Managing Director: *We would not have left Westport except for the weaker and more expensive telecoms capacity.*

In Westport the company paid €33,000 per year for a 512kbit/s always-on connection. In Galway the company is paying €23,000 per year for a 1Mbit/s always-on connection. Therefore in Westport they were paying 30 per cent extra for half the speed and capacity.

There are several reasons why the costs in Westport are much higher than those in Galway.

In Galway, the company can benefit from the superior telecommunications infrastructure located there.

There is some degree of competition in the Galway market. The national backbone networks of both Eircom and Esat BT extend into Galway. In Westport, there is only one provider.

The backhaul distance from Galway to Dublin (and onwards to international connections) is less than that from Westport to Dublin.

In addition to the differential costs **within** Ireland, telecoms costs in Ireland are considerably higher than other countries. In the US the company can buy the same amount of bandwidth for \$4,800 per year (€4,900), for what they paid €33,000 per year in Westport. In order to get around the excessive bandwidth costs in Ireland, the company has moved 90 per cent of their serving capacity to the US in 2000.



Case Study

Connacht Gold, Co. Sligo

Connacht Gold Co-Op is a large multi-purpose co-operative, with 600 employees, whose head office is located in Tubercurry Co. Sligo. They have twenty-nine stores⁵⁵ mainly in the north-west. The business requires sufficient telecommunications capacity to enable on-line interaction between each of its stores and the head-office.

Connacht Gold transmits information from the head office to the branches. Until recently they relied on ISDN services, downloading data mainly during the night hours using dial-up services. However the service was very slow and not very reliable. The firm needed an always-on service and DSL would be ideal, but DSL is not yet available. In the absence of DSL, Connacht Gold has decided to combine ISDN⁵⁶ and satellite technologies. The company currently uses ISDN for all twenty-nine sites and aims to replace some of these sites with satellite connections.

The satellite technology is being tested at their Portlaoise office. The satellite can deliver between 128kbit/s and 256kbit/s upstream, depending on cost and the number of users. The cost of satellite services (with a 3Gbit quota) is €168 per month, per location. There is also a €999 deposit charge for the 18 month contract for the satellite. This service will download 20Mbits from the internet in five minutes.

There are no line of sight issues⁵⁷ and the system works well in all weather conditions. However, the quality, reliability and security on satellite would not be as good as on a leased line.⁵⁸

Satellite as a transmission method is particularly suitable for this company because of the location and distance from the exchanges of their different outlets along with cost and speed issues. The company is therefore testing satellite for always-on services. The company will continue to use ISDN for those sites with lower capacity requirements.

The key issues for Connacht Gold are the desirability of always-on connectivity and of broadband capacity (the latter would allow for videoconferencing etc.). Their current traffic levels are 20Mbits per month, however, now that they have the always-on facility, they believe that their capacity requirements will increase.

The company have formed the impression that providers are continuing to promote leased lines over other broadband services. Their solution has been to keep the use of leased line (and costs) to a minimum and to deploy satellite and ISDN solutions depending upon local circumstance.

⁵⁵ The company also has manufacturing sites however the case study refers only to the stores.

⁵⁶ At the time of writing DSL services were not yet being offered at any of the locations. If and when they do become available, DSL may replace ISDN at some of the sites. DSL is currently charged at €80 per month which would average at €960 per annum for a 3Gbit quota. In the UK, DSL is charged at £30 sterling per month or £360 per annum.

⁵⁷ Line of sight becomes a factor only if for example there is a 10 foot wall right beside the site.

⁵⁸ Eircom quoted €4,000-€5,000 per year for a 64kbit/s leased line connection for one location only (the head office). For all their locations to be on leased lines they were quoted in excess of €100,000 per annum.

Government Telecommunications Policy



5.1 Introduction

In this section government telecommunications policy is summarised. First, developments since the mid-1990s are outlined and the National Development Plan (NDP) funding is detailed. Following this, the latest government initiatives are considered, particularly the programme of investment in Metropolitan Area Networks (MANs).

Liberalisation of the telecommunications market is required by EU directives and is driven by the idea that competition in the sector will increase and improve supply, while at the same time reducing costs. A key part of this process is allowing other competitors to enter the liberalised market while the incumbent (Eircom) continues to operate.

When the liberalisation process began in 1998 the market was characterised by optimism. The worldwide telecommunications industry was growing rapidly and there were plans for building new networks and the delivery of new services. At this time, government's role was to effect and promote the liberalised market. There was limited public funding made available for the provision of new telecommunications infrastructure. Some key developments that occurred under the period of the 1994-1999 National Development Plan include the following.

- The Office of the Director of Telecommunications Regulation (ODTR) was established in 1997 and is responsible for implementing the laws on liberalising the telecommunications market. The ODTR was replaced by the Commission for Communications Regulation (ComReg) in December 2002 under the terms of the Communications Act 2002. ComReg will regulate and licence the telecommunications sector.
- Full liberalisation of the telecommunications market occurred in 1999 with the sale of Telecom Éireann. Since then all communications services are provided by private sector providers in a regulated market.

- Under the 1994-99 NDP, thirteen projects⁵⁹ were awarded funding to rollout backbone and local access networks. In total €26 million was awarded in grants. Recipients included NTL, Chorus, Esat BT (Ocean), HEAnet and Eircom. The government also engaged in a public private partnership, which helped fund improvements in international connectivity⁶⁰.

The National Development Plan 2000-2006 committed €200 million to telecommunications infrastructure projects of which two-thirds is earmarked for the Border, Midlands and Western Region.⁶¹ It was acknowledged in the NDP that the free market alone could not ensure adequate provision. The funding allocation was based partly on the recognition of the likelihood of market failure, i.e. that commercial providers would not invest in all areas of the country.

Under the current investment plans of the communications companies, large areas of the midlands will not have access and much of the west coast will not be served.⁶²

Under the first round of NDP funding in January 2001, nine different projects were awarded grants totalling €55 million. Esat BT, Eircom, Crossan, ESB Telecom and Nevadatele are delivering on their programmes. These projects are listed overleaf.

Table 5.1 Projects Awarded Funding under the NDP (2001)

OPERATOR	PROJECT
Esat BT	Rollout of DSL and Fibre
Eircom	DSL Rollout
Crossan Cable	Cable Rollout
ESB Telecom	Fibre Rollout
Nevadatele	Co-location/Switches
Chorus	Rollout of Fibre, Cable and Wireless

⁵⁹ These thirteen different projects were awarded to six different companies.

⁶⁰ The Global Crossing network.

⁶¹ €90 million of this is from the European Regional Development Fund and can only be drawn down if the exchequer funding is spent. Two-thirds of the total is designated for the BMW region.

⁶² The National Development Plan 2000-2006, p.68.



In August 2001⁶³ three different programme lines were proposed. These were the continuing grant assistance to some commercial projects, the promotion of DSL and the provision of funding to local authorities to develop metropolitan area networks. This latter element is by far the most significant for the Western Region. This funding to local authorities was decided following a review of policy and this is discussed in the following sections.

5.2 Government Policy Review

Originally the entire NDP programme of €200 million was intended to be spent on private sector companies in the form of grant assistance to extend broadband infrastructure and services to the regions. However, the downturn in the global telecommunications market impacted on the investment programmes of many of the providers.⁶⁴ This prompted a review of government policy.

The Cross-Departmental Team on Infrastructure and Public Private Partnerships (PPPs), in the Taoiseach's Department, set up a Telecommunications Infrastructure Working Group in September 2001. This group was asked to assess telecommunications policy in light of the downturn and our relatively weak position vis-à-vis other OECD countries. In evaluating the broadband infrastructure, the Group concluded that the key deficit is in local access broadband networks and recommended the development of open access local networks.

5.3 New Connections

In March 2002, following the report of the Telecommunications Working Group, a Government Action Plan New Connections was published. *New Connections* committed the government to secure

the widespread availability of open-access, affordable, always-on broadband infrastructure and services for businesses and citizens throughout the State within three years...

In the medium-term, we expect that broadband speeds of 5Mbit/s to the home and substantially higher for business users will be the minimum standard within 10-15 years for broadband.

We will aim for Ireland to be the first country in Europe to make this level of broadband service widely available for its people.

(p.20)

This Government Action Plan sanctioned the concept of investment in the local access part of the network.

5.4 Funding to Local Authorities (Metropolitan Area Networks)

It was decided to make funding available to public bodies and local authorities for the construction of broadband networks at an aid rate of 90 per cent. A three-phase rollout was announced with each phase granting public funding to local and regional authorities to build open access Metropolitan Area Networks (MANs) in 123 cities and towns.⁶⁵ These fibre networks are to be located in urban areas and will become part of the trunk and local access networks linking each of these towns to the existing backbone of the country. This should facilitate the deployment of lower cost, higher speed and always-on internet access.

⁶³ The second call for proposals under the NDP 2000-2006.

⁶⁴ For example two companies that were awarded funding in January 2001 have not implemented their programmes. Formus has since gone into liquidation and Chorus has failed to implement its contracts because of financial constraints.

⁶⁵ Announced by Minister O' Rourke on the 8th March 2002.



These MANs are to be made available on an open access-basis to private operators, and remain in long-term public ownership (in the hands of a 'Managed Services Entity'). The networks comprise fibre networks.⁶⁶ There are three phases to this programme.

- Phase One provides for funding to 19 towns and eight minor centres and the MANs are to be completed by the end of 2003. A total of €44 million of Exchequer funding has been allocated for this Phase. An additional feature of phase one is the piloting of new technologies (including wireless technology) in three locations. These locations have not yet been decided but an announcement is expected by the end of 2002.
- Phase Two will see the similar MANs being developed in a further 48 towns. Unlike Phase One it is intended that these networks will be completed through a PPP (rather than local authorities) and involve a total investment of another €100 million. Phase Two should be completed by the end of 2005.
- Phase Three will involve rolling out the programme to cover all 123 towns in the State with a population of 1,500⁶⁷ or over (an additional 56 towns) and the target date for completion is 2007.

It is understood that the deployment of Phases Two and Three depend upon the success of Phase One.

Phase One is underway and 19 different towns and eight minor centres are designated for funding (see Table 5.2).⁶⁸ All of the networks in the Western Region are expected to be constructed during 2002/2003 and will probably not become operational until 2004.

The Metropolitan Area Networks are to be run by a Managed Services Entity (MSE). This will involve a public private partnership (PPP) arrangement where the organisation contracted to manage the MANs cannot also offer services. This entity will be responsible for the day-to-day management of the MANs. The organisation awarded this function is to be decided by the Department of Communications, Marine and Natural Resources following a tendering process. The functions of the MSE will include, operating as a carrier's carrier and selling broadband capacity to operators and internet service providers.

5.5 CLÁR

As noted in Table 5.2, two of the MANs projects to be completed in the Western Region (Belmullet and Dungloe) are being co-funded under the CLÁR programme. CLÁR is a targeted investment programme which was launched in October 2001. Sixteen areas have been selected for inclusion in this programme on the basis that they have experienced the greatest population decline since 1926.⁶⁹ CLÁR is to fasttrack NDP spending and it had a dedicated budget of €12.7 million in 2002.

CLÁR and Údarás na Gaeltachta will co-fund the delivery of town fibre networks to the Industrial Parks in Belmullet, Co. Mayo and Dungloe, Co. Donegal. The total cost of the works in Belmullet is €128,500 and in Dungloe is €76,942. The CLÁR funding element is €103,000.

⁶⁶ Independent expert evaluation rejected wireless and satellite proposals made by local authorities as an unsuitable technology for local authorities at this point in time.

⁶⁷ As defined in the 1996 Census.

⁶⁸ In addition, two of the networks listed (Belmullet, Dungloe) are funded under the CLÁR programme.

⁶⁹ The exception to this rule is the Cooley Peninsula.



Government Telecommunications Policy

Table 5.2 Status of Local Authority Metropolitan Area Networks

TOWN	Estimated Completion Date ⁷⁰	Project Led By	Indicative Costs €M
Towns in Western Region			
Belmullet*	3/2003	U na G	0.12
Ballina	6/2003	CC	2.50
Carrick-on-Shannon	6/2003	CC	1.60
Dungloe*	3/2003	U na G	0.07
Gweedore	3/2003	U na G	2.50
Galway City	10/2003	CC	8.00
Kiltimagh (m)	6/2003	CC	0.47
Letterkenny	2/2003	CC	4.00
Manorhamilton	6/2003	CC	0.86
Roscommon	6/2003	CC	2.00
Total Indicative Cost			22.12
Other Towns			
Athlone	6/2003	CC	
Carlow	5/2003	SERA	
Carrickmacross (m)	6/2003	CC	
Cavan (m)	6/2003	CC	
Clonmel	5/2003	SERA	
Cork City	10/2003	CC	
Digital Hub/Coombe (m)	10/2002	CC	
Drogheda (m)	6/2003	CC	
Dundalk (m)	6/2003	CC	
Dungarvan (m)	5/2003	SERA	
Kilkenny	5/2003	SERA	
Kingscourt, Cavan (m)	6/2003	CC	
Limerick City	10/2003	SD	
Monaghan (m)	6/2003	CC	
Mullingar	6/2003	CC	
Portlaoise	6/2003	CC	
Tullamore	6/2003	CC	
Waterford City	8/2003	SERA	
Wexford	5/2003	SERA	

CC denotes County/City Council; U na G denotes Údarás na Gaeltachta; SERA denotes the South-East Regional Authority; SD denotes Shannon Development; 'm' denotes the 8 minor centres designated.

* denotes those funded under CLÁR.

Source: Regional Broadband Programme Department of Communications, Marine and Natural Resources. October 2002.

⁷⁰ Estimated completion date in October 2002.



5.6 Other Government Initiatives

VSAT Satellite

The Department of Communications, Marine and Natural Resources funded a pilot trial of VSAT technology in 2001/2002. Three different projects were successful and one of these is detailed in a case study (page 32).⁷¹

Community Application of Information Technology (CAIT)

The CAIT initiative was launched in December 2002 and was aimed at providing access to the Information Society for voluntary and community groups and, through their involvement, to disadvantaged sections of the population who would normally not be in a position to access information technology. It was designed to bridge the 'digital divide' and help promote demand. Over 70 projects were awarded funding and a wide range of groups including rural communities, farmers, older and unemployed people were represented. The budget estimates for 2003 show a decrease in the allocation of funding to CAIT of 86 per cent, therefore the programme will cease.

WLAN

The Department of Communications, Marine and Natural Resources has invited applications for pilot projects using Wireless Local Area Network technology. As noted in Section Two, funding of €300,000 is to be awarded to five projects, and these are expected to be announced before the end of 2002.

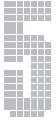
5.7 EU Funding

Under the Regional Programme of Innovative Actions, funded by the European Regional Development Fund (ERDF), €240,000 will be made available to the BMW Regional Assembly to pilot wireless technologies in the Border, Midlands and Western Region. This is expected to commence in 2003. A similar programme is operating in the Southern and Eastern Region. Five communities there have been awarded funding for projects which aim to encourage them to use information and communications technology, to create a local network and services such as, local news, parenting and local business promotions.

Summary of Government Policy

- The National Development Plan 2000-2006 committed €200 million to telecommunications infrastructure projects of which two-thirds is earmarked for the Border, Midlands and Western Region. Under the first round of NDP funding in January 2001, nine different projects were awarded grants totalling €55 million.
- A review of government policy took place in 2001/2002. It was concluded that the key infrastructure deficit was in local access broadband networks. The development of open access local networks was recommended. This has been given effect in a three-phase programme to provide fibre rings in 123 towns with populations in excess of 1,500.
- In March 2002, a Government Action Plan, *New Connections* was published. This committed the government to secure the widespread availability of open-access, affordable, always-on broadband infrastructure and services for businesses and citizens throughout the State within three years.
- Phase One of the three-phase Metropolitan Area Network (MAN) programme, is underway. It provides funding to twenty-seven centres for the construction of fibre networks, including ten in the Western Region. These networks will be run by a Managed Services Entity. Its functions will include day to day management and selling broadband capacity to operators. The deployment of Phases Two and Three will depend on the success of Phase One.
- Other government initiatives have included a VSAT Satellite trial, funding for community applications of IT and a planned pilot of WLAN technology. The BMW Regional Assembly has also secured EU funding for the promotion of local services using wireless technologies. The CAIT (Community Application of Information Technology) Initiative will end in 2002.

⁷¹ The three pilot projects are Cedar Satellite Systems Ltd. (CSSL), Castlebar Co. Mayo, Navan Education Centre, Co. Meath; and West Offaly Task Force, Co. Offaly.



Case Study

VSAT Technologies, Cedar Satellite Systems and the Mayo Education Centre

VSAT⁷² refers to any fixed satellite and in this context refers to satellite based, always-on broadband Internet access. Unlike terrestrial broadband it is particularly suitable for more remote regions. It can deliver voice and data transmission from head office to branch and can provide bandwidth from 95Kbit/s up to 45Mbit/s.

VSATs can be used for a wide variety of telecommunications applications, including corporate networks, rural telecoms and distance learning. A major advantage of VSAT systems is that they provide connectivity without having to build expensive networks. VSAT networks can be installed quickly, and configuration is quite simple. VSAT is particularly suitable for multicasting, in which a single signal stream is routed to a number of recipients, such as in the case of distance-learning.

A VSAT Pilot Trial operated under the aegis of the Department of Communications, Marine and Natural Resources and involved the deployment of VSAT technology in three diverse user communities. The Mayo Project is the focus of this case-study.⁷³

Cedar Satellite Systems Ltd. and The Mayo Education Centre

Cedar Satellite Systems Ltd. project is deployed at twenty-six terminals in Mayo and Galway. One is located at the Mayo Education Centre which links into seven primary schools and eight post primary schools.⁷⁴

This project commenced in November 2001 and Cedar Satellite Systems Ltd. linked the fifteen schools (including island based schools) and the Mayo Education Centre to the VSAT system. Each of the schools are linked to each other and the Mayo Education Centre. The VSAT technology deployed provides for 2Mbit/s downstream and 128kbit/s upstream. ISDN connections provide a back-up in case of satellite failure.

⁷² Very Small Aperture Terminal. A VSAT network consists of three components; a central hub, a satellite, and a number of VSAT earth stations. The user's computer is connected to the satellite dish generally located at the users building. This dish sends digital signals to a satellite and receives digital signals from the satellite. When a client requests data from the Internet, the client's VSAT dish transmits a signal to the satellite, which passes the message onto the central hub. It is then routed into the Internet. Data from the Internet to the VSAT dish follows the reverse path. The hub or earth station manages, controls and monitors the network.

⁷³ The three pilot projects are Cedar Satellite Systems Ltd. (CSSL), Castlebar Co. Mayo, Navan Education Centre, Co. Meath; and West Offaly Task Force, Co. Offaly.

⁷⁴ The remaining terminals are with Lake District Enterprise Ltd. (Ten Community Initiative sites such as libraries, tourist offices and community access points under the aegis of Lake District Enterprise Ltd).



Case Study (...continued)

The Costs

Satellite systems have installation costs that vary from supplier to supplier. The average is approximately €1,500. The monthly running costs vary from about €150 for single users to €300 for networks. ISDN costs approximately €40 per month plus the time connected which is charged at a metered rate.

The Benefits

This project has enabled the schools and the Mayo Education Centre to access the internet at much higher speeds and at relatively inexpensive rates.

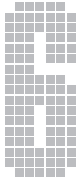
- Some schools are now in a position to provide internet access to all classrooms and to establish a full computer training room in their schools.⁷⁵
- One school has an internet site developed by the children. The children are in video contact with schools around the world to exchange views and ideas and have developed a website around this. This site has been selected for an international award.

- The island schools in particular, had no possibility of access to the internet apart from via a PSTN line. Access to broadband has created many more possibilities. The faster download times for large files have allowed new possibilities such as downloading multimedia files and access to internet radio.
- The Mayo Education Centre is running a Music Technology Course for teachers. It would be almost impossible to support such a course – involving downloading music files for twenty people – on an ISDN line. The broadband access that the satellite provides makes this possible.

Postscript

The pilot project described was to end in 2002 however it was hoped that a second phase would be initiated. The project has been informed that Cedar Project Phase Two will not proceed. Those schools already using the system will no longer be able to access it from November 2002.

⁷⁵ One of the schools in Swinford now has fifty computers accessing the internet through this system. This would be impossible without such a broadband system.



Implications and Recommendations

6.1 Introduction

In this section key issues that emerge from the foregoing review of the current state of telecommunications infrastructure and services in the Western Region are discussed together with recommendations for action. A summary of the key recommendations concludes the section.

6.2 Access to Broadband Infrastructure in the Western Region

The first and most fundamental issue is that of access. In an increasingly knowledge and information-based society, high quality telecommunications infrastructure is becoming as basic a requirement as energy and transport infrastructure. Proximity to the fibre network is a prerequisite for those users with higher capacity requirements (large businesses), and the fact is that many parts of the Western Region do not have access to broadband services. SMEs and home users, are relying mainly on ISDN or copper-based leased lines for data transfer and access to the internet. Locations that are distant from the fibre backbone have little prospect of attracting or retaining businesses with high data transfer requirements. Those businesses already in such locations experience very significant capacity and cost disadvantages.

In a knowledge based economy, quality broadband infrastructure is a necessity, and without it growth and competitiveness will be constrained. Telecommunications infrastructure policy for the Western Region should be based on an acceptance that infrastructure there must be at least on a par with other regions.

6.3 Government Support for Broadband Infrastructure Investment

Poor access in the Western Region is a result of market failure i.e. the commercial return on investment in fibre, or other broadband technologies, is insufficient to attract private investment. The government, recognising the critical shortfall at the local area level, has responded to this problem by funding the

construction of Metropolitan Area Networks (MANs) in towns throughout the country, which are designed to extend capacity and induce competition. These MANs will be run by a Managed Services Entity (MSE) as a Public Private Partnership (PPP). Phase One of this initiative is currently being built and includes several towns in the Western Region.

It is essential that Phase One and subsequent phases be delivered as quickly as possible. Any readjustment of public finances should not result in the delay or postponement of the Government's commitment to deliver open access, affordable, always-on broadband infrastructure within three years.

As discussed in Section Two, the optimum technology for the future provision of broadband is fibre cable, however, this is also the most expensive. Nevertheless, short-term cost considerations resulting in postponement of investment in the fibre network could prove more expensive in the longer-term when the demand for greater capacity at higher speeds increases. It is worth noting that the cost of building fibre networks has decreased very considerably in recent times as the price of basic equipment has fallen due to the downturn in the telecommunications industry generally. In terms of value for money, it is recognised that this is a good time to build fibre networks.

It is important that towns in the seven western counties are well represented in Phase Two of the MAN programme. Local authorities and other public agencies should be proactive on this issue.

The establishment of the Managed Services Entity should be expedited. It should be given a clear operational mandate that includes maximising competition among providers both in operating services and in deploying various technologies. It should have a responsibility to ensure that services are available at a competitive price to users in the MAN towns.

Implications and Recommendations

6.4 Access to Broadband Technologies

Much of the Western Region is characterised by low levels of population density. In the short-term, there is not a strong business case for the extensive rollout of fibre in the region. The other important technology, DSL, will also have a limited rollout. The cost of delivering new services and technologies is more expensive in a smaller market.

The SME sector, particularly those located outside of the main centres, has begun to access technologies – such as satellite – to deliver broadband but these are not widely available. Other technologies are not widely deployed. In areas with dispersed population, such as the West, it is important to maximise the rollout of services based on such technologies. Thus, public investment in wireless, satellite and mobile technologies is essential to offset market failure in relation to their deployment of these technologies.

The provision of €300,000 funding for trials of new technology in the current round of NDP expenditure is insufficient as it will only provide for projects in five locations countrywide. Funding should be increased significantly and every effort made to secure the involvement of commercial providers.

6.5 Higher Costs in the Western Region

As noted in Section Two above, leased lines are currently a very common way of delivering broadband access to companies in Ireland. Leased lines can be delivered via copper or fibre. Tariffs for leased lines are regulated by the ODTR and based on the distance from the user to the nearest local exchange, and from there to the exchange and user at the leased line's destination – for most companies this will be in Dublin.

As a consequence, businesses located in the Western Region will generally have higher transmission costs than those located in the Midlands or East because the length of the circuit (to Dublin) is longer. The current leased line pricing structure effectively penalises businesses which are farthest from Dublin.

Businesses with higher or more advanced data transfer needs may be offered more competitive rates over the ATM network which can also deliver

higher capacity. Pricing on this ATM network is not regulated and, as is evident from the case studies, operators routinely charge customers on the basis of their distance from an ATM node (PoP). These backhaul charges particularly affect customers in Mayo, as they are charged for routing to the Galway or Sligo ATM node.

The pricing structure for leased lines should be reviewed by the Commission for Communications Regulation (ComReg) including consideration of a move to 'cost oriented' pricing. This would be likely to make leased line prices more competitive but would not necessarily make them uniform across the country. Other options include capacity based tariffs. In parts of the US for example, tariffs are based only on the capacity required and there is no charge incurred for distance from user to end destination.

The Commission for Communications Regulation should re-examine operators' tariff structures for ATM services in light of current circumstances, and make mandatory the publication of ATM tariffs.

As long as the current pricing system prevails and users of ATM services are charged on the basis of their distance from an ATM node (PoP), there is a case for the installation of an additional ATM node in Co. Mayo. Consideration should be given as to who should provide such a facility and whether it should be publicly funded. However, it is important to bear in mind that the same result could be achieved by altering tariff arrangements along the lines suggested above.

6.6 DSL and the Potential of Other Technologies

As noted above, broadband delivered over fibre-optic cables is currently the most future-proof option, but is also the most expensive. In the last few years DSL technologies have been heralded as the solution for small to medium sized enterprises as well as having the potential to serve home users. However outside of the main urban centres in the Western Region, the lower population densities served by most exchanges suggest that currently there is little or no commercial case for the rollout of DSL services.



Implications and Recommendations

However, new technological developments could potentially allow the deployment of DSL over copper at greater speeds (up to 10Mbit/s). This would allow delivery to the great majority of homes and businesses based on the existing infrastructure. Of course, the providers will be guided by commercial returns in determining the extent of any rollout. While this newer technology may be less expensive than what is currently on offer, the commercial case will still be weaker in rural areas. Where market failure occurs and more sparsely populated areas are disadvantaged in terms of accessing new technologies, public funding may be required to support provision.

Third Generation Mobile Technology (3G) is expected to provide lower capacity broadband services to a significant portion of the population. Services will include e-mail and internet access. Three providers have been awarded licences to rollout these services in Ireland. These are expected to become widely available in 2004.

However, only one of the licensees is required to provide services on a nationwide basis. Therefore, apart from Galway city, only one provider will operate in the Western Region and this has potentially serious implications in terms of price and levels of service. While the urban centres will be served by several providers, much of the Western Region will be served by only one provider and therefore there will be no price competition. The introduction of competition in the fixed line market induced other players into the market and led to more competitive pricing.

In the absence of competition for 3G services, the quality of service may be poorer and tariffs higher. This situation should be monitored closely by the Commission for Communications Regulation to ensure that consumers in the West are not at a cost disadvantage.

6.7 Decentralisation and eGovernment

The long awaited process of decentralisation of government offices and services should proceed as quickly as possible. Government is a significant consumer of broadband services and the electronic delivery of government services (eGovernment) can enable and induce the use and adoption of new

technologies. This will also facilitate greater investment in telecommunications infrastructure in the regions.

Decentralisation and the deployment of the eGovernment strategy, which involves networking all public bodies, should be considered as a key enabler for the promotion of ICT use across the spectrum of users.

6.8 Articulating Local Demand

As has been emphasised throughout this bulletin, provision of telecommunications services is demand-driven to a very significant extent. Providers repeatedly say that they will only respond to demand i.e. they must see a clear commercial case for investment in ICT technology and services. Funding for initiatives such as the VSAT trials can play a key role here.

Much can be done at local level to articulate the collective needs of SMEs and domestic users. Local authorities, the social partners, LEADER Groups and Partnerships, and other community sector organisations could form an effective collective voice in demanding services from the providers and in seeking continued proactive intervention by the State and the Commission for Communications Regulation.

6.9 Information Update

It can be very difficult to identify and ascertain the deficiencies and problems associated with the current telecommunications infrastructure in order to assess what is required. This is partly a result of the technical subject matter and the pace at which new developments occur. However more often than not, understanding is impeded by the difficulty of accessing what is regarded as commercially sensitive information. Nonetheless, unbiased information is critical to determine, for example, the need for and extent of public funding required.

The Department of Communications, Marine and Natural Resources should be mandated and resourced to produce comprehensive information in the form of up to date maps of fibre and other broadband networks.

Implications and Recommendations

6.10 Flat-Rate Internet Access⁷⁶

It is widely accepted that access charged at a metered rate is a key reason for the relatively low rate of internet usage in Ireland. In order to increase penetration rates and internet usage, flat-rate internet access (even at low speeds) is crucial. The current cost of dial-up internet access is determined by the connection time which is a disincentive to experimentation and wider take-up. Also the cost of access is higher during the day, which discourages usage by the SME sector.

One of the key advantages of modern information and communication technology (ICT) is its capacity to overcome physical distance by allowing worldwide access to information regardless of the user's location. This means that ICT is particularly valuable in rural locations with dispersed populations such as the Western Region. If flat-rate access were available, increased usage it would likely lead to higher rates of usage and potential for widespread application in ebusiness, eGovernment, education, medicine etc. In time, this will create a larger market which will in turn encourage the providers to invest in the provision of higher speed technologies such as DSL.

The Minister for Communications, Marine and Natural Resources has issued a draft Policy Direction to the Commission for Communications Regulation. This directs ComReg to use its powers to facilitate the introduction of flat-rate internet access as a priority.

It is vitally important to the Western Region that this direction be issued, following consultation, and that flat-rate internet access be introduced as soon as possible.

6.11 Universal Service Obligation

One way of ensuring widespread provision in a competitive market where the provision of services is often determined by the profit margin can be a universal or public service obligation.⁷⁷ Since 1983

Telecom Éireann (as it was then) was charged with meeting all reasonable requests for telephony services, which constituted a universal obligation for the provision of basic telephone services. Following liberalisation, EU legislation was transposed into Irish law, giving further force to the USO. In addition it gave the power to the regulator (the ODTR) to designate which provider(s) had the obligation to provide this USO. In most cases throughout Europe this responsibility fell upon the incumbent and the same was true in Ireland.

The USO, as it currently applies, provides for access to the fixed network and telephone services – providing for transmission at a minimum of 2.4kbit/s on a PSTN line.⁷⁸ Therefore this USO requires that Eircom must satisfy all reasonable requests for a fixed telephone line anywhere in the country. The ODTR has the power to mediate if Eircom deems a request ‘unreasonable’, but in practice this has not occurred. The access speeds which apply (2.4kbit/s) are well below any definition of broadband. There is to be a new USO Directive from the EU in July 2003 and this is expected to consolidate the existing measures, rather than proposing a new minimum access speed.

Within Ireland, there is the possibility that a ‘Providers’ Fund’ will be established and all operators may be required to contribute. This fund could then be accessed if it was felt that Eircom were incurring disproportionately higher costs in the delivery of the USO.

In the context of the Government's commitment to widespread availability of broadband services, consideration should be given to extending the minimum requirement of the USO to include basic broadband. This would involve examination of the economics and likely effect of any higher minimum standard. If it was considered that public funding is required, it could be in the form of a contribution to the proposed Providers' Fund.

⁷⁶ Flat-Rate Internet Access is charged at a standard rate, in contrast to a metered rate where charges are applied based on the time spent accessing the internet. This is often referred to as FRIACO.

⁷⁷ Another Public Service Obligation or PSO is in force in Ireland through the provision of funding for regional airports.

⁷⁸ There are two other provisions; Directory services (such as telephone books and directory enquiries) and the provision of public pay telephones.



Implications and Recommendations

6.12 Service Issues, Transparency and Customer Focus

Inadequate service from the telecommunication providers is an issue for many businesses and consumers. Significant delays in the provision of basic services such as ISDN are frequently cited. Poor customer relations in dealing with account enquires is mentioned, as is the adequacy of technical support. While the latter may be inevitable in a period of structural change and a fast moving technological environment, it can also be seen as the predictable outcome of an insufficiently competitive environment in the Western Region.

It is desirable that customers have access to intelligible, unbiased information to allow them to make effective decisions regarding services. They should also have a recourse to some independent authority.

The scope of the Commission for Communications Regulation should include a clear customer focus, including a facility for receiving and processing customers' complaints and ensuring operators' compliance with agreed standards of service.

6.13 The Redundancy of Broadband Connections in the Western Region

For businesses with always-on data requirements there is a need for redundancy. This is essentially a safeguard, whereby if the initial means of connectivity is disrupted there is an alternative system available to ensure always-on connectivity, as in the case of an electricity generator providing back-up energy supplies. The lack of redundancy is

a key issue for customers in the Western Region and can be attributed to absence of competition in the market place, both among providers and between technologies. If redundancy is not available in the Western Region then companies will be more inclined to move their operations elsewhere.

As noted in Section Three, there is considerable spare capacity in the current backbone networks and this will be augmented when the new networks are completed. Some observers take the view that in parts of the country, there is a more than adequate fibre network and that much of this network is not in use. There is also the view that access to these networks is too expensive which is why parts are not 'lit' or operational. Given that public funds have enabled some of these networks to be rolled out, it is desirable that they should be made available at a price which will entice new entrants into the market, particularly outside of the major centres. This will induce further competition, address the lack of redundancy and capitalise on the entire infrastructure available.

Consideration should be given to extending the remit of the Managed Services Entity (MSE) referred to above to include managing open access to the fibre networks currently owned by state bodies such as ESB and CIE and any other relevant spare capacity in the broadband system.



Key Recommendations

The recommendations are summarised here in the order in which they appear in the text.

1. Many parts of the Western Region do not have access to broadband services. In a knowledge-based economy, quality broadband infrastructure is a necessity, and without it growth and competitiveness will be constrained. Telecommunications infrastructure policy for the Western Region should be based on an acceptance that infrastructure there must be at least on a par with other regions.
2. Phase One and subsequent phases of the Metropolitan Area Networks (MANs) programme should be delivered as quickly as possible. Any readjustment of public finances should not result in the delay or postponement of the commitment to deliver open access, affordable, always-on broadband infrastructure within three years.
3. It is important that towns in the seven western counties are well represented in Phase Two of the MAN programme. Local authorities and other public agencies should be proactive on this issue.
4. Establishment of the Managed Services Entity (MSE) should be expedited. It should be given a clear operational mandate that includes maximising competition among providers, both in operating services and in deploying various technologies. The MSE should have responsibility to ensure that services are available at a competitive price to users in the MAN towns.
5. In areas with dispersed population, such as the Western Region, it is important to maximise the rollout of services based on wireless and satellite technologies. Public investment is essential to offset market failure. The provision of €300,000 funding for trials of new technology in the current round of NDP expenditure is insufficient. Funding should be increased significantly and every effort made to secure the involvement of commercial providers.
6. In the Western Region, the higher cost of broadband connectivity is a major issue and a disincentive to investment. The pricing structure for leased lines should be reviewed by the Commission for Communications Regulation. Consideration should be given to cost oriented or capacity based tariffs.
7. The Commission for Communications Regulation should re-examine the operators' tariff structure for ATM services in the light of current circumstances, and make mandatory the publication of ATM tariffs.
8. As long as the current pricing system prevails and users of ATM services are charged on the basis of their distance from an ATM node (PoP), there is a case for the installation of an additional ATM node in Co. Mayo. Consideration should be given as to who should provide such a facility and whether it should be publicly funded.
9. Only one of the Third Generation (3G) licensees is required to provide services outside of the five major cities. In the absence of competition, 3G services in the Western Region are likely to be more expensive. This situation should be monitored closely by the Commission for Communications Regulation to ensure that consumers in the West are not at a cost disadvantage.



Key Recommendations (...continued)

- 10.** Decentralisation and the deployment of the eGovernment strategy, which involves networking all public bodies, should be considered as a key enabler for the promotion of ICT use across the spectrum of users.
- 11.** The provision of telecommunications services is demand-driven to a very significant extent. Much can be done at local level to articulate the needs of SMEs and domestic users. Local authorities, the social partners, LEADER Groups and Partnerships and other community sector organisations could form an effective collective voice in demanding services from the providers and in seeking continued proactive intervention by the State and the Commission for Communications Regulation.
- 12.** The Department of Communications, Marine and Natural Resources should be mandated and resourced to produce accurate information in the form of up to date maps of fibre and other broadband networks.
- 13.** It is vitally important that flat-rate internet access be introduced as soon as possible.
- 14.** In the context of the Government's commitment to the widespread availability of broadband services, consideration should be given to extending the minimum requirement of the Universal Service Obligation to include basic broadband. This would necessitate an examination of the economic implications of such a requirement.
- 15.** Inadequate service from the telecommunication providers is an issue for many businesses. The scope of the new Commission for Communications Regulation should include a clear customer focus, including a facility for receiving and processing customers' complaints and ensuring operators' compliance with agreed standards of service.
- 16.** There is considerable spare capacity in the backbone networks and this will be augmented when the new networks are completed. Public money has financed some of these networks so it is desirable that they should be made available at a price which will entice new entrants into the market particularly outside of the major centres. Consideration should be given to extending the remit of the Managed Services Entity (MSE) referred to above to include managing open access to the fibre networks currently owned by state bodies such as ESB and CIE, and any other relevant spare capacity in the broadband system.

Glossary of Telecommunications Terms

ADSL	Asymmetric Digital Subscriber Line. Access technology over the ordinary telephone cable. Allows access speeds from the network to the user of up to 8Mbit/s depending upon the distance to the nearest broadband node.
ATM	Provides for access speeds of between 34 and 155Mbit/s. Asynchronous Transfer Mode – a fast switching and multiplexing technique that allows voice, data, audio and video to be carried on the same network.
BWLL	Broadband Wireless Local Loop. This technology allows companies to beam high-speed internet services to buildings via radio waves rather than using wires. This allows the service to become operational faster than traditional broadband connections, which have to be installed by digging up roads and laying cable.
Cable Modem	A device enabling connection from a TV or PC to a cable TV line and receive data at high speeds and internet access.
DSL	Dedicated Subscriber Line technologies that allow high-speed broadband communications over existing copper wires. Can enable the provision of high speed internet and multimedia services. (Up to thirty times faster than traditional modem services).
FRIACO	Flat Rate Internet Access is charged at a flat-rate, in contrast to a metered rate where charges are applied based on the time spent accessing the internet.
Frame Relay	Form of data networking appropriate for organisations with 3 or more locations with mid to high bandwidth needs. Voice services are available but still under-developed. Frame Relay gradually being replaced by faster technologies such as ATM.
ISDN	Integrated Services Digital Network. Offered in two forms – Basic ISDN (2 x 64kbit/s channels) and the faster Primary ISDN (30 x 64kbit/s channels).
Leased Line	A leased line is a telephone line which has been leased for private use. Large companies often lease lines from providers (e.g. Eircom) providing them with bandwidth and the ability to connect between the different sites of the same company.
LLU	Local Loop Unbundling. Allowing other telecommunication companies and service provider's access to the former incumbent's local network to provide services directly to the customer.
PoP	Point of presence. A PoP or point of presence is an access point to the internet. An ATM node is a particular type of PoP.
PSTN	Public Switched Telephone Network refers to the general fixed line telephone system throughout the country and is based on copper cables.
VSAT	Very Small Aperture Terminals. Suitable for applications such as transmission of voice and data from head office to branch office providing bandwidth from 9.6Kbit/s up to 45Mbit/s.
WLAN	Wireless Local Area Network. A high-speed communications system designed to link computers and other data processing devices within a small area.

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