Connecting the West

November 2012

Next Generation Broadband in the Western Region

The Western Development Commission (WDC) is a statutory body promoting economic and social development in the Western Region of Ireland (counties Donegal, Sligo, Leitrim, Mayo, Roscommon, Galway and Clare). WDC reports highlight and provide analysis of key regional policy issues.

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Executive Summary

Executive Summary

Broadband infrastructure is a transformative infrastructure, with the capacity to change what people do and the way they do it. Broadband has enabled innovation and growth and it is estimated that the internet contributes up to 6% of GDP in advanced economies and generates significant employment growth.

Quality broadband access can make geographic distance to market far less relevant and provides easy access to worldwide markets. This can be particularly useful in promoting regional and rural development and reducing, if not eradicating, the limitations of more peripheral locations.

The evidence from across the Western Region presented in this report indicates that in many areas broadband services lag those that are available elsewhere in the country. The Western Region accounts for 18% of the households in Ireland but accounts for 28% of applicants to the Rural Broadband Scheme (RBS) highlighting the weaker broadband services there.

Case studies from businesses in the Western Region illustrate how some small businesses are frustrated by poor broadband service levels ranging from a lack of service availability to intermittent and inconsistent basic broadband and insufficient speeds. Lack of access to quality broadband telecommunication infrastructure is one of the deficits inhibiting growth of the businesses already operating in the region, and discourages others from locating there.

The recently published National Broadband Plan *Delivering a Connected Society* sets out targets for next generation broadband delivery to comply with EU targets set out in the Digital Agenda for Europe (DAE). This Western Development Commission (WDC) report examines progress towards achieving the EU targets and assesses the likely impact of the National Broadband Plan on next generation provision in the Western Region.

It is recognised that the market will not invest in next generation networks in all areas as the commercial case is weaker in more rural areas. In order to ensure that regional and rural areas are not disadvantaged, additional State investment will be required to deploy next generation infrastructure outside the main urban centres.

Policy on next generation broadband deployment should recognise the range of applications and industries which require next generation access, the ever increasing bandwidth requirements and the long term value of investment in network infrastructure. Though the immediate timeline is to ensure achievement of the DAE targets by 2020, the infrastructure required to support this will be generating benefits far beyond then.

Government policy should ensure that the Western Region is well served in future proofed next generation services. In considering State investment, policy should be based on the widest assessment of benefits and the lifespan of various technologies, ensuring the best return to State investment over the longer term. The report highlights the case for long term investment in next generation broadband infrastructure to ensure better value for money.

Though it may require additional investment, fibre to the home or kerb should be the preferred technology for towns with a population of 1,500 or more. This will ensure the best return to the State and national economy over the medium to long term. It would be preferable to invest in long term legacy infrastructure than short term service delivery.

The case for more extensive rollout of fibre is likely to be greater if considerations like the wider economic and social benefits are included and the appropriate evaluation period chosen. The returns will include the wider economic benefits of better positioning in the global knowledge economy, job creation and enterprise development all supported by quality, future proofed broadband. The fibre network will not be universal and more rural areas are likely to use a variety of technologies such as wireless and satellite to access next generation services, but fibre should be as extensive as possible.

Section 1

Introduction

1.0 Introduction

This report assesses broadband provision in the Western Region[1], identifies current gaps in services, highlights requirements in the short to medium term and suggests appropriate policy responses to help ensure delivery of next generation broadband. Ten years ago the Western Development Commission (WDC) produced an assessment of telecommunications provision in the Western Region, *Update on Telecommunications in the Western Region*[2]. This report revisits some of the same case study companies examining developments in telecommunications services since then and highlighting deficits and concerns.

Through online activity the potential for participation in global trade is largely unlimited by location. Quality broadband access can make distance much less relevant and can be a catalyst in dispersing economic activity. The Western Region and other more rural, peripheral regions can benefit hugely from improved broadband infrastructure providing a basis for regional economic growth and job creation.

The Government recently published a National Broadband Plan *Delivering a Connected Society*[3] which sets out targets for next generation broadband delivery to achieve EU targets set out in the Digital Agenda for Europe[4]. The purpose of *Connecting the West, Next Generation Broadband in the Western Region* is to examine the current situation and by using case studies, highlight the benefits and identify deficiencies in current broadband services. It examines the likely impact of the National Broadband Plan on next generation provision in the Western Region. Additional investment to ensure regional and rural areas are not disadvantaged will be required and the case for long term investment in next generation broadband infrastructure to ensure better value for money is highlighted in this report.

1 Counties Donegal, Sligo, Leitrim, Mayo, Roscommon, Galway and Clare.

2 WDC, 2002, Update on Telecommunications in the Western Region.

3 DCENR, 2012, Delivering a Connected Society, A National Broadband Plan for Ireland. http://www.dcenr.gov.ie/NR/rdonlyres/1EA7B477-741B-4B74-A08E-6350135C32D2/0/NBP.pdf

4 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0245:FIN:EN:PDF The Digital Agenda for Europe is one of the seven flagship initiatives of the Europe 2020 Strategy, set out to define the key enabling role that the use of Information and Communication Technologies (ICT) will have in delivering on the Europe 2020 Strategy. As part of the EU Digital Agenda for Europe, each EU member state is required to have a National Broadband Plan by the end of 2012 which will identify how next generation broadband targets will be met.

Section 2

Broadband and Economic Growth

2.0 Broadband and Economic Growth

The particular population distribution of the Western Region raises issues for broadband investment. This, together with the role of broadband in facilitating economic and employment growth are examined in this section. Government policy which aims to support next generation broadband deployment throughout Ireland is also outlined.

2.1 The Western Region: A Rural Region

The Western Region is a predominantly rural region with 64.9% of its population living outside of towns with a population of 1,500 or more compared to 38%[5] nationally. The region has four National Spatial Strategy (NSS) gateways, Letterkenny (linked with Derry), Sligo, Galway and Shannon (linked with Limerick) and three hubs Ballina/Castlebar, Tuam and Ennis. There are now over 40 towns with a population in excess of 1,500 persons[6] in the Western Region, an increase of 9 since 2006.

The population distribution and the size and distribution of urban settlements in the region are different to that nationally. Over half the national urban population live in cities, however as the Western Region has only one city the share of its urban population living in a city is far lower (27.4%)[7]. A larger share of the region's urban population lives in small towns. In the Western Region 16.4% of the urban population lives in small towns (1,500-2,999) while nationally only 6% of the urban population lives in such towns[8]. This population distribution is important in considering how and with which technologies next generation broadband is deployed.

2.2 Broadband Infrastructure and Regional Growth

Broadband network infrastructure enables the transmission of data. The better the network is, the faster the speed of data transmission and the greater the capacities that can be delivered. While there is no definitive definition of next generation broadband, also termed 'advanced broadband', it does entail higher speeds than basic broadband, which is generally considered to be 1-2Mbps[9]. Next generation broadband speeds can range from those delivering up to 8Mbps download speeds to 100Mbps and higher.

5 CSO, Census of Population 2011, Population Classified by Area, Table 3.

6 See footnote 5.

7 This is based on the CSO definition of cities: Cork, Dublin, Galway, Limerick and Waterford.

8 CSO, Census of Population 2011, Population Classified by Area, Table 7.

9 Mbps stands for millions of bits per second or megabits per second and is a measure of the speed of data transfer (bandwidth) on a telecommunications medium.

Broadband infrastructure is a transformative infrastructure, with the capacity to change what people do and the way they do it[10]. Broadband has enabled innovation, growth and the Information and Communications Technology industry. New products include online entertainment and games, while new ways of doing business include online trading and the provision of services electronically (for example public information services, education and eGovernment).

International research shows that the internet contributes up to 6% of GDP in advanced economies[11] and most of the economic value created occurs outside the information technology sector, with 75% of the benefits captured by companies in more traditional industries. The research also found that the internet created 2.6 jobs for each one lost arising from technology-related efficiencies[12]. Broadband also enables eWorking and this can be particularly useful in promoting regional and rural development and reducing, if not eradicating the limitations of more peripheral locations.

Broadband related sectors including ICT and Cloud computing are very significant industrial sectors, both globally and in Ireland and include the hardware and software sectors as well as sectors such as medical devices and eLearning. In the Western Region, the ICT sector which captures both hardware and software is a fast growing sector, recording an increase of over 20% in the number of active enterprises between 2006 and 2010[13]. This contrasts with a decline in total active enterprises in the Western Region of 14% over the same period. In 2011 there were 8,211 people working in the Information and Communications sector in the Western Region[14]. The ICT services sector has a very strong export focus and it is the second largest assisted employment sector in the Western Region[15] and it accounted for 13% of total assisted employment in the Western Region in 2010[16].

Broadband is considered the number one infrastructure priority for enterprise growth[17]. It is a key element in improving Ireland's competitiveness and Forfás notes that

...the widespread availability of advanced broadband infrastructure and services is essential to realising future growth potential in existing and emerging sectors. It will also play a key role in supporting the growth of small business, capturing opportunities for productivity and innovation, supporting regional development, ...Despite recent progress, Ireland still lags the EU and OECD in terms of high speed broadband availability[18].

10 This is in contrast to other types of infrastructure e.g. transport, which is often considered a derived demand. For example, the demand for transport is derived from other needs in the economy, so that in a growing economy there is a need to transport more goods and therefore a need for better transport provision.

11 See footnote 3, p.3.

12 http://www.mckinsey.com/Insights/MGI/Research/Technology_and_Innovation/Internet_matters

13 CSO, Business Demography 2010

14 CSO, Census of Population 2011, Profile 3: At Work, Table 3

15 After Medical Technology

16 Based on Forfás data to be published in a forthcoming WDC Regional Sectoral Analysis

17 National Competitiveness Council, 2011, Ireland's Competitiveness Challenge 2011. Engineers Ireland believes that the deficiencies of Ireland's communications infrastructure prevent it from meeting producer and consumer needs. Engineers Ireland, 2012, The State of Ireland 2012, A Review of Infrastructure in Ireland.

18 National Competitiveness Council, 2011, Ireland's Competitiveness Challenge 2011, p. 28, 29.

In the national interest, growth in all regions should be optimised. To do this all regions need to have a strong infrastructure base enabling them to compete, as well as to attract and retain investment and jobs[19]. Arising out of the liberalisation of the telecommunications market, private investment has been driving the rollout of broadband infrastructure and services nationally (and internationally). Just as with other types of infrastructure provision, population density is a determinant of the cost of delivery and potential returns[20]. Government acknowledges that the market will not deliver the same level of service to smaller centres with lower population densities and that the State will have to support provision to these areas.

2.3 Government Broadband Policy

The Government has recently published its National Broadband Plan (NBP) *Delivering a Connected Society*[21]. Ireland has committed to the European Commission's Digital Agenda for Europe (DAE)[22] and a requirement is to publish a national broadband plan which will identify how various broadband targets are to be reached. The NBP has been informed by the Report of the Next Generation Broadband Taskforce[23] which represented the larger telecommunications providers and also a public consultation process[24]. The NBP contains a commitment to deliver broadband targets of

- between 70 and 100Mbps to more than half the population by 2015.
- 40Mbps to a further 20% of the population (by 2016).
- and a minimum of 30Mbps for all homes and businesses (by 2016)[25].

The target speeds refer to download speeds and the upload speeds are usually less. Though there are no explicit upload targets, it is expected that the minimum target upload speeds will be approximately 25% to 30% of the target download speeds[26]. As the range of online activities grows and user participation increases it is probable that upload speeds will become increasingly important.

These target speeds are to be delivered by the telecommunications industry, with Government intervention in areas where the industry considers it will not be commercially viable (market failure). This Government intervention will be more prevalent in more rural areas, delivering minimum speeds of 30Mbps. The higher speeds of up to 100Mbps will be delivered by industry in urban areas. The timeline for these targets is more ambitious than the EU targets contained in the DAE and if delivered will comply with the minimum target speeds (30Mbps) for all EU citizens.

19 WDC, 2010, Why Care About Regions? A New Approach to Regional Policy and OECD, 2009, How Regions Grow: Trends and Analysis and OECD, 2009, Regions Matter: Economic Recovery, Innovation and Sustainable Growth

20 The implications of deregulation and market provision for rural areas such as the Western Region was highlighted in publications such as WDC, 2002, Update on Telecommunications in the Western Region and WDC, 2001, The State of the West.

21 See footnote 3

22 See footnote 4

23 DCENR, 2012, Enabling a Connected Society, Report of the Next Generation Broadband Taskforce http://www.dcenr.gov.ie/NR/rdonlyres/2A82998E-0468-4A2D-9565-345B17EB81FA/0/NGBTReport.pdf

24 The WDC made a submission to this process http://www.wdc.ie/wp-content/uploads/WDC-submission-to-DCENR-on-NGB-Taskforce-7.pdf

25 The latter two targets are to be delivered within the lifetime of the current Government. See footnote 21, p.1.

26 See footnote 3, p8

Despite this, Ireland's next generation broadband target speeds are lower than some comparator countries with not dissimilar population density rates. While Ireland has a relatively low proportion of people living in urban areas compared to the OECD average; its rate of 60% is the same as Finland and similar to Japan (65%) and Hungary (65%). Also Ireland's population density (63 per km^2) is higher than several other comparator countries, for example Australia (3 per km^2), Finland (16 per km^2), USA (32 per km^2), Canada (3 per km^2) and Sweden (21 per km^2)[27], all of which have higher rates of fixed broadband subscribers[28].

The rollout of next generation broadband networks has been compared to electrification with Minister Rabbitte noting that 'Internet connectivity is now as important for both employment and society as electricity has been for the last 60 years' [29]. An indicative figure of €175 million of Government funding for State led investment has been proposed and this is expected to leverage another €175 million from other funding sources. The NBP commits the Department of Communications, Energy and Natural Resources (DCENR) to undertake a mapping exercise to determine the extent of the industry rollout and the consequent extent of market failure[30].

The extent and type of Government intervention required in the NBP is not yet clear but the earlier Report of the Next Generation Broadband Taskforce[31] has provided some insight into the anticipated investment by industry over the next five years. These investment plans have informed the targets set out in the NBP (above).

In addition, the Programme for Government in 2011 commits to

co-invest with the private sector and commercial semi State sector to provide next generation broadband to every home and business in the State. This will be achieved by delivering fibre to the home or kerb for 90% of homes and businesses in Ireland with the remaining 10% provided with high speed mobile or satellite broadband[32].

Fibre is one of the optimum technologies as it is regarded as the most future proofed and is therefore likely to yield better value for State investment. The NBP does not provide any detail on the extent of fibre rollout and the extent to which the Government will need to support fibre deployment to the home. The WDC believes that because next generation broadband is a priority transformative infrastructure, similar to electrification, it will be important to ensure that the optimum policies and technologies to support growth in the long term are followed.

27 See footnote 23, p.84.

28 Forfás, 2011, Ireland's Advanced Broadband Performance and Policy Priorities, p.19.

29 http://www.dcenr.gov.ie/Press+Releases/2012/Minister+Rabbitte+Delivering+a+Connected+Society+%e2%80%93+A+National+Broadband+Plan.htm

30 See footnote 3, p.9.

31 See footnote 23.

32 Programme for Government 2011, p 14. http://per.gov.ie/wpcontent/uploads/ProgrammeforGovernmentFinal.pdf The commitment to fibre to the home or kerb to 90% of the population was also noted in the Report of the Next Generation Broadband Taskforce, Enabling a Connected Society, p.30.

Section 3

Broadband in the Western Region

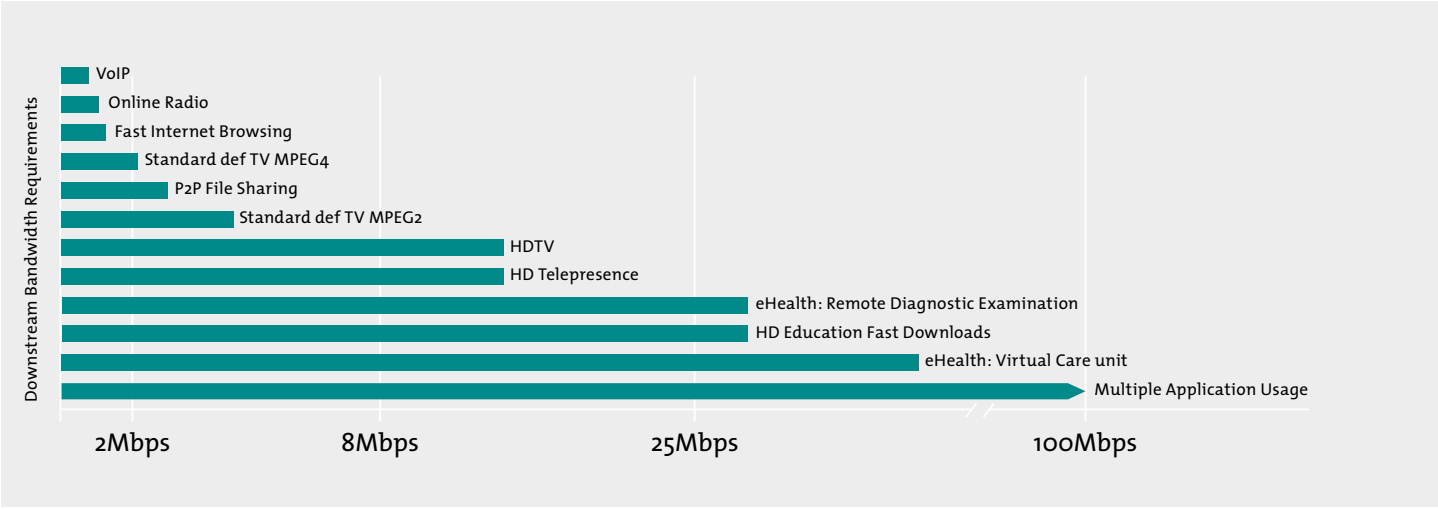
3.0 Broadband in the Western Region

The current experiences of different types of broadband users (Domestic, SME, Large Firms and Education) in the Western Region are examined in this section. The findings are illustrated through case studies of companies operating in the region. Many of these companies were included in a WDC publication on telecommunications ten years ago and have survived and grown since then. Current difficulties are illustrated and their future outlook examined.

The discussion and case studies are divided into four broad types of broadband users: Domestic, SME, Large Firms and the Education sector, but there are overlaps. While the case studies focus on enterprise needs, there are many small businesses and start-ups that operate from home, and therefore can be considered to fall into the domestic user category. There is also an increasing tendency for some employers to use eWorking as a flexible work practice[33] and some of the case studies employ eWorking as standard practice. The current situation for each type of user will be examined and illustrated with case studies.

Different users have different broadband requirements. Figure 1 below illustrates the range of applications requiring different broadband speeds and the range of potential uses.

Figure 1 Broadband Speeds and Corresponding Applications



Source: EU Commission, 2010, European Broadband: investing in digitally driven growth

33 The Irish Examiner reported that broadband speeds of less than 5Mbps download and 1Mbps upload preclude applicants for new customer support jobs working from home for Amazon and Apple. 31 August 2012.

3.1 Domestic Users and eWorkers

Basic broadband, though widespread, is still not yet universally available. The National Broadband Scheme (NBS) and the Rural Broadband Scheme (RBS) are Government programmes designed to deliver the EU target of universal basic broadband access by 2013. The NBS began in 2010 and RBS services will begin by end 2012. The objective of the RBS is to ensure that those remaining premises which cannot access basic broadband from the NBS or commercial providers will be served.

While broadband penetration is increasing, over a third (34.7%) of all homes did not have a broadband connection in 2011[34]. Nationally, 70% of urban households had broadband compared with 56.5% of rural households[35]. In the Western Region just 57.9% of all households had broadband access[36]. Reasons for the lower broadband penetration rates in the region are likely to include access to services, cost[37], the later availability of broadband services and the generally older demographic profile. There is evidence too that there is an increasing urban-rural divide in available bandwidth speeds. Next generation broadband services are already being rolled out in some urban areas offering speeds of up to 150Mbps to domestic users.

The continuing deficit in broadband services in the region is evident in the data on the applicants to the RBS which indicate that a disproportionately high number are in the Western Region. The Western Region accounts for 18% of households in Ireland, but accounts for 28% of applicants to the RBS, highlighting the greater regional deficit. An additional concern is the number of applicants to the RBS who were deemed ineligible. Of the original 5,000 applicants, approximately 1,300 were considered ineligible for service under the RBS[38]. It is not clear why these were considered ineligible, though it may be that a service was already available in their area. Their decision to apply to the RBS may suggest dissatisfaction with their current level of service.

Inadequate broadband speeds and dissatisfaction with service levels in parts of the Western Region has been reported to the WDC. Initially, the minimum download speed under the NBS was 1.6Mbps, comparable to the RBS, though if the service is to be delivered by satellite the minimum download speed is 1Mbps[39]. There is a requirement to upgrade speeds under the NBS to a minimum of 2.3Mbps download speed by October 2012. Part of customer dissatisfaction concerns the use of 'headline' speeds which in many cases are not achievable, as the speeds are compromised by the number of users (contention) at any one time[40]. Other dissatisfaction relates to the inadequacy of basic broadband speeds to the needs of users today, such as video-streaming and on demand TV. Both these issues are often compounded by poor customer service[41].

The lack of broadband or poor service levels is becoming a constraint in accessing services. The range of services being delivered online is continually increasing and common examples include online travel reservations and online banking with the latter likely to accelerate with the closure of more bank branches in smaller towns[42]. On the ground service delivery in many rural areas is contracting and many services are being further curtailed in the current economic environment, for example the

34 CSO, This is Ireland, Highlights from Census 2011, Part 2, p.40.

35 See footnote 33.

36 CSO http://www.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?maintable=CD430&PLanguage=0

37 Cost of services is likely to be a factor arising out of the huge increase in unemployment, for example 17% of adults in the Western Region now live in a jobless household. Source: CSO, Quarterly National Household Survey, Q1, 2011, Special Run.

38 http://www.dcenr.gov.ie/Communications/Communications+Development/Rural+Broadband+Scheme/

39 There is a requirement for an upload speed of 1.2Mbps, a monthly allowance of 25Gbits and a maximum contention ratio of 22:1. The contention ratio refers to the number of users that may be using the service at any one time. Broadband speeds may be slower if there is a high contention ratio, especially at peak times.The cost must not be more than €40.00 per month VAT inclusive with a maximum installation charge of €100 VAT inclusive. http://www.dcenr.gov.ie/Communications/Communications+Development/National+Broadband+Scheme/NBS+FAQs.htm#Product

40 It is also important to note that the Digital Agenda for Europe (DAE) targets also represent headline speeds. Report of the Next Generation Taskforce, Enabling a Connected Society, p.31.

41 For example there is dissatisfaction in parts of Leitrim and Roscommon with services under the NBS in terms of both service level (download speeds at or below the specified minimum level and intermittent services) and poor customer support.

42 AIB and Permanent TSB branch closures are the more recent examples. The recent Ulster Bank online technical difficulties have also shown how weak the bank branch network has become as a consequence of the move to online banking.

closure of banks, post offices, rural Garda stations. There is now a near universal acceptance that online access is the norm for some services and quality broadband is an imperative.

Domestic speeds are also increasingly important from an enterprise location perspective as they enable eWorking, a practice which many companies employ, as illustrated by the eTeams, MeteoGroup and Lionbridge examples. For some companies such as eTeams (case study 1) and Lionbridge (case study 5), eWorking is an integral component of their business model.

The following case study is an example of an expanding rural business which uses eWork and highlights the need for higher speeds and more competitive pricing for broadband services to domestic users, eWorkers and the SME sector.

Case Study 1: eTeams, Scariff, Co. Clare (formerly E-training International)

eTeams, www.eteams.ie (formerly E-training International) provide translation and localisation services to Government, the EU and private sector clients. Formed in 1994, eTeams was an original case study in the WDC's 2002 telecommunications report. Approximately 75% of the company's revenues are based on exports and this is expected to grow to 85%. The company hopes to increase employment by at least three full-time staff in the short term.

Located in Scariff, Co. Clare, the company has 23 permanent staff in addition to over 1,500 translators and 3,000 interpreters on its international database. Most employees operate on an eWork basis - working remotely from the company office. eTeams is a good example of a rurally based company exporting services globally and using ICT to sustain high quality employment which is independent of location.

Telecommunications Issues

The office has a 2Mbps synchronous fixed wireless connection backed up by an 8Mbps download DSL service. The wireless and DSL service costs €159.99 per month. The Director's view is that this capacity is considerably cheaper in Germany (where she is originally from). In Germany a standard DSL package of 16Mbps download /800kbps upload costs around €29.95 and 50Mbps download/10Mbps upload is available for €49.95. She feels the lack of competition in broadband services locally means that services are more expensive.

In 2008 they reviewed their broadband services and disaster recovery plans and decided to host their own main server in a data centre in Dublin where high capacity reliable bandwidth was guaranteed. In 2010 eTeams shopped around and identified a much cheaper alternative in Strasbourg. They now rent three high specification servers each with a 100Mbps connection and a 550Gbps external connection in a data centre with further service upgrades available. This is less than a third of the price quoted in Ireland. These servers host the company's critical software: the translation management system, translation software and the exchange server. The only service hosted in Scariff is the office book-keeping.

Each eWorker uses the software hosted on the server in Strasbourg on a real-time basis and their work is backed up 24/7 there. Clients may send a file to be translated which could range in size from 10MB to 300MB. It is then accessed remotely by the eWorker translating it.

Staff who work from home use either mobile broadband or DSL. There are two or three core days each week where all management and administrative staff (12) attend the office. On these days there is insufficient broadband capacity to support all staff working online simultaneously. The director has a system of 'workarounds' to ensure work can proceed.

Future Outlook

The general trend for the company, in line with experience elsewhere, is for larger data transfers and higher speeds. The Director would like higher connectivity at a more competitive price. She believes that mobile broadband at current speeds is workable but places limitations on eWorking, especially in rural areas. The director believes that 4G[43] wireless will be ideal for very rural areas though it is important to have a high capacity core fibre network supplying sufficient, affordable backhaul. She believes that next generation broadband should be delivered to all areas in tandem. There should not be a situation where some areas (such as urban areas) are prioritised and delivery to other more rural areas is deferred.

43 4G refers to fourth generation wireless communications standard and provides mobile ultra-broadband internet access.

3.2 Small and Medium Sized Enterprise (SME) Users

The SME sector is a particularly important sector accounting for 72% of manufacturing and services employment in Ireland[44]. Regarding advanced broadband services, it has been noted that *SMEs located outside the main urban centres have significantly less choice and less access to good quality service*[45].

There is limited regional data on enterprise ICT usage but a recent survey found that just 12% of SMEs in Connacht/Ulster used fixed line VoIP (Voice over Internet Protocol), much less than the national average of 18%[46]. In 2010 inadequate broadband was cited as a barrier to increasing exports among creative sector businesses particularly for technical activities such as digital media, graphic design and architecture[47]. Increasing exports is vital to that sector's future growth and job creation while the economic downturn has increased the need for all businesses to increase exports. Improved broadband speeds are a national issue, but it is particularly important to ensure acceptable broadband speeds for rural businesses and those needing to trade online.

In the Western Region some small businesses are frustrated by poor service levels ranging from a lack of service availability to intermittent and inconsistent basic broadband and a lack of sufficient upload speeds and poor customer service. Poor upload speeds have prohibited the use of video-conferencing in particular, which is a particularly useful tool for businesses located on different sites and can significantly reduce business travel costs, especially for those located in more peripheral areas. An example includes McGrath's Limestone Works, an SME in county Galway (case study 2) who need higher speed broadband to connect with their site in Scotland. The company has been advised that this service is not available and there is little prospect of it being available in the foreseeable future.

For other SMEs, pricing is an issue and higher speeds at more competitive rates are available to competitors across Europe[48], as has been the experience of eTeams (case study 1) and the MeteoGroup (case study 3). Higher regional broadband costs have been cited as an issue which needs to be addressed to mitigate against regional disadvantage[49].

44 http://www.centralbank.ie/stability/Documents/SME%20Conference/Session%201/Paper%202/Paper.pdf

45 Forfás, 2011, Ireland's Advanced Broadband Performance and Policy Priorities, p.9.

46 http://www.comreg.ie/_fileupload/publications/ComReg1196b.pdf (Slide 36)

47 WDC, 2011, Economic Impact Assessment of the Creative Sector in the Western Region: Future Growth Trajectories, compiled by the Centre for Innovation & Structural Change on behalf of the WDC.

48 There are various studies which compare international broadband prices. For example Forfás 2011 and Engineers Ireland 2012, The State of Ireland 2012, A Review of Infrastructure in Ireland.

49 Engineers Ireland, 2012, The State of Ireland Report 2012 which has called for measures to bring regional broadband costs down to match rates available in Dublin.

Case Study 2: McGrath's Limestone Works, Cong and Claremorris, Co. Mayo

McGrath's Limestone Works Ltd, www.mcgrathsquarries.ie is a family owned and operated company established over fifty years ago. Based in Cong, Co. Mayo and with a site in Claremorris, Co. Mayo, the company supplies the glass industry, agricultural feed industry, chemical, construction, environmental and plastics and rubber industries. The company employs 50 people and is growing its export market.

The company has diversified since the construction downturn and through the development of various quality products has managed to retain employment and increase exports. They are exporting high grade limestone to Scotland and Sweden and Enterprise Ireland is assisting the company to further develop its export markets. Due to the presence of high grade limestone reserves at the quarry, the company has huge potential to grow its bottle making capacity and diversify into higher value products with exports to Germany now being considered.

Telecommunications Issues

The company has recently set up a depot in Edinburgh to serve the UK market. To operate the Edinburgh site more effectively the company needs better connectivity between its sites at Cong, Claremorris and Edinburgh. However the telecommunications service is insufficient to support this. The current service is unreliable with their DSL connection constantly dropping. The company has been advised that the line from the Cong exchange has not been upgraded. Additionally the company feels that it is very difficult to get follow through from customer service representatives.

There appears to be limited if any choice in telecommunications providers in their area which means it is hard for the company 'to shop around'.

Future Outlook

A better, more resilient broadband service at the two Irish sites would enable:

- Remote monitoring of the sites on a 24 hour basis through CCTV.
- Some remote operations at the Edinburgh site.
- Servicing of company equipment on a remote basis.
- Video-conferencing facilities which would dramatically reduce the travel required from the Irish offices to Edinburgh which in turn would significantly reduce costs and travel time of senior executives.

The company considers that poor broadband services are limiting their growth and export potential. With better broadband connectivity between the sites and video-conferencing facilities, the three sites at Cong, Claremorris and Scotland could be managed much more efficiently and cost effectively.

To effectively compete with businesses in other countries, rural and regional areas must not be left behind. From an enterprise development perspective it is important that next generation services are available to businesses wherever they are located. They are needed to support businesses and retain existing employment in addition to positioning them for further growth and expansion. Next generation services are an important selling point for the State's development agencies and widespread availability will be important in ensuring support for new investments, both foreign and indigenous. Equally, inadequate broadband is a critical constraint in location decisions and is a disadvantage for locations trying to attract and develop enterprises[50].

50 The IDA have said that inadequate broadband has proved decisive in investment decisions. *Poor broadband 'decisive' in losing investment*, Irish Times, 31 August 2012.

The MeteoGroup case study is an example of a modern innovative company successfully operating from the West of Ireland but enduring inadequate telecommunications services. Their multinational activity has highlighted more competitive telecommunication services at the company's other sites.

Case Study 3: MeteoGroup, Ennis, Co. Clare (formerly Nowcasting Ltd.)

Nowcasting International Ltd., an Irish company established in the late 1990s was a case study in the 2002 WDC telecommunications report. In 2011, MeteoGroup, www.meteorgroup.com, acquired Nowcasting and the company now forms part of MeteoGroup Offshore supplying meteorological and oceanographic services to the offshore industry. MeteoGroup, which operates out of twelve sites globally, has a strong commitment to the Ennis base and business elements are being transferred to Ennis. Personnel from the Netherlands now report into Ennis and the Ennis site provides material for 29 forecasters based in Aberdeen and elsewhere. Exports account for 97% of the company's sales from the Ennis site, where 14 people are employed.

Telecommunications Issues

Telecommunications services support services to their customers, for example forecasting data downloads, as well as voice and data services connecting the Ennis operation to the company's other sites. Until 2003 Nowcasting was located in Kilrush, Co. Clare. Poor telecommunications capacity was a reason for the move from there to Ennis. Ennis had been designated one of Ireland's Information Age towns and the company moved to Ballymaley Business Park (built in 2003/04). However the telecommunications service was not as robust as they expected.

Though the office is only about 1 km away from the DSL exchange in Barefield, they are not connected to this exchange but to the further one located in Ennis. The speeds are compromised by the distance from the exchange and the number of users. As additional clients were accommodated in the business park, capacity decreased with greater usage and increased contention. Consequently the company was experiencing high contention rates and poor data transmission speeds (½Mbps download). The company considers that the telecommunications infrastructure is a disaster, especially considering that Ennis was designated an Information Age town.

Until earlier this year the company had their data storage functions held in Dublin. Cost became an issue as the same services could be bought elsewhere for much less. They have now moved data storage to the Netherlands as it is more cost effective to use the wider MeteoGroup infrastructure. They have saved over €6,000 per annum on internet capacity and connections alone.

Future Outlook

The company has found that the telecoms capacity has been a significant obstacle to their development. They have customers all over the world and need secure and competitive voice and data connectivity. Sometimes they need to transfer large data files. Soon the company will need quality 20-30Mbps connections and they want VoIP and video-conferencing facilities.

Due to the company's location and the need for specialist skills, the company has allowed eWorking, for example one employee lives and works in west Co. Galway. More reliable connectivity to homes will be required to enable home working and allow the company attract and retain key personnel.

CMS Peripherals is an example of a company successfully operating from a small rural town but needing high capacity, resilient telecommunications capacity to do so. The experience of the company highlights the value of the fibre network, even in a relatively small population centre and the need to ensure further investment and competitive pricing.

Case Study 4: CMS Peripherals, Kiltimagh, Co. Mayo

CMS Peripherals, www.cmsperipherals.com, 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. In 2011 the company acquired CCI Distribution, a data storage distributor in Harrogate, North Yorkshire. CMS Peripherals now has annual revenues of €160 million and employs 190 staff across the three sites.

The Kiltimagh office, which employs 50, distributes data storage products to the Irish marketplace and approximately half of the staff in Kiltimagh work on group functions across the three sites. Since 2007 it has re-located its logistics and warehousing function to the UK office accounting for a decrease of eight staff at the Kiltimagh site.

Telecommunications Issues

The company needs seamless voice and data connectivity with its UK sites. One of the company's strategic priorities is to grow through further acquisitions, most likely in the UK or Ireland. With each successive acquisition there is an explosive growth in data requirements. This will result in a need for greater connectivity across multiple sites with better resilience[51] and redundancy[52]. It operates a VoIP system (over wireless) and the company wants to introduce IP video-conferencing facilities.

About four years ago, the company secured a 10Mbps service using the Kiltimagh MAN (Metropolitan Area Network). The 10Mbps service is a point to point service from CMS Peripherals in Kiltimagh via a radio link from the Kiltimagh MAN to the London site. They have a service level agreement of 10Mbps with a 2Mbps backup. This leased line costs €18,000 per annum. The company would like to have a higher capacity backup leased line but this is not available[53]. The cost of services seems much cheaper in the UK. For example a UK supplier can provide a 100Mbps service with a 10Mbps back up from Harrogate to London for approximately €35,000.

In 2010 the company suffered significant down time because a telecommunications cable was cut (accidentally) outside the company premises in Kiltimagh and so all data and voice services were cut. Repairs were interrupted at 5pm (close of business) and not resumed until the following day when voice and data services were restored. These incidents are an embarrassment when trying to deliver group functions across the entire group.

Future Outlook

Currently, the company believes it may have sufficient telecommunications capacity for up to three years but they need more resilience and a much more competitive price, especially when compared to UK prices. The company is currently rolling out SAP which will increase bandwidth requirements further. On account of the better telecommunications capacity in the UK, they will be hosting it there in the short term. The company currently uses two or three cloud solutions using data centres in the UK.

If key personnel within the company were not committed to the Mayo site, the company might have moved back office functions to another site in the UK. This, coupled with the quality of the workforce in Kiltimagh, are the key reasons why the company continues its operation there. However due to the continuing growth of the company, its telecommunications services are continually being reviewed and if capacity in Kiltimagh is perceived as a 'weak link' then other telecommunication sensitive functions may be transferred to the UK by the UK based IT director.

Mobile Telephone Services

In the last three to four years there seems to be a significant deterioration in mobile phone services and this appears to be a universal problem with all suppliers. There is a particular difficulty between Roscommon and Westmeath and calls seems to be dropping continuously along this route. Following enquiries they were led to believe that part of the problem may be the use of a temporary mast. Another frustrating experience is journeys from Kiltimagh to Belfast where coverage is very poor. On one recent occasion, during which a conference call was being conducted, the call dropped ten times along the route. While this experience is difficult to deal with, it is particularly problematic when the experience across other sites is much better with rare instances of call drop outs.

51 Resilience refers to the strength of the system. The greater the resilience the more unlikely there will be system failure.

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

53 A 10Mbps Ethernet line is available at €35,000 but this is not a leased line and would be shared with other users.

3.3 Larger Users

The case study evidence suggests that generally, larger users in the Western Region, such as multinational companies, can access the bandwidth they need but that the price is expensive compared to what is available elsewhere. Forfás found that compared to our international competitors, the average business package offered in Ireland is the fifth most expensive of the 13 countries benchmarked with the second slowest speed[54]. At a subnational level, businesses in the Western Region have to pay the additional backhaul costs to Dublin (the international access point). Regional broadband costs need to be competitive with Dublin rates, otherwise these extra costs to business will act as a disincentive to regional investment, job creation and retention and reduce regional and national competitiveness[55]. Some companies can negotiate better prices as they may access services with the same provider at other sites in the UK or Europe (for example Lionbridge), but smaller companies without this buying power may be at a disadvantage compared to companies operating in the Dublin area.

International connectivity has been improved through new telecommunications links such as Project Kelvin linking North America to Co. Derry and Global Crossing, providing significantly improved international connectivity to Dublin. Additional international connectivity via the Emerald Networks[56] cable from the US direct to the Western Region should provide significant new connectivity as well as opening up opportunities for enterprise development which relies on very speedy data transmission, (for example financial services). This cable will extend from the US east coast to Iceland and south to Belmullet and is potentially marketable in 2014.

As noted, the ICT services sector is a very significant and fast growing sector and is the second largest assisted employment sector in the Western Region. If price and service levels in the Western Region are not comparable to Dublin it will be more difficult to attract and retain new businesses in all sectors but especially those requiring high bandwith. An example is the Digital Games sector which is the focus of a new industry-led group to drive growth and the creation of 2,500 jobs by the end of 2014[57]. Competitively priced next generation broadband will be critical to support this jobs growth and help expand and develop the games sector already located in the Western Region. It is also important that broadband costs and speeds improve compared to our international competitors so as to support export growth as much as possible.

54 Forfás, 2011, Ireland's Advanced Broadband Performance and Policy Priorities, p.22.

55 Engineers Ireland, 2011, The State of Ireland 2012, A Review of Infrastructure in Ireland. p22.

56 http://www.emeraldnetworks.com/system-map/

57 http://www.djei.ie/press/2012/20120725a.htm See also Forfás (2011), The Games Sector in Ireland: An Action Plan for Growth

Case Study 5:
Lionbridge Technologies, Ballina, Co. Mayo

Lionbridge is a global technology services company listed on the NASDAQ stock exchange that generates over $425m in revenues and employs over 4,500 people in offices across 26 countries. In Ireland, Lionbridge has operations in Mayo and Dublin employing over 350 people.

The Ballina operation with over 100 employees was a case study in the WDC's 2002 telecommunications report. It is the global centre for an emerging and fast growing business called "Enterprise Crowdsourcing". The Ballina team's educational profile has evolved with most entry level staff now educated to degree level and many with Masters and some with PhDs.

The Enterprise Crowdsourcing Business Unit (www.thesmartcrowd.com) focuses on helping customers in the technology, online travel, online retail, internet search and traditional financial services industries to re-invent their outsourcing approaches to deliver significant cost savings through the redesign of 'jobs' into 'tasks'. The immediate benefits are cost savings of at least 30% over traditional outsourcing models – for example, one global customer used to rely on large accounting firms to monitor EU regulatory changes to financial rules across numerous countries in order to keep its financial software up to date. Through Lionbridge Enterprise Crowdsourcing, this monitoring job is now broken down into individual tasks, which are still completed by qualified, certified and experienced accountants but at 30% less expense to the customer.

Today, over 100 million such "tasks" from a growing number of customers are distributed to pre-screened professionals within a globally sourced and qualified workforce ('the crowd') of over 11,000 people across 102 countries, managed by Lionbridge teams from the Ballina centre. This entire organisation, or crowd, is hosted in a secure, private internet "cloud".

Telecommunications Issues

In terms of telecommunications capacity, it has been very important for the office in Ballina to move from the ISDN line it had in 1998 to a 2Mbps line in 2002 to its fibre based 25+Mbps private line circuit with backup which it uses today. The telecoms provider can give them 100Mbps if required with in-built backup, which is actually cheaper than the 2Mbps line they had 10 years ago.

The Ballina business currently has no specific fixed line telecommunications concerns. According to Paul McBride, Vice President at Lionbridge and General Manager of the Business Unit, 'Fixed line telecoms capacity in Ballina has moved from a strategic imperative in 2002 to a basic utility today'. This highlights the changes since 2002 as well as the importance of good telecommunications capacity in enabling the Ballina site to increase its value added operations and improve and strengthen its strategic position within Lionbridge's global business.

He believes that regional investment in telecommunications infrastructure campaigned for by various industry groups and organisations, including the WDC, helped ensure better fixed line broadband for, and the survival of, the Ballina operation. The other key factor in ensuring competitive telecommunications services in Ballina is that procurement can be across multiple sites and for example, the provider in Ballina also services Lionbridge locations in Dublin and the UK.

Future Outlook

The general manager believes that product and services innovation is being transformed from a "top down" model, where the corporation traditionally drives innovation, to a model where innovation comes from the consumer, or from the "bottom up". Therefore, it is critically important to ensure that the businesses and homes of all stakeholders involved, both consumers and employees alike, have the best possible wireless connectivity to enable them to participate fully in this innovation transformation. As the world moves rapidly from fixed line PCs to the mobile device delivering real-time services and information to consumers, the need for wireless broadband capacity and speeds far in excess of today's offering is the new strategic imperative.

To connect to individuals and homes in a networked world, solutions will have to include high capacity wireless technologies. This will enable and support the coming generations of Irish professionals who will work more frequently and exclusively on a mobile basis. Within Lionbridge, business can be done from the home or other locations on an as needed basis, but due to limitations on speed, availability and capacity, it is not possible for most employees to avail of the opportunity. It is true that individuals living in the urban centres can connect from home via a wireless technology, but speed and capacity are the major issues that must be resolved both county and country-wide if employment is to increase from the home or mobile workplace. The "last mile" for many will still have to be delivered wirelessly - There is a concern however that wireless speeds will not increase sufficiently to keep pace with what global business has come to expect from fixed line fibre.

3.4 Education Users

Education is very closely related to the development of enterprise and employment growth[58] and broadband capacity in the education sector is critical in supporting the skills development of the future workforce. The extension of the pilot Schools Broadband scheme to all second level schools will ensure access to next generation broadband (100Mbps) by 2014. All post-primary schools in the seven counties of the Western Region will be included in the first phase to be delivered by the end of 2012. This will allow for greater download speeds but also higher upload speeds and will help ensure that children attending schools in more peripheral regional and rural locations will have access to high speed broadband in school, even if those services are not available at home. Access at school will also help stimulate demand for higher access speeds at home which will generate more demand for services and improve the business case for investment.

In the Western Region, eLearning is well established as a delivery mode[59], for example Institute of Technology Sligo has pioneered its use nationally and internationally and the Mayo Education Centre has been delivering online courses internationally for the last decade. However as the Mayo Education Centre case study illustrates, online learning is hampered by inadequate upload and download broadband speeds. All training and education centres should be able to access high speed broadband so as to allow them deliver high quality training. Domestic users also need next generation speeds to undertake distance education and training. This is particularly important in the current climate with high unemployment and a renewed focus on retraining to enable the unemployed and underemployed to successfully re-enter the workforce[60].

The education sector is important both as an economic sector in itself and for upskilling the labour force. The Western Region has a particular strength in education services with the number of enterprises increasing by 40% between 2006 and 2010[61]. There is also significant growth potential for international trade in online education services which can only be realised with better broadband. Forfás lists education services as a sector with emerging opportunities and untapped potential as well as noting the importance *of access to competitively priced, next generation broadband to enhance productivity, stimulate and enhance innovation, and support future growth and employment* [62].

Next generation broadband will also help support the delivery of eHealth services. This is likely to be particularly useful in a region such as the Western Region with an older age profile, a more dispersed population and in some cases, relatively long distances to major medical centres. As Figure 1 (page 13) illustrates, next generation broadband access will be critical to deploying eHealth applications.

58 WDC, 2011, Education, Enterprise & Employment: How can better Integration of the 3Es drive growth in the Western Region?

59 The benefits of cloud computing to the education sector have been highlighted in Goodbody Economic Consultants, 2011, Ireland's Competitiveness & Jobs Opportunity: Cloud Computing, p.25.

60 The particular education and training issues that arise from the economic downturn in the Western Region are discussed more fully in WDC, 2011, Education, Enterprise & Employment: How can better Integration of the 3Es drive growth In the Western Region?

61 CSO, Business Demography 2010

62 Forfás, 2010, Making It Happen, Growing Enterprise for Ireland. p.xxii

Case Study 6:
Mayo Education Centre, Castlebar, Co. Mayo

The Mayo Education Centre provides Continuing Professional Development for teachers and the wider school community at local and national levels. Services include post-graduate courses, ICT support, meeting rooms, administration support and a resource library. All newly qualified teachers now have to complete their professional training through an Education Centre. The Centre has initiated postgraduate work with teachers in Mayo and nearly 100 students are now doing postgraduate courses. There are also 28 people at the Centre completing Doctorates or Masters in education in conjunction with some UK universities and new online courses in association with UK universities are set to begin in Autumn 2012.

Telecommunications Issues

Currently, the Education Centre cannot access sufficient broadband speeds at a competitive price to deliver the full range of coursework. In particular there are insufficient upload speeds for content such as jpegs, video or MP3. Upload speeds are also unsatisfactory for the moodle[63] platform which is becoming increasingly popular as a tool in schools. This has become an issue for course directors developing online course work for teachers. The upload speeds have also been insufficient to support video-conferencing (VC) and therefore they cannot use the VC equipment which the Centre has invested in (on the understanding that broadband speeds would be higher).

The weak upload speeds limit the Centre's capacity to service the ICT learning needs of teachers. The maximum download speed is 6Mbps (DSL) which is insufficient for the 20 teachers currently undertaking online training. The Centre is putting more and more of its evaluation assessments online and they do not have sufficient broadband capacity for groups of teachers to access and complete these online evaluations simultaneously. Better upload and download capacity is needed when considering other tools such as iPads and eBooks.

The Centre has just commenced a 'Coderdojo' club and over seventy school children aged eight years and older have applied. These are young entrepreneurs developing apps. However, the current capacity of 6Mbps, will mean that only 12 children can go online simultaneously leaving up to 60 children waiting for online access.

The Centre could access higher speeds than the current DSL service but the cost is prohibitive and the Centre is already paying for higher speed services than are actually being delivered. The current service should deliver 12Mbps but the download speed is usually only 6Mbps. The Centre needs 24Mbps at a minimum, is paying for 12Mbps and is only receiving 6Mbps highlighting the difference between headline and actual speeds. The Director is concerned that Castlebar does not have as much industry competition as other urban centres and this may be impacting on service levels.

Future Outlook

Located on the GMIT campus, when the Centre was being built (2002) fibre was included in the building specification. However as there is no wider fibre connection from the building to the national fibre network (for example there is no Castlebar MAN) the Centre cannot avail of higher fibre delivered services. The Centre could possibly use HEAnet[64] (Ireland's National Education and Research Network) but there is a cost associated with connection to this network.

The experience of the Centre shows how high quality broadband has a huge role to play in delivering education services supporting modern teaching methods as well as supporting training in coding and IT for teachers. Broadband is also required to support distance education allowing online delivery to those who do not live close to a higher education institution.

63 Moodle is a Course Management System (CMS) also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). It is a free web application that educators can use to create effective online learning sites.

64 HEAnet, Ireland's National Education and Research Network, provides Internet and associated ICT and eInfrastructure services to Educational and Research organisations throughout Ireland.

3.5 Summary

The case studies highlight some of the impacts of broadband investment to date. These range from the problems associated with inadequate basic broadband, to the benefits of Metropolitan Area Networks (MANs) investment for the SME sector and larger users as well as the investment in various international connectivity projects. The case studies also show the critical role broadband infrastructure plays in supporting and retaining employment in the Western Region especially in multinational operations with key functions being delivered from the Region (MeteoGroup, CMS Peripherals, Lionbridge, eTeams). Many of these operations are highly skilled and are an important element of the employment base of the Western Region and a key selling point in developing and attracting new enterprises.

Given that the current basic service is quite unsatisfactory for many small businesses and domestic users in the Western Region, especially in rural areas, it is clear that additional investment in higher speed services is required. The rural nature of the Western Region suggests that this region will be more severely impacted by the absence of commercial operators (market failure). It is evident from the case studies that the current poor level of service available to many western businesses and householders is hampering growth and development and undermining competitiveness. To support the needs of both industry and domestic users, better upload and download speeds which are competitively priced need to be widely available. Delays in the rollout of higher speed services may impact heavily on job growth and enterprise retention and expansion in the Western Region. Broadband is a basic utility required to access a range of services and is a critical infrastructure for business. The next section will focus on the outlook for next generation services in the Western Region.

Section 4

Next Generation Broadband Outlook

4.0 Next Generation Broadband Outlook

The deployment of next generation broadband is likely to involve varying broadband speeds in different areas of the country. The likely deployment of next generation broadband in urban, semi-urban and rural areas is examined in this section, focusing in particular on the likely rollout in the Western Region.

The mapping exercise to be undertaken by DCENR as part of the NBP will *determine the exact position in relation to existing and planned broadband services throughout the country*[65]. It will identify the exact rollout of commercial investment and the extent of government intervention required. Map 1 (page 28) is an assessment of next generation service provision based on the targets set out under the NBP. It is by its nature approximate as the actual rollout of services is yet to be determined by the mapping exercise.

The areas in indigo refer to the target to deliver 70-100Mbps to more than 50% of the population. These areas are likely to be urban areas (cities and towns of 10,000 population or more) and are selected because they are the most highly populated accounting for over 49% of the population[66].

The lime green areas refer to the target of at least 40Mbps to be delivered to 20% of the population, and these areas are likely to be outside the principal urban centres but not the very rural areas. These are likely to include many urban centres and some county towns including towns with a population size greater than 5,000 depicted by the orange dots and towns with a population greater than 1,500, depicted by the blue dots in Map 1.

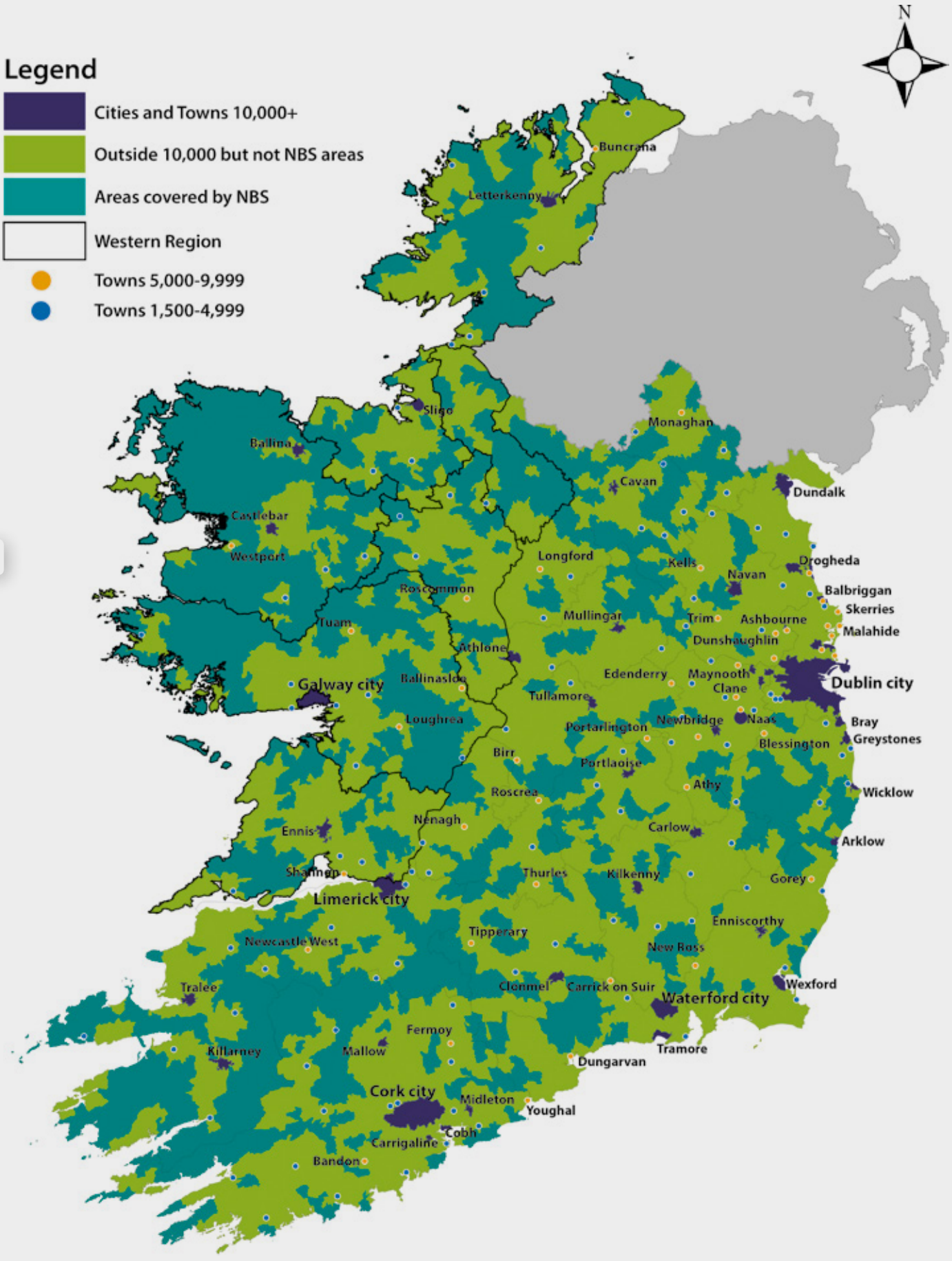
The aqua green areas have a target speed of a minimum of 30Mbps. These are mainly rural areas with dispersed populations comprising up to 30% of the population. In the map these are the areas currently served by the NBS and are a good indicator of where the market has failed to deliver basic broadband services.

65 See footnote 3, p. 15.

66 CSO, Census of Population 2011, Population classified by Area, Table 7, p117-118. The actual detail will be identified by the DECNR mapping exercise.

Map 1 Next Generation Broadband in Ireland

Likely pattern of next generation broadband deployment



4.1 Next Generation Outlook for the Western Region

Urban areas – cities and towns 10,000+ (indigo)

According to the NBP, at least 50% of the population will have access to headline speeds in excess of 70Mbps by 2015 and these services will be provided in the cities and larger urban centres. The delivery of high speed broadband to a large segment of the population is welcome and will ensure that at least parts of the country will be on a par with comparator countries. However the population distribution in the Western Region is different to that nationally and it is likely that far less than 50% of the Western Region's population will have access to these speeds.

Telecommunications companies sell dark or unlit fibre to other telecommunications companies and to large enterprises. Greater availability of fibre can induce competition, enabling market entry by other companies and improving price and service levels. The government's investment in Metropolitan Area Networks (MANs) has been a very significant element in the deployment of dark fibre around cities and towns throughout the country. In terms of jobs and foreign investment, the State investment in MANs has had a significant impact; from 2004 through to 2007 the first 27 MAN towns increased their share of new IDA jobs from 24% to 89%.[67] Of course the MANs may not be the only factor attracting IDA companies but they are certainly likely to be an important contributory factor.

To date there are 22 towns in the Western Region with MANs, ranging in size from Galway to Kiltimagh. However, five NSS hubs still do not have a MAN, four of which are in the Western Region; Tuam, Castlebar, Ennis and Shannon[68]. MANs will also be very useful in extending deployment of next generation broadband to homes and businesses[69] (to be discussed further in section 5).

Larger broadband users are usually located in the larger urban centres where there is a stronger infrastructure with wider deployment of fibre networks and several market players operating in a competitive environment. They generally appear to be able to access the broadband services they require. However, the cost of backhaul data traffic to Dublin from regional areas is still an issue and needs to be minimised to ensure that companies outside of Dublin are not at a competitive disadvantage.

The larger urban areas in the Western Region should be able to access high next generation speeds comparable to other centres across the country. This is imperative to ensure that industry needs are met as well as ensuring extensive availability of higher speeds services to the more densely populated areas. Improved backhaul capacity and MAN infrastructure will be important in helping deliver this to centres in the Western Region.

Deploying fibre in the telecommunications duct alongside the Bord Gáis pipeline from Bellanaboy in Co. Mayo to Co. Galway[70] will be a significant addition to backhaul capacity within the Western Region. This will provide additional connectivity to the national network and should provide more competitively priced backhaul for MANs and other fibre and wireless networks. This capacity, as well as providing additional bandwidth to current users will be very valuable in attracting new investments to the Region and counties Mayo and Galway in particular. As noted previously the Emerald Networks cable from the US direct to the Western Region will provide significant new connectivity which will support the needs of larger users.

67 Figures supplied to the WDC by eNet and based on an analysis of IDA announcements data.

68 Deployment of MANs to these centres was a stated objective of the NDP 2007-2013 and a recommendation in the most recent Forfás reports on Broadband. Forfás (2010), Ireland's Broadband Policy Performance and Policy Actions, p.33-35. Forfás (2011), Ireland's Advanced Broadband Performance and Policy Priorities, p.29. This will be in addition to the 94 MANs already completed. The fifth NSS centre without a MAN is Mallow Co. Cork.

69 http://debates.oireachtas.ie/ACC/2012/05/17/00005.asp

70 WDC, 2012, WDC Submission to the Consultation on telecommunications duct infrastructure constructed alongside the gas pipeline in Co. Mayo and Co. Galway http://www.wdc.ie/wp-content/uploads/WDC-submission-to-DCENR-Galway-Mayo-duct-14.3.2012.pdf

Semi-urban areas – outside centres 10,000+ but not NBS areas (lime green)

The NBP is proposing three different target speeds (rather than two, as in the EU targets of 100Mbps and 30Mbps). The second category, depicted by the lime green in Map 1, refers to the likely rollout of target speeds of 40Mbps to a further 20% of the population (and possibly up to 35%) beyond those in the larger urban centres. These slower speeds are likely to be delivered to smaller towns, for example those towns with a population of 1,500 – 10,000.

It seems likely that these smaller towns may be at a considerable disadvantage compared to larger urban centres. This will impact particularly in the Western Region with a higher share of its population living in smaller towns than that nationally.

Generally the practice in most countries is to deliver the higher speed target (100Mbps) as far as possible, while deployment to the most rural and sparsely populated areas usually involves lower speeds, as set out in the EU DAE target of a minimum speed of 30Mbps for all EU citizens by 2020. For example, previously in Finland a universal service of 1Mbps was set for 2010 and the current target is that by 2015 more than 99% of the population will have access to 100Mbps[71]. Finland in particular is an example of a country with low urbanisation (similar to Ireland) but with ambitious targets for broadband speeds to practically the entire population. In Australia 93% of Australian premises will have access to fibre to the premises, capable of providing broadband speeds of up to one gigabit per second (1,024Mbps). The advantages of high speed broadband in connecting rural areas and in delivering online education and health services is a key goal of that country's Digital Strategy[72].

As has been noted, the Western Region has a population distribution different to that nationally with a much larger share of the urban population living in smaller towns. From a regional development point of view it is important that there is a good spatial balance across regions in the availability of next generation services. The use of an intermediate target speed of 40Mbps, lower than that available in the larger urban areas may mean that these centres cannot compete for enterprises requiring higher bandwith speeds. Locations with maximum speeds of 30-40Mbps will not be as attractive as sites with broadband speeds double that. This will prove a disadvantage to enterprise development in such areas. In addition, the established trend of ever higher speeds becoming the acceptable minimum standard shows no sign of abating. This would suggest that 30-40Mbps will not be considered adequate in years to come.

71 http://www.lvm.fi/web/en/topical/pressreleases/-/view/4109304
72 http://www.nbn.gov.au/the-vision/digitaleconomystrategy/

Rural areas – Areas covered by the NBS (aqua green)

Services under the NBS and RBS aim to deliver 'basic' broadband to all by 2013. The current NBS will cease in August 2014, though the mast (wireless) infrastructure will remain. Based on the current provision of basic broadband, market failure is evident in those areas now covered by the NBS and RBS schemes. It is likely therefore that Government funding will be required to deliver next generation broadband to most if not all these areas. State funded next generation services in these areas (coloured aqua green in Map 1) are unlikely to occur until after August 2014 when the current NBS contract expires.

Acceptable and required broadband speeds are increasing all the time and what was deemed a minimum standard ten years ago is not considered acceptable now[73]. Applications such as High Definition TV (HD TV), video-conferencing and distance learning require greater bandwith (see Figure 1). Therefore the delivery of next generation broadband to all users will increasingly become an imperative.

The telecommunications industry believes that between 70-85% of the population will have access to minimum broadband speeds of 30Mbps by 2020 through a combination of technologies including fibre, cable, 4G fixed wireless and mobile[74]. Government intervention will be required for the remaining 15-30% of the population to ensure access to 30Mbps or higher as a basic minimum. This is likely to be a particular problem in the Western Region as a particularly rural region.

The NBP targets for these areas are headline speeds of 30Mbps. While 30Mbps will be a vast improvement on speeds currently available, these areas will be at a considerable disadvantage compared to more urban areas where speeds of 100Mbps will be available. It is also not clear that 30Mbps is likely to be sufficient over the longer term based on previous experience of increasing broadband speed requirements and the range of applications which can be deployed (Figure 1). The next section will focus on the issues regarding next generation deployment in the Western Region and the choices to be made.

73 There is a general trend of raising the threshold of the broadband definition as higher data rate services become available, so for example in 2010 the U.S. Federal Communications Commission (FCC) defined "Basic Broadband" as data transmission speeds of at least 4Mbps downstream. Ten years ago, Forfás (2002) defined broadband as anything higher than Basic Rate ISDN (144k/bits) and ComReg defined the minimum threshold for broadband as 512kbit/s. (ODTR Report 02/79)

74 See footnote 23, p.78, 79.

Section 5

Next Generation Broadband: What are the issues?

5.0 Next Generation Broadband: What are the issues?

Rollout of next generation broadband nationally will be principally delivered by the market and the Government will fund delivery in areas of market failure. This section examines the issues influencing which areas are likely to access which target speeds and by what technologies. More comprehensive evaluation of the benefits of fibre investment is also outlined.

5.1 Which Areas?

It is clear from the NBP and industry[75] that there are three broad areas and targets. In determining the case for State investment in broadband infrastructure, the EU categorises areas by the level of infrastructure and competition in services as follows:

- Areas with two or more broadband networks and no need for State intervention.
- Areas with one broadband network, possible case for State intervention.
- Rural areas with low broadband coverage and no expectation of new investors within 3 years.

These three categories loosely approximate to the three categories identified in the NBP and therefore it seems likely that Government intervention can only take place in those areas outside the principal urban areas (the latter two categories).

Forfás has proposed a target of an initial deployment of next generation broadband (100Mbps)[76] to centres with a population greater than 1,500 persons through fibre deployment over the next five years[77]. This would provide coverage to 62% of the national population, but just 35% of the Western Region population. Extending 100Mbps coverage to all towns with a population greater than 1,500 would be more ambitious than the NBP targets and would likely capture most of the first two categories of areas, leaving just rural areas (the third category) without 100Mbps next generation deployment.

75 See footnote 23, p. 35.

76 See footnote 28. Forfás believes that this interim target (2016) will go a significant way to achieving the DAE target of next generation access of 30Mbps for all citizens, of which in excess of 60% of the population will be able to access 100Mbps (the EU target is 50% of households subscribing).

77 Engineers Ireland propose a target of achieving universal high-speed broadband to substantially all parts of the State by 2016 through the continued development of the 'fibre to the cabinet' (FTTC) and 'fibre to the home' (FTTH) networks as well as satellite-based access services. There is a need for increased development of wireless broadband (e.g. WiFi and WiMax) particularly in areas of the country which are not adequately served by existing landline infrastructure. See footnote 49.

5.2 Which Technologies Where?

There are a range of technologies used to deploy next generation broadband. To achieve higher speeds, fibre on part, if not all the network is very important. Connection from the national and regional fibre networks direct to the premises is known as 'the last mile' and this is the focus of the NBP.

Telecommunications companies have already started deploying fibre to the cabinet[78] (FTTC) and some of the larger urban centres are already being served with next generation broadband speeds of up to 150Mbps. The physical extension of the fibre network as near to the user as possible and ideally to the home/business, fibre to the home (FTTH), is regarded as the most future proofed technology for next generation broadband delivery[79].

5.2.1 Fibre

Fibre technologies can support speeds of 1Gbps (1,024Mbps), higher than wireless technologies, and can provide symmetrical (equal up and download) speeds. Investment is required to upgrade networks to cater for the higher speeds which will be required in the future. Cable network operators also use fibre as part of their network. Already changes in lifestyle have had implications for network usage such as accessing TV programmes, music and film downloads, gaming and shopping online. The range of applications can be expected to grow as depicted in Figure 1. In addition to fibre direct to the home or kerb, the availability of fibre networks is critical to enterprise needs. Cloud computing applications hosted in data centres[80] are a key area of growing economic activity and rely on high capacity resilient fibre networks.

The telecommunications industry represented on the Next Generation Taskforce comprised the larger operators in Ireland, many of whom have their own fibre networks and these are likely to concentrate on deploying to the larger centres and areas where they have traditionally had a presence. There are other smaller companies who are active in delivering broadband to smaller, more regional and rural locations. Less populous centres may appeal to smaller market players who already operate in these areas providing wireless services but are becoming active in fibre deployment to smaller population settlements[81].

To ensure the best use is made of State investments to date, State-owned fibre networks such as MANs, CIE[82] and BGE networks need to be made more widely available on an open access basis[83]. The role of the regulator (ComReg) may be particularly useful in more sparsely populated areas where there is more limited competition. The regulator is mandated to regulate access to networks so as to develop effective choice for consumers, both business and residential[84]. In its role in promoting competition, the regulator has a particular responsibility in those areas with few if any market players and more limited competitive activity. Regulation should aim to improve access to infrastructure and induce market entry, particularly by smaller industry operators in regional locations. In particular lower cost access to State owned networks could induce greater use and incentivise competition especially in areas where

78 FTTC is where fibre cable is laid from the telephone exchange to neighborhood telecoms cabinets - midway between the exchange and the home/business. In this case copper wiring carries the rest of the signal to the home/business. By rolling out fibre closer to the home/business and reducing the length of the copper line, broadband download speeds are improved.

79 As noted, the Programme for Government committed to co-investing with the private sector to provide high speed broadband to every home and business, by delivering fibre to the home (FTTH) or kerb to 90% of homes and businesses and providing the remaining 10% with high speed mobile or satellite.

80 Hosting facilities for network servers have high energy requirements but the temperate climate in Ireland reduces the requirements for cooling/air conditioning with reduced environmental impact.

81 An example is a company called Lightnet which is planning to roll out FTTH in Loughrea (Census 2011 pop. 5,062) and to be the first town in Ireland with widespread fibre to the home. They are also proposing to build FTTH in Killimor (pop. 335). http://www.lightnet.ie/fibre-broadband

82 For example, this network is currently used exclusively by BT in the provision of telecommunications services. Forfás (2011), Ireland's Advanced Broadband Performance and Policy Priorities, p.55.

83 See footnote 28. Forfás note that existing state telecommunications assets could be combined under a common arrangement. p.41.

84 http://www.comreg.ie/about_us/roles_what_we_do.523.html

there is currently limited if any competition. The current situation seems to be that smaller industry players can find the cost of accessing existing state-owned networks prohibitive. Regulation supporting more competition and a pricing model based on a greater number of industry operators paying lower network costs, rather than fewer operators paying higher network costs, could yield better returns on Government investment and provide more services at regional and local levels.

State telecommunications assets are important in helping to bridge the gap between market provision of services and the need for additional State investment. Due to current funding difficulties the sale of some State assets is being considered, for example CIE may be considering the sale of its fibre telecoms network which extends across the country's rail lines[85]. Options should be explored which would retain State ownership of these assets so that these can be used to help deliver next generation services, especially to regional and rural areas with more limited market activity.

5.2.2 Cost of Fibre

Fibre is one of the most expensive next generation technologies to deploy because it requires a physical connection to the premises. It can be considered similar to electrification or extension of the gas network and the costs are primarily due to the civil works which can comprise up to 80% of the cost[86]. The more rural the population the higher the cost as each premises needs to be physically connected to the network. Forfás has estimated that the investment required to deploy fibre to all premises (homes and businesses) in towns with a population greater than 1,500 is estimated at €2.23 billion, providing in excess of 1 million connections at an average cost of €2,149 per connection[87].

A separate study by the Telecommunications and Internet Federation[88] estimated the average cost of deploying FTTH to all premises, and therefore more extensive coverage, as €1,568 per connection in urban areas and €2,378 in rural areas. Internationally cost estimates are broadly similar, for example in Germany the cost of 100% coverage of FTTH was estimated at €2,900 per connection[89] higher than the estimate for 100% coverage in Ireland. In Sweden it has been estimated that the cost of fibre to the home ranges from €1,751 to €2,919 per home and the total cost of FTTH is estimated nationally at €6.5 billion[90].

5.2.3 Wireless Technologies

There are a range of wireless technologies capable of delivering various data transmission speeds. Telecommunications is a fast moving environment with huge advances in new technologies. The most relevant of these in the context of next generation broadband are LTE, Wimax and Satellite. LTE known as 4G LTE (Fourth Generation Long Term Evolution) is the latest standard for wireless communication using radio spectrum and can offer download speeds of 14Mbps to 100Mbps. WiMAX (Worldwide Interoperability for Microwave Access) is another wireless communications standard and while download speeds of 100Mbps are technically possible, actual speeds depend on the distance of the user from the base station and the number of users connected to the base station.

85 In July 2012 the Cabinet agreed to provide €36 million in emergency funding. Irish Times, 25th July 2012. *Emergency funding of €36m for CIÉ agreed.*

86 See footnote 28, p.37. Costs of up to 65% have been cited by the Telecommunications and Internet Federation, see footnote 88.

87 See footnote 28, p.61. This cost was estimated in 2011 and did not assume any fibre connections were already in place.

88 http://www.tif.ie/Sectors/TIF/TIF.nsf/vPages/Broadband-Publications-building-a-next-generation-access-network-for-ireland-16-04-2010/$file/TIF%20Report%20'Building%20a%20Next%20Generation%20Access%20Network%20for%20Ireland'%20Final.pdf , p.14

89 See footnote 28, p.61.

90 Forzati, M., Mattsson, C., 2011, Socio-economic return of FTTH investment in Sweden, a prestudy, Sponsored by the Swedish Government's Broadband Council (Bredbandsforum), http://www.acreo.se/Global/Publications/Prestudy_socio-economic_return_of_FTTH.pdf
Given that 30% of Swedish premises are already fibre connected, the remaining cost is estimated at €4.7bn. Currency conversions based on www.xe.com on 19 October 2012

These technologies enable the delivery of wireless broadband and can be an alternative to cable and fibre in reaching more remote locations, however, as the bandwidth must be split among multiple users there are lower speeds in practice. Satellite is usually the technology of choice for very remote areas. In terms of next generation access the OECD argues that

wireless networks will continue to be important, but as applications require increased bandwidth, and users wish to access greater amounts of data, they are expected to become complementary to fibre, rather than a substitute. As end-user bandwidth demand continues to grow, fibre will likely become the fixed-line network of choice [91].

5.2.4 Wireless Delivery and Spectrum Policy

Radio spectrum supports various applications and increasingly is valued in supporting wireless broadband delivery. While the management of that spectrum is the responsibility of national governments, under EU regulations flexible market based management of the spectrum is required. In Ireland, ComReg has statutory responsibility for the efficient management and use of the radio spectrum[92].

The switchover from analogue to digital TV, as well as the freeing up of spectrum previously used for 2G mobile services, will release spectrum capacity for mobile telephone and broadband. This spectrum, auctioned in November 2012, will allow telecommunications companies offer 4G services.

The importance of spectrum in delivering next generation broadband in rural areas has been recognised. In 2008 the WDC argued *it is important that spectrum policy takes cognisance of the role of wireless in Next Generation Access (NGA)... Spectrum policy needs to acknowledge that the use of wireless technologies will be the only alternative for the provision of NGA in many parts of Ireland.*[93] In 2010, the DCENR Spectrum Policy Statement recognised the role of spectrum in rural areas noting that, *the provision of spectrum to... and to provide access to broadband in remote areas of the country is central to government policy in this regard*[94]. More recently, both industry and Government have acknowledged the very important role that spectrum has to play in delivering high speed broadband in rural areas[95].

As part of the sale of 4G spectrum, ComReg has proposed a national population coverage requirement of 70% to apply to licence holders. As delivery will be concentrated in the higher density areas, the 70% population coverage requirement will deliver a geographic coverage rate much less than that. It has been suggested that the national geographic penetration rate could be as low as 12.9%[96].

This national 70% population coverage requirement may not adequately support the rollout of 4G services across the Western Region. There is no requirement for regional coverage and this is likely to impact much more negatively in the Western Region with its lower population density. If for example, in order to reach the 70% coverage requirement, the licence holders decided to target towns with a population in excess of 1,500, nationally this would extend to 62% of the population, but in the Western

91 OECD, 2011, Next Generation Access Networks and Market Structure, http://www.oecd.org/sti/interneteconomy/48460232.pdf p.19

92 This is to be in accordance with policy directions given by the Minister for Communications, Energy and Natural Resources.

93 WDC, 2008, WDC Submission to the Public Consultation on Spectrum Policy, Department of Communications, Energy and Natural Resources, p.4.

94 DCENR, 2010, Spectrum Policy Statement

95 DECNR, 2012, Report of the Next Generation Taskforce, p.61

96 These issues were deliberated in the ComReg Consultation process. The experience of other countries with higher coverage requirements was also noted and several stakeholders took the view that the population coverage requirements could be higher. http://www.comreg.ie/_fileupload/publications/ComReg1225.pdf. The rate of 12.9% was contained in a submission to ComReg by S. Minch. http://www.comreg.ie/publications/spectrum_liberalisation_-_publication_of_non-confidential_responses_to_comreg_document_11_60_and_recent_correspondence.583.104000.p.html

Region it would only cover 35.1% of the population[97]. The population coverage requirement will also impact on mobile telephone coverage as there are likely to be extensive black spots across the Region, compounding those currently experienced by business (see case study 4).

Wireless delivery has generally been identified as the technology of choice for high speed broadband delivery in rural areas. Apart from the implications arising from the coverage requirements discussed above, there are other difficulties faced by users in rural areas. The OECD notes the difficulties that arise with limited competition in rural areas served with wireless technologies.

There may be some regions only served by a single wireless provider, as is sometimes the case with low population densities, in some regions. This currently occurs where the most widely deployed fixed wireless offers, for users that cannot access fixed broadband, frequently have far higher prices, lower speeds and usage caps than for DSL, cable or fibre networks in those countries[98].

Wireless delivery will be the only means of next generation broadband delivery for many rural areas. Limited (if any) competition in some areas and the population coverage requirements of 4G licence holders are factors which are likely to impact more severely on the Western Region given its geography and population distribution.

5.2.5 Other countries' technology choices

In Finland the 'Broadband for all 2015' project aims to have 99% of the population located within 2km of a fibre optic or cable network which will allow for data transfer speeds of 100Mbps. The remaining distance to the home or business can be delivered by the existing copper line using new technologies which allow higher transmission speeds. This is fibre to the cabinet (FTTC) or kerb and is the same method as is being rolled out in some urban centres in Ireland. In Finland, industry is expected to deliver services to 95% of the population. Public funding is required to deliver next generation access of 100Mbps to approximately 130,000 households in sparsely populated areas, raising the population coverage to over 99%[99].

In Australia, the National Broadband Network aims to connect 93% of Australian premises (homes, schools and businesses) through fibre to the premises (FTTP) providing speeds of up to 1Gbps. The remaining 7% of premises will have access to the network through next generation fixed wireless and satellite technologies, providing peak speeds of 12Mbps.

Across Europe there are a range of examples where Government is supporting private investment in fibre networks to ensure as widespread deployment as possible[100]. Some of these supports include various EC approved State aids and Forfás notes that since 2009 State aid for broadband in the EU has increased significantly. It is recognised that State aid can play a key role in areas where market players are not planning to invest[101].

In Sweden, the share of publicly owned fibre infrastructure is high and similar to that owned by the incumbent telecommunication operator which helps to promote competition and deliver services more extensively.

97 CSO, 2011, Population by Area (Formerly Volume One)
98 http://www.oecd.org/sti/interneteconomy/48460232.pdf, p.19
99 http://www.lvm.fi/web/en/internet
100 http://www.ftthcouncil.eu/documents/Reports/Dot-econ_Regulatory_Report.pdf
101 See footnote 28, p.39.

Within Ireland, the choice of technologies should not be unduly prescriptive. Technology and commercial criteria are likely to change and some smaller centres which may be not be included on the basis of strict population criteria, may be deemed commercially attractive because of their geography (for example proximity to or presence of existing infrastructure[102]). There will also be towns and villages which employ a lot more people than their resident population[103]. An example would be Tynagh, Co. Galway (population approximately 440) which has several large employers including Tynagh Mines, a power plant (Tynagh Energy Limited) and a wood products manufacturer (Connaught Timber). Therefore it has a much larger working population than its resident population and a stronger demand for next generation access than its population would imply.

Fibre deployment in rural areas can be commercially attractive. The degree of profitability may not attract investment by the larger operators but it can be attractive for smaller providers. Decisions on the technology choices for deployment to all areas, but especially to those outside the larger urban centres need careful consideration. Some of these areas are likely to require State investment and this could have a significant impact considering that close to 65% of the Western Region population live outside population centres of 1,500.

5.3 Evaluating Fibre: More Comprehensive Evaluation Methods

Though the benefits of next generation broadband are widely recognised, the case for widespread fibre deployment is not as clear, primarily because of the level of initial investment required and the longer term return on investment. Commercial operators generally operate on relatively short term investment cycles[104] while there are many demands on limited State funding. Typically the commercial case for investment in broadband services is based on the demand for services by the customer, often known as average revenue per user (ARPU). From a State investment perspective, evaluation is typically based on cost benefit analysis (CBA) which aims to measure the range of costs and benefits to help determine the case for investment.

In practice both ARPU and CBA may not fully measure the range of benefits which can arise. While investment in fibre networks can be evaluated in a similar fashion to investment in other infrastructure, technological innovation and new product and service developments are continually extending the range of benefits from investment in broadband infrastructure generally and fibre deployment in particular. For example, the development of eHealth technologies including remote monitoring and diagnosis will provide opportunities to deliver some healthcare direct to the community rather than through hospitals. The greater bandwidth and symmetrical (upload and download) speeds with fibre networks can support those applications requiring very good upload and download speeds. Figure 1 (see page 13) highlighted the range and extent of high bandwidth applications. As many of these applications such as eHealth are still being developed, it is difficult to estimate their full value and benefit. Measuring benefits is further complicated by the convergence of technologies and service provision. For example where a range of services are provided over the same network (such as telephone, internet access and TV services) also known as bundled services.

102 For example, Kiltimagh in Co. Mayo with a population of less than 1,500 has a MAN which is being used by local employers, for example CMS Peripherals and is important in sustaining high quality local employment which is serving international sites.

103 The CSO Census of Population Place of Work, School or College Census of Anonymised Records (POWSCAR) can measure a town's working population rather than its resident population. For example, WDC (2009)Travel to Work and Labour Catchments in the Western Region: A Profile of Seven Town Labour Catchments.

104 An industry investment cycle of 3-5 years was the basis for the planned investment set out in the Report of the Next Generation Broadband Taskforce.

Research undertaken in Sweden provides some economic calculations on additional returns to fibre which need to be captured in evaluation. In Sweden, higher rents are charged for homes with fibre connectivity. Tenants pay an extra €5.50 per month for a home with a fibre connection and this is valued at €267 million per year for all fibre connected homes[105], which yields €185.6 million per annum return on investment.

Investment in fibre networks can also reduce telecommunications costs to the user, for example the Stockholm Regional Council (regional government) reduced its telecommunications costs by 50% following deployment of the fibre network[106]. This is attributed to increased efficiency and greater competition with more telecommunication operators providing services on the high capacity fibre network.

At a wider economy level, the OECD has examined the benefits arising to other economic sectors (transport, health, education and electricity) of a national 'fibre to the home' network. The analysis examines the cost of deploying 'fibre to the home' across different OECD countries, including Ireland, and has estimated that the combined savings in each of the four sectors over a 10 year period could justify the cost of building a national 'fibre to the home' network[107].

Measuring the benefits of State investment should also take account of the impact on other Government policy objectives. More balanced regional and rural development and greater regional economic growth are important Government policy objectives[108]. As noted earlier, next generation access and fibre networks, including the MANs, are an important selling point for the State's development agencies. It is important that the benefit of fibre in attracting new investments and supporting regional economic growth is captured in evaluation. Inadequate broadband is a critical constraint in location decisions and is a disadvantage for locations trying to retain and attract enterprises. Extensive deployment of fibre networks across the regions will be important in promoting more balanced economic development and contributing towards national growth.

Measuring the costs of fibre investment is generally focussed on the civil works required, which can be up to 80% of the total cost. It is likely that the civil costs are lower now than previously. There is the view that the price of fibre installation is decreasing[109]. Also, it is possible that costs may be shared with other public infrastructure projects by combining civil works with other infrastructure investments such as smart metering of water and electricity and upgrades of electricity transmission networks[110].

5.3.1 Measuring Value for Money: Appraisal Timeframe

Commercial timeframes may be relatively short even though the infrastructure yields a longer term return. State investment which is designed to deliver next generation broadband should be based on technologies which are future proofed over the longer term and not just aimed at meeting immediate targets for 2015 and 2020. Forfás has also argued that State investment should be in the most future proofed technology.

105 http://www.acreo.se/Global/Publications/Prestudy_socio-economic_return_of_FTTH.pdf, p. 21. Swedish Krona converted to Euro on 30 October 2012. Apart from the possibilities of higher bandwidth, fibre deployment ensures lower signal loss compared to radio and microwave which leads to higher housing value.

106 http://www.acreo.se/Global/Publications/Prestudy_socio-economic_return_of_FTTH.pdf, p. 20

107 http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=dsti/iccp/cisp(2009)2/final

108 Government of Ireland, 2007, National Development Plan 2007-2013: Transforming Ireland – A Better Quality of Life for All

109 http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=dsti/iccp/cisp(2009)2/final p.39

110 See footnote 28, p.38.

The Department of Finance[111] does not specify the appraisal timeframe for investment in fibre networks but considers that it should be based on the economically useful life of the project. The current guidelines for the economic assessment of transport infrastructure suggest an evaluation period of 30 years[112]. In its assessment of the cost of deploying fibre, Forfás used a 30 year time period. The OECD note that the copper networks delivering DSL have been there for 50 years or more and fibre optic lines are expected to have a similar lifespan[113]. Therefore an evaluation period of at least 30 years for the deployment of fibre networks would be appropriate.

5.3.2 Value for Money: Cost of State Broadband Investment

In considering next generation deployment it is useful to consider some of the costs of State investment in broadband infrastructure to date. Comparing the relative cost to the exchequer of the MANs fibre rollout with investment in delivering a basic broadband wireless service through the NBS highlights the long term value (even over a relatively short period) of fibre rollout. These costs are based on the capital costs of deploying the infrastructure and do not measure the subscriber costs paid by the user.

The total capital cost of building 93 MANs (27 in Phase 1 and 66 in Phase 2) was €180 million, with €90 million refunded from the EU. It is estimated that 600,000 individuals and businesses are benefitting from MAN infrastructure so far[114], suggesting an average cost per user of €300. It is recognised that the MAN investment is targeted at serving population centres rather than dispersed populations which improves the business case of the MAN investment, but there is still considerable long term benefit yet to be realised. These computations do not take into account the future take-up of services via the MANs, which are likely to deliver for decades[115], as well as providing backhaul and helping deliver next generation broadband through fibre deployment to the cabinet/home.

On the other hand the NBS delivering a wireless service for just three years has had a total exchequer cost of €79.5 million, with a net cost of €44 million after EU refunds. The objective of the NBS is to provide basic broadband access to 234,000 premises through the deployment of mast infrastructure (and occasionally satellite) for three years only (expires August 2014). When the scheme commenced there was a projected customer base of 68,000 by 2014. Based on this, the average cost will be €1,169 per user (3.9 times that of the MAN infrastructure[116]). However by August 2012 there were only 41,000 customers indicating a cost per user of €1,939 (6.4 times that of the MAN infrastructure). On a best case scenario, with 100% take-up across the entire 234,000 premises (which is unlikely), the average cost per user would be €339.7, still higher than the current cost per user of the MANs, with the longer lifespan of the MANs not taken into account.

The NBS (along with RBS) is serving a different need, an immediate gap in service provision and aims to ensure universal access to a broadband service. Wireless delivery is and will continue to be important in serving remote areas. While take-up has been low, there is some evidence that market operators have moved into some areas to provide a service and therefore the State investment has helped induce competition in areas where none existed. The physical network of masts built under the NBS (though not owned by the State) will be able to facilitate future delivery of higher speed broadband, though the potential speeds will be less than that available with fibre deployment.

111 http://publicspendingcode.per.gov.ie/d-standard-analytical-techniques/

112 http://www.dttas.ie/viewitem.asp?id=11801&lang=ENG&loc=1512 Department of Transport Guidelines on a Common Appraisal Framework. June 2009

113 http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=dsti/iccp/cisp(2009)2/final

114 Figures presented to the Oireachtas Committee on Public Accounts, 17 May 2012. The view was also expressed that MAN infrastructure will be important in future delivery of services and in helping rollout NGB in smaller towns. A previous VFM report (by DCENR) had questioned the investment in MANs but it is now widely regarded that this was premature. Take-up of services could be expected to be slow initially. http://debates.oireachtas.ie/ACC/2012/05/17/00005.asp

115 This is acknowledged in the Value for Money and Policy Review of the Metropolitan Area Networks (Phase 1), Department of Communications Energy and Natural Resources, June 2008, p.17.

116 These figures were presented to the Oireachtas Committee on Public Accounts. 17 May 2012. http://debates.oireachtas.ie/ACC/2012/05/17/00005.asp

In considering State investment in next generation broadband delivery it would be preferable to invest in future proofed legacy infrastructure, preferably State owned and on an open access basis which will promote competition and provide better value for money over the longer term. Investing in fibre networks is likely to be a better long term investment when the wider economic and social benefits are considered. This will be more cost effective than subsidising a short term service with a more limited infrastructure build and a shorter life span.

As noted earlier as bandwidth demands increase, wireless technologies will be seen as complementary to, rather than a substitute for, fibre networks. While speeds of 30Mbps may seem more than sufficient now, speeds of 150Mbps are currently on sale in some cities in Ireland. In addition, based on the experience of ever increasing speeds and the range of applications which can be used, it is very unlikely that 30Mbps will be sufficient in the future. Fibre networks will not be suitable for all areas but investment should be guided by a principle of deploying fibre as extensively as possible.

5.4 Summary

Government policy, in ensuring access to next generation broadband throughout the country should recognise the range of applications and industries which require next generation access, the ever increasing bandwidth requirements and the long term value of investment in network infrastructure. While the immediate timeline is to ensure achievement of the DAE targets by 2020, the infrastructure required to support this will be generating benefits far beyond 2020. Policy should therefore aim to support as widespread deployment of fibre as possible. Though it may require additional investment, fibre to the home or kerb should be the preferred technology because it will ensure the best return to the State and national economy over the medium to long term.

The case for the wider rollout of fibre is likely to be stronger if considerations like the appropriate evaluation period and the wider economic and social benefits are included. These returns will include the wider economic benefits of better positioning in the global knowledge economy, job creation and enterprise development all supported by quality, future proofed broadband. The fibre network will not be universal, and more rural areas are likely to use a variety of technologies such as wireless and satellite to access next generation services, but fibre should be as extensive as possible. If centres in the Western Region are to compete, retain and attract investment and support job creation, investments in various technologies, including fibre networks, must be made so that the Region is not disadvantaged in its broadband capacity and quality of service.

Section 6

What is to be Done? Conclusions and Recommendations

6. What is to be Done? Conclusions and Recommendations

6.1 Conclusions

While broadband is regarded as a basic utility for both individuals and businesses, the imperative now is to ensure next generation broadband is provided to all areas of the country. New product development and online service delivery requires increased bandwith which means that basic minimum speeds are no longer acceptable and next generation speeds are required. The following sets out the recommendations to support next generation deployment and ensure a better return on State investment.

The SME sector needs competitively priced quality broadband services to enable it to trade internationally. The case studies from the Western Region demonstrate the extent of international trade within the SME sector and that broadband is a prerequisite in enabling this. While improved broadband speeds are a national issue, it is particularly important to ensure next generation broadband for rural businesses and those needing to trade online. Technology can reduce distance to market for more peripheral locations but only where quality services are available at a competitive price. It is imperative that smaller centres are not disadvantaged with inadequate next generation services.

There are many examples of Government policy in other countries supporting the delivery of next generation broadband in less populous areas and where there is market failure. Examples tried and tested elsewhere should be used to inform rollout of the NBP. Where possible, fibre to the home or kerb is the preferred technology and is likely to yield greater long term benefits. In deploying universal next generation broadband wireless and fibre technologies are complementary, though fibre is likely to be a better long term investment when the wider economic and social benefits and the longer term benefits are considered. The following recommendations will, if implemented, help ensure more extensive future proofed next generation broadband throughout the country and especially to areas outside the largest urban centres. This will help facilitate regional and rural enterprise development and job growth and position the Western Region and rural areas for sustained long term economic growth.

6.2 Recommendations

1. The areas depicted in aqua green in Map 1 (see page 28) are the NBS areas and are considered to be areas with low coverage and little expectation of new commercial investors. After August 2014 the current NBS will cease, though the mast (wireless) infrastructure will remain and can be used for the deployment of next generation services. It is likely that many parts of these NBS areas will continue to require further Government support in the provision of services. **While much of the delivery is likely to be via wireless technologies, there are places which are relatively densely populated (e.g. towns over 1,500) and may benefit more from investment in longer term legacy infrastructure such as fibre networks.** Investing for the long term in fibre infrastructure, to be available on an open access basis, will help induce market entry and reduce the need for future subsidised next generation services in these areas.

2. The lime green areas are those outside the principal urban centres but not very rural areas, and are likely to include many urban centres and some county towns including towns with a population greater than 1,500 (blue dots) as depicted in Map 1 (see page 28). In so far as possible and bearing in mind the longer term benefit, **further State investment should be used to deploy fibre networks to these areas.** Fibre deployment to these areas will be necessary to ensure the Programme for Government commitment of delivering fibre to the home or kerb for 90% of homes and businesses is met.

3. Government policy should recognise the ever increasing bandwidth requirements and the long term value of investment in fibre network infrastructure. While the immediate timeline is to ensure achievement of the Digital Agenda for Europe (DAE) targets by 2020, the infrastructure required to support this will be generating benefits far beyond 2020. The case for the wider rollout of fibre is likely to be stronger if the appropriate evaluation period and the wider economic benefits are considered. **An immediate investment requirement is to build MANs in the five remaining NSS centres**, four of which are in the Western Region (Tuam, Castlebar, Ennis and Shannon). This will improve the attractiveness of these locations for industry and strengthen their role as economic drivers for their rural hinterlands as well as supporting fibre to the home or kerb in these centres.

4. If Ireland is to achieve the DAE target of universal broadband by 2013 then the **RBS and NBS** must be rolled out fully and comprehensively with an emphasis on ensuring **consistent delivery of a service with a basic minimum speed** rather than services based on headline or advertised speeds. The use of 'headline' speeds, which are often not achievable, cause customer confusion and can engender customer dissatisfaction. Targets should be based on minimum standards of speed and service.

5. For those not availing of online services (due to access, cost or other reasons) ever increasing online delivery makes it difficult for these citizens to access services. **Alternative means of accessing services**, especially in smaller centres and more rural areas must continue to be made available.

6. The mapping exercise to be undertaken by DCENR will serve as the baseline for next generation broadband deployment. As industry investment plans are a 'best case' scenario **progress towards achieving these industry targets should be monitored and assessed** on a regular basis. Regular monitoring can help direct Government investment plans more efficiently and effectively, ensuring that next generation broadband is delivered to regional and rural locations as quickly as possible.

7. The indigo areas in Map 1 (see page 28) are those areas being served by the commercial providers and it is likely they will roll out next generation services and therefore there will be no need for State intervention in these areas. While the actual detail will be identified by the DECNR mapping exercise, these centres are the most highly populated, amounting to approximately 50% of the population. From a Western Region point of view it will be important to ensure that in those centres **there is sufficient network infrastructure capacity and service competition** to ensure that regional business are not disadvantaged with higher regional broadband costs than elsewhere in Ireland.

8. Policy needs to support market entry by new entrants and smaller players. Improving access to existing State-owned telecommunications networks can help. Regulation ensuring open access arrangements for all State owned telecommunications assets (for example MANs, ESB/ Eirgrid networks, CIE, NRA, Bord Gáis and RTE networks) will help promote market entry and competition. This is particularly important in regional locations where there is more limited market activity. Smaller industry operators can deliver services profitably in less densely populated areas but policy needs to support their market entry. **Government policy should support open access arrangements for MANs and all State owned networks which could help new and smaller entrants operating in regional locations and promote services at competitive prices.** Greater use of MAN and other State owned infrastructure will also yield a greater return on State investment to date.

9. State telecommunications assets are important in helping to bridge the gap between market provision of services and the need for additional State investment. The sale of some State assets is being considered, for example CIE's fibre-optic telecoms network which extends across the country's rail lines. **Options should be explored which would allow retention of State ownership so that these assets can be used to help deliver next generation services, especially to regional and rural areas with more limited market activity.** Ways to maximise revenue streams from the lease of such assets should also be examined. If the sale of State assets is to proceed then some sale proceeds should be ring-fenced for the Government to support next generation deployment in more regional and rural areas.

10. The regulator (ComReg) is mandated to regulate access to networks so as to develop effective choice for consumers. As such the role of the regulator can be particularly useful in areas where there is more limited competition. It is welcome that the Minister has requested that the regulator takes a holistic economic view which could reduce the cost of ownership of spectrum licences where operators are mandated to build in more rural areas[117]. **This practice of taking a wider holistic view, and in so far as possible, capturing all benefits, individual and societal, immediate and over the longer term should become universal practice in guiding State investment decisions.**

11. The review and update of spectrum policy, due in 2013, should take into account the particularly important role of wireless technologies and spectrum in deploying next generation broadband to rural areas. **Regulation should fully support the deployment of wireless technologies to ensure next generation delivery as extensively and quickly as possible.**

12. DCENR is to identify funding sources for a State led investment in broadband[118]. One option is the Connecting Europe Facility (CEF) which has allocated €9.2 billion for the development of high-speed broadband networks and associated services[119]. This funding will include debt and equity instruments as well as grants and is targeted at the private sector as well as regional and local authorities. The EC is consulting on the guidelines to be adopted in December 2012 and there is an intention to simplify the current guidelines and ease the conditions for investment in rural areas[120]. The guidelines also note that in less developed regions, Structural and Cohesion funding will be the primary source of support for the deployment of broadband networks while grants and/or financial instruments from the CEF may complement such support. **It would be important that Ireland is well positioned to access Structural, Cohesion and CEF funding to support investment in next generation deployment in rural areas.**

117 See footnote 3, p.12.

118 See footnote 3, p. 9. This is to be in conjunction with the Department of Public Expenditure and Reform and NewERA.

119 http://ec.europa.eu/budget/reform/documents/com2011_0657_en.pdf

120 http://europa.eu/rapid/pressReleasesAction.do?reference=IP/12/550&format=HTML&aged=0&language=EN&guiLanguage=en

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