# PROJECT KELVIN - DIRECT INTERNATIONAL COMMUNICATIONS LINK

## EVALUATION 2015 – FINAL



**Cogent Management Consulting LLP**

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**PROJECT KELVIN - DIRECT INTERNATIONAL COMMUNICATIONS LINK**

**EVALUATION 2015**

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# Glossary of Terms

| Abbreviation/ Term | Definition |
|---|---|
| Availability | The fraction or percentage produced by dividing the time when an end-to-end circuit is available by the total time in the period of measurement. The circuit is considered to be not available when no data is received at the final end point or when the quality of the signal is unacceptable or when there is more than 10 consecutive severely errored seconds. |
| Backbone route | A backbone is a larger transmission line that carries data gathered from smaller lines (spurs) that interconnect with it |
| Backhaul | Backhaul refers to the core infrastructure required to transfer the aggregated data from one core point to another. Normally core points are located on a ring topology and the ability to get from one point, or node, to another is referred to as the backhaul capability. |
| Benchmark Price | The agreement between DETI/DCENR and Hibernia stated *that "at the end of each Service Year, and in respect of each Service Month during that Service Year, the Contracting Authority should compare the Service Provider's Maximum Product Price for each Mandatory Product between each of the Mandatory Locations and Hudson Street, New York against the Benchmark Price for that Mandatory Product in that Service Month".* |
| Carrier Neutral | Open to all customers to access and use on a non-discriminatory basis, including as to the technology that is required to connect to that telecoms infrastructure or service. |
| Cloud | The cloud is the collective group of software and data facilities available online, operated remotely in technology centres, not owned by individuals or companies but accessed on a need-to-use basis. |
| CPD | Central Procurement Directorate |
| Dark Fibre | A 'dark fibre' or unlit fibre is an unused optical fibre, available for use in fibre-optic communication. Dark Fibre refers to the increasingly common practice of leasing fibre optic cables from a network service provider. The active network equipment required to support services over the Dark Fibre is provided by the entity leasing the Dark Fibre. |
| DCENR | Department of Communications, Energy and Natural Resources |
| DETI | Department of Enterprise, Trade and Investment |
| DWDM | Dense Wavelength Division Multiplexing (DWDM) is optical technology used to increase bandwidth over existing fibre-optic backbones. |
| EC | European Commission |
| ERDF | European Regional Development Fund |
| EU | European Union |
| FDI | Foreign Direct Investment |
| FTE | Full Time Equivalent |
| Gbit/s | Gigabit per second |
| GDP | Gross Domestic Product |
| GPT | General Purpose Technology |
| ICT | Information and Communications Technology |
| ITT | Instructions to Tenderers |
| MAN | Metropolitan Area Network |
| Mb | Megabit |
| Mbit/s | Megabit per second |
| MEAT | Most Economically Advantageous Tender |
| MNC | Multinational Company/ Corporation |
| Msecs | Milliseconds |
| North West Region (of the island of Ireland) | For the purposes of this report, the North West Region (of the island of Ireland) is defined as the area which was eligible for funding through the INTERREG IVA Programme and was therefore the focus of the Departments for Project Kelvin. This area includes the six Counties of NI and the six Border Counties (Cavan, Donegal, Leitrim, Louth, Monaghan and Sligo). |
| Point of Interconnection (PoI) | A Point of Interconnection (PoI) is a location at which the physical interconnection between two or more different carriers/network operators can be provided. Project Kelvin is considered to be about point to point connectivity that can use different networks to provide the full end to end circuit. |
| Resilience | Inherent reliability, security against obvious external threats and the capability to withstand some degree of damage |
| Saturn Ring | Virgin Media (formerly ntl:Telewest) operates the Saturn fibre network which linking a number of towns and cities in NI including Belfast and Derry~Londonderry. The Saturn network includes twelve PoIs across NI. |
| SEUPB | Special EU Programmes Body |
| Spur route | A spur route is a usually short route forming a branch from a longer, more important backbone route. |
| Switched Hop | A 'hop' is one portion of the path between the source and the destination of a package of data. Each time the data packet moves to a new portion of the path a 'switched hop' is required. At each switched hop faults can occur and delays occur which lowers the overall resilience and latency of the path. |
| Telecom(s) | Telecommunication(s) |

# 1 INTRODUCTION AND BACKGROUND

## 1.1 Introduction

The Department of Enterprise, Trade and Investment (DETI) in Northern Ireland (NI) and the Department of Communications, Energy and Natural Resources (DCENR) in the Republic of Ireland (RoI) (hereafter jointly referred to as 'the Contracting Authority' or 'the Departments') have commissioned Cogent Management Consulting LLP ('Cogent') to undertake an Interim Evaluation of the Direct International Communications Link ('Project Kelvin') into the North West region of the island of Ireland[1].

This section of the report considers the background of Project Kelvin, including:

- The roles of the Departments and the strategic and policy context within which these roles sit;
- The background to the Project; and
- The requirements of the Contracting Authority and the methodology employed by the Evaluation Team to fulfil those requirements.

## 1.2 DETI and DCENR Role in Telecommunications

### *1.2.1 Introduction*

In recent decades, there has been an exponential rise in the usage of broadband[2] and it is estimated that by the end of 2014 approximately 2.9 billion people (representing 40% of the global population) were online[3]. At current growth rates, it is estimated that half of the global population will by online by 2017 and that the number of networked devices could exceed 25 billion by 2020. There is therefore a global agenda to provide adequate digital infrastructure and to promote optimal usage of digital technologies to support this rapid growth and to maximise the realisation of potential benefits on a global scale.

A wide range of EU, UK, NI and RoI strategies and policies recognise the economic and social benefits which can be derived from optimal digitisation and the role that Governments can play in enhancing the provision and usage of telecommunications infrastructure.

Project Kelvin sought to align with, and contribute towards the achievement of the strategic objectives and imperatives that existed (or continue to exist) throughout its development, construction and operational phases. In particular, the Evaluation Team has identified the following strategies and stakeholders as having strategic relevance to Project Kelvin:

[1] For the purposes of this report, the 'North West region'/ 'North West region of the island of Ireland' is defined as the area which was eligible for funding through the INTERREG IVA Programme and was therefore the focus of the Departments for Project Kelvin. This area includes the six Counties of NI and the six Border Counties (Cavan, Donegal, Leitrim, Louth, Monaghan and Sligo) of the Republic of Ireland.
[2] In telecommunications, broadband is a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types. The medium can be coaxial cable, optical fibre, twisted pair, or wireless broadband (wireless broadband includes Mobile broadband).
[3] International Telecommunication Union (ITU) – Facts and Figures 2014

| Table 1.1 - Policy/ Strategies Considered | |
|---|---|
| | **Policy/ Strategy** |
| European Strategies | European Commission Europe 2020 |
| | European Commission Digital Agenda for Europe 2010 |
| UK Strategies | DBIS and DCMS National Broadband Strategy – Britain's Superfast Broadband Future 2010 |
| Cross-Border Strategies | InterTradeIreland Comprehensive Study of the All-Island Economy 2006 |
| | INTERREG IVA Programme |
| NI Strategies | NI Programme for Government 2008-2011 and 2011-2015 |
| | NI Executive Investment Strategy for Northern Ireland (ISNI) 2008-2018 & 2011-2021 |
| | DRD 'Shaping our Future: The Regional Development Strategy for Northern Ireland 2025' |
| | Economic Vision for Northern Ireland (2004) |
| | NI Executive Economic Strategy |
| | DETI Corporate Plan 2008-2011 and 2011-2015 |
| | Invest NI Corporate Plan 2008-2011 and 2011-2015 |
| | DETI Telecommunications Action Plan for NI 2011-2015 |
| | ILEX Regeneration Plan and The One Regeneration Plan for Derry~Londonderry |
| RoI Strategies | National Development Plan 2007-2013 |
| | DCENR Delivering a Connected Society: A National Broadband Plan for Ireland 2012 |
| | DCENR Enabling a Connected Society: Report of the Next Generation Taskforce 2012 |
| | DCENR Doing More with Digital: National Digital Strategy for Ireland 2013 |

Appendix I provides a brief discussion on each of these documents, identifying their specific relevance to Project Kelvin. However, in summary, the strategy/ policy review identifies the importance that the various government stakeholders placed, and continue to place, on driving forward telecommunications (telecoms) infrastructure in order to grow the overall economy. Across the range of strategies and policies considered, the following key themes emerge:

- The development of modern and efficient telecommunications (hereafter referred to as 'telecoms') infrastructure is critical to a country/region's future macroeconomic growth, competitiveness and social development.
- Telecoms provision dictates how a place can relate to, and integrate with, the wider global environment and economy and it was and is therefore essential that the North West region of the island of Ireland offers comparable provision with other regions of the UK and RoI.
- The small size and peripheral location of the North West region of the island of Ireland has presented particular challenges in ensuring that resident businesses and communities can benefit from a competitive and sustainable telecoms infrastructure.
- There is a need for enhanced, cross-border co-operation including in the provision of key infrastructure, such as telecommunications.
- Enhanced telecommunications infrastructure on a cross-border basis has the potential to encourage increased foreign direct investment (FDI) and encourage indigenous businesses to continue to operate within the island of Ireland.
- In particular, direct telecommunications linkages to North America and Europe have the potential to improve the attractiveness of the North West region as a base for knowledge-based industries such as high-technology and financial services, which work in these key markets.
- Furthermore, a direct telecoms linkage sends out a strong marketing message to multinational companies/ corporations (MNCs) about the capability and sophistication of the North West region as an investment location.
- Improved telecoms offers potential to grow indigenous businesses through increased competitiveness and lower costs and is of particular importance to the emerging digital sector in the North West region.

In summary, our analysis indicates that there was, and continues to be, widespread recognition (both within NI and RoI) of the vital role that investment in telecoms infrastructure can play in moving the economies of both jurisdictions (NI and RoI) onto a strong growth trajectory, and also in ensuring that the residents of peripheral areas such as the north west of the Island are not disadvantaged from a social and cultural perspective.

### *1.2.2 Rationale for Investment in the North West Region*

The North West region of the island of Ireland has historically received disproportionately low levels of inward investment, partially as a result of its peripherality and the legacy of the Northern Ireland Conflict. Furthermore, the 2001 and 2011 Censuses showed levels of unemployment in the North West region (and in particular Donegal, Derry~Londonderry and Strabane) to be higher than the average unemployment levels across NI and RoI and these same areas have been statistically shown to be amongst the most deprived areas on the island of Ireland based on the Northern Ireland Multiple Deprivation Measure and the Haase-Pratschke Affluence / Deprivation Index.

This cycle of low investment and high unemployment is recognised as a driver for social and political instability and economic imbalance. As such, there is a recognised need to break the cycle by creating meaningful employment opportunities for marginalised people on both sides of the Border and ultimately to address the economic and social disadvantage demonstrated within the North West region.

Recognising this need, both the NI and RoI Governments have policy agendas to invest in the North West region to make the region more attractive and competitive for small businesses, large MNCs and those high-value industries which will make the region more economically sustainable in the long-term.

### *1.2.3 Role of DETI and DCENR*

Recognising the strategic imperatives, one of DETI's responsibilities in NI is the delivery of telecommunications policy. DETI works closely with the telecoms industry to encourage the development of telecoms infrastructure across NI and works in cooperation with DCENR to develop telecoms infrastructure on a cross-border basis.

Correspondingly, DCENR is responsible for policy initiatives in the communications sector in the RoI and for publicly funded interventions in the telecoms market where the private sector is not able to deliver the necessary telecoms infrastructure.

Both Departments recognise the importance of working together to develop policy and deliver initiatives relating to telecoms infrastructure in the North West region of the island of Ireland in order to rebalance the regional economy.

## 1.3 Background to Project Kelvin

### 1.3.1 *Introduction*

Recognising the strategic and economic importance of world-class telecoms infrastructure, the Contracting Authority commissioned a number of studies to assess the feasibility of a proposal to construct a direct international telecoms link into the North West region of the island of Ireland which would directly link the region to one or more major international telecoms hubs based outside the UK and Ireland. The key reports prepared during the development of Project Kelvin were as follows:

- 'DETI Direct International Connectivity Feasibility Study' (PA Consulting on behalf of DETI, April 2007);
- 'Independent Assessment and Review of Project Kelvin - North West Direct International Connectivity' (Grant Thornton on behalf of SEUPB, April 2008);
- 'Notifications of State Aid' (DETI and DCENR, June 2008); and
- 'Project Kelvin – Business Case and Economic Appraisal' (Colin Stutt Consulting on behalf of DETI, November 2008).

This section provides an overview of key findings drawn from these reports and of the development of Project Kelvin.

### 1.3.2 *International Telecoms Infrastructure Prior to Project Kelvin*

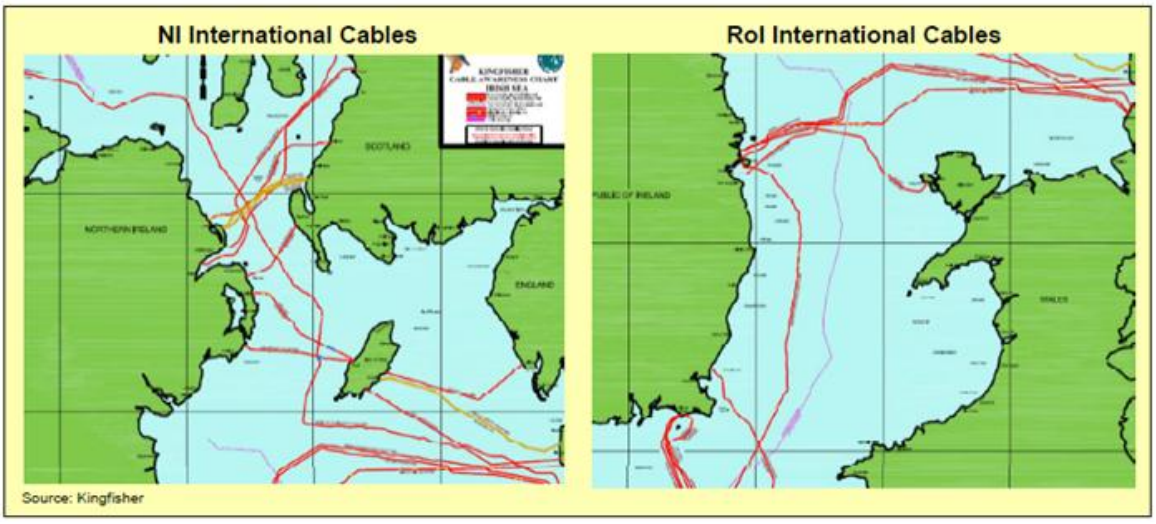
The 2007 Feasibility Study assessed the Island's existing (at that time) telecoms infrastructure prior to Project Kelvin in order to identify any deficiencies in provision, which might subsequently underpin the need for intervention.

This report identified that throughout the mid-to-late 1990s and into the early 2000s there had been sustained exponential growth in global telecoms and internet usage. In turn, this growth in usage had spurred global investment in submarine cable infrastructure linking continents to enhance international connectivity, including extensive infrastructural works undertaken to create inter-continental connectivity between Europe and North America. The majority of the submarine cabling laid connected the New York area in the USA to the Devon and Cornwall area in England (where subsequent onward linkages were made with mainland Europe). These submarine cables provided low latency[4] international connectivity between Europe and the USA and contributed towards the global competitiveness of telecoms hubs such as London and Amsterdam.

Prior to Project Kelvin, there were 15 submarine cable systems from the island of Ireland (6 connected to NI and 9 connected to RoI). However, all but one connected directly from the east coast of Ireland into Great Britain and used terrestrial (land-based) network systems to get to the exit point and onto the North-Atlantic cable systems that ran out from the south coast of England. One system (the Hibernia-South system) linked Southport in England to Dublin and onwards to North America and provided the only direct international telecoms link to the USA from the island of Ireland.

The following chart illustrates the international submarine cables from the island of Ireland which existed prior to the development of Project Kelvin[5]:

**Figure 1.1: Island of Ireland International Submarine Cables (2007)**




At that time (2007), there was (and still is) only one submarine cable system which passes over the North Coast of the Island. This cable system, the Hibernia-North system, is operated by Hibernia Networks (hereafter referred to as 'Hibernia')[6]. The Hibernia-North system connects Halifax in Canada to Southport in England and then loops back from Southport to Dublin, where it connects to the Hibernia-South system and onwards to North America. Prior to Project Kelvin there was no direct linkage from the Hibernia-North system to the North Coast of the island of Ireland. Instead the cable

[4] Latency is defined in the Invitation to Tender for Project Kelvin (Schedule 1) as *"the time taken for data to complete a round trip from the point of origination to the point of termination and back again to the point of origination"*. Latency of a connection has a significant impact on the types of applications that can be run across the connection.
[5] Source: Kingfisher cited in PA (2007) 'DETI Direct International Connectivity Feasibility Study - Final Report'
[6] Hibernia Networks was known as Hibernia Atlantic during the development and implementation of Project Kelvin and rebranded in January 2012.

passed within 30-35km of the North Coast of NI and onwards to England as shown in the left-hand map image within Figure 1.1.

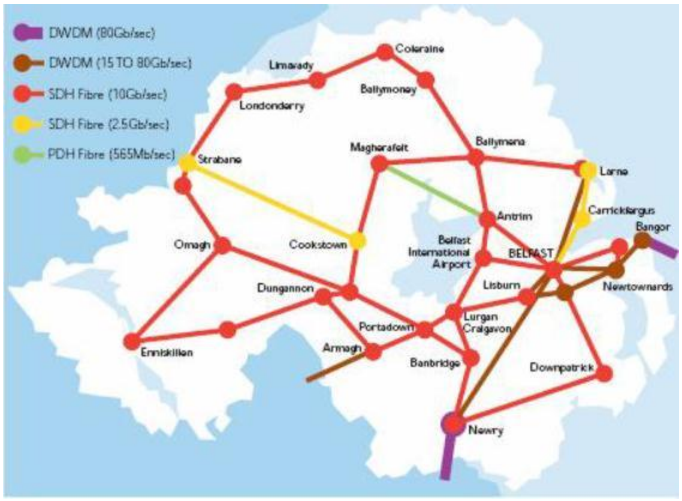
The Feasibility Study identified the Hibernia-North system to be the most accessible and cost effective infrastructure by which to provide direct international telecoms connectivity to the North West region of the island of Ireland.

### 1.3.3 *Terrestrial Telecoms Infrastructure Prior to Project Kelvin*

Over recent decades there has been significant and ongoing investment in terrestrial telecoms infrastructure in NI (both through private and public funding) which has provided a relatively extensive terrestrial network throughout NI. Prior to Project Kelvin, the networks were delivered by five main network providers (BT, NTL[7], Bytel, eir[8] and Cable & Wireless[9]). BT had the most extensive network and NTL also maintained a complete ring structure throughout NI.

Figure 1.2 illustrates NI's core terrestrial telecoms infrastructure prior to Project Kelvin[10]:

**Figure 1.2: NI Core Terrestrial Infrastructure (2007)**




Within RoI, eir was the primary telecommunications provider prior to the implementation of Project Kelvin, with an extensive network throughout the country and a number of connections on a cross-border basis, including connections from Belfast to Dublin via Newry and Dundalk and from Letterkenny to Derry~Londonderry. The other major operator along the Border Region was ESB Telecoms. It is understood that ESB Telecoms connects to 13[11] of the Republic of Ireland's 94 metropolitan area networks (MANs), including the provision of backhaul connectivity for Letterkenny, Sligo, Cavan, Dundalk and Drogheda.

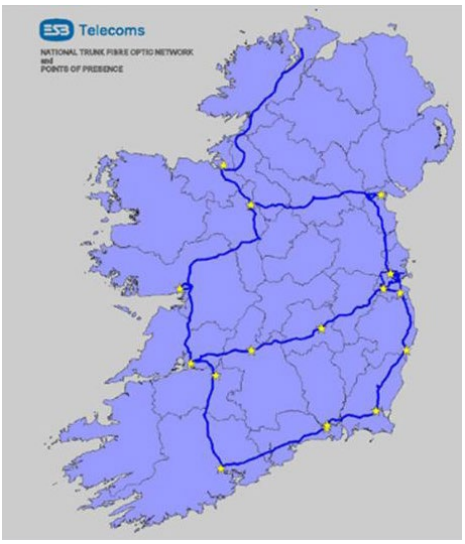
[7] It should be noted that NTL / NTL-Telewest is now branded as Virgin Media.
[8] Previously eir
[9] Cable & Wireless was subsequently taken over by Vodafone.
[10] Source: DETI cited in PA (2007) 'DETI Direct International Connectivity Feasibility Study - Final Report'. Please note that baseline maps showing the infrastructure for each provider prior to Project Kelvin are attached as Appendix II.
[11] Wexford, Waterford, Cork, Limerick, Portlaoise, Galway, Roscommon, Carrick on Shannon, Sligo, Letterkenny, Cavan, Dundalk and Drogheda.

Figure 1.3 illustrates the current eir and ESB Telecoms networks throughout the island of Ireland (although it is understood that the ESB Network remains unchanged from its position prior to Project Kelvin)[12].

**Figure 1.3: eir and ESB Telecoms Networks**

**eir Telecoms Network**


**ESB Telecoms Network**




### *1.3.4 Deficiencies in the Provision Prior to Project Kelvin*

As previously noted, prior to Project Kelvin there was no direct international telecoms link to the North West region of the island of Ireland (or to any part of Northern Ireland). As such, bandwidth from the North West (e.g. Derry~Londonderry) was required to make more 'switched-hops'[13] to reach North America than equivalent bandwidth from Belfast or Dublin. The 2007 Feasibility Study noted that data travelling from Derry~Londonderry would have made approximately 20 switched hops to reach New York including six from Derry~Londonderry to Belfast (Limavady, Coleraine, Ballymoney, Ballymena, Antrim and Belfast) plus an additional 10-15 through GB to reach the trans-Atlantic crossing cable which provided a single hop to the landing point in New York.

There is an inverse relationship between the number of switched-hops and the level of resilience[14] and latency of a telecoms connection. As such, the international connectivity in the North West region was less reliable and slower than for the East of the island.

Furthermore, whilst the terrestrial telecoms connectivity in NI was considered to be relatively extensive prior to Project Kelvin, there was minimal competition in many areas, with BT having a dominant position as the incumbent operator throughout NI. Similarly, in many areas of the border counties of RoI, eir was the only provider (typically either eir or ESB Telecoms) and there was very limited competition in the market.

Poor connectivity and limited levels of competition in certain areas had also resulted in a disparity in the cost of bandwidth connectivity between the East and the West of the island, with the cost of regional

[12] Sources: http://www.eircomwholesale.ie/Our_Network/ and http://www.esbtelecoms.ie/infrastructure/national_fibre_optic_network.htm

[13] A 'hop' is one portion of the path between the source and the destination of a package of data. Each time the data packet moves to a new portion of the path a 'switched hop' is required. At each switched hop faults can occur and delays occur which lower the overall resilience and latency of the path.

[14] Resilience is defined in the Invitation to Tender for Project Kelvin (Schedule 1) as *"inherent reliability, security against obvious external threats and the capability to withstand some degree of damage"*.

backhaul[15] connections from Belfast to Dublin (estimated to be £3,500 per megabit (Mb)[16]) being significantly lower than the corresponding cost of bandwidth connections from Derry~Londonderry to Belfast (estimated to be £7,000 per megabit (Mb)[17]. This drove up the cost of telecoms for service providers and high-bandwidth users based in the North West as compared with those based on the East of the island.

The table below summarises the costs of regional backhaul and onward international connectivity from the North West in 2007 as compared with London, Dublin and Belfast[18]:

| Table 1.2 – Cost Comparison for International Telecoms Connectivity (2007) | | | |
|---|---|---|---|
| **Components of Cost** | | **Cost per Mb (£)** | |
| **Connection From** | **To** | **Via London** | **Via Dublin** |
| London | New York | 500 | - |
| Dublin | New York | - | 500 |
| Belfast | London | 2,500 | - |
| Belfast | Dublin | - | 3,500 |
| Derry~Londonderry | Belfast | 7,000 | 7,000 |
| | | | |
| **Applying these components of cost to different connections to New York produces the following costs:** | | | |
| From London/ Dublin | | 500 | 500 |
| From Belfast (Belfast – London/ Dublin – New York) | | 3,000 | 4,000 |
| From Derry~Londonderry (Derry~Londonderry-Belfast-London/ Dublin-New York) | | 10,000 | 11,000 |

Based on this analysis, it can be seen that the cost of backhaul and onward connectivity from Derry~Londonderry to New York (£10,000 to £11,000) was 20 to 22 times more costly than international connectivity direct from London or Dublin (both £500) depending upon which route was used. Indeed, NI was generally at a disadvantage, with costs from Belfast to New York (£3,000 - £4,000) being 6 to 8 times higher than the corresponding costs for London or Dublin to New York. As such there was an evident need to encourage competition and provide the infrastructure required to enable NI to compete with hubs such as Dublin and London.

The inequality was further exacerbated towards the North West region with costs in Derry~Londonderry being approximately three times higher than the equivalent costs from Belfast.

It should be noted that in December 2007 (following the finalisation of the Feasibility Study), a major telecommunications operator on the Island confirmed to the Contracting Authority that it had agreed new prices for a 2Mb link to New York (utilising the existing infrastructure) which were as follows:

| Table 1.3 – Prices for International Connectivity (2007) | | |
|---|---|---|
| **Location** | **Yearly rental (of a 2MB telecoms link to New York)** | |
| | **(£)** | **(€)** |
| Within 40km of Belfast, Derry~Londonderry and Portadown | 18,522 | 23,104 |
| Letterkenny | 36,156 | 45,100 |
| Monaghan | 33,216 | 41,433 |

The State Aid notification further reported that an international telecommunications operator[19] had quoted an annual price of €38,820 for an annual 2Mb link from Letterkenny or Monaghan to New York.

[15] Backhaul refers to the core infrastructure required to transfer the aggregated data from one core point to another. Normally core points are located on a ring topology and the ability to get from one point, or node, to another is referred to as the backhaul capability.
[16] As per the analysis in the 2007 Feasibility Study and 2008 Business Case and Economic Appraisal reports
[17] ibid.
[18] Based on analysis included within PA (2007) 'DETI Direct International Connectivity Feasibility Study - Final Report'.
[19] This company was a further telecoms provider which was utilising some of the existing infrastructure throughout RoI prior to Project Kelvin.

Whilst it is not possible to directly relate these annual rental charges quoted by the major telecommunications operator on the Island (Table 1.3) to the figures produced by PA Consulting (as per the Feasibility Study and shown in Table 1.2), it was the view of the Departments that the revised pricing *"did not undermine the rationale for Project Kelvin…and did not remove the adverse effect of the border on telecommunications costs*"[20].

The previous discussion indicates that prior to Project Kelvin there was a general lack of high quality (in terms of resilience and latency) telecoms infrastructure in the North West region of the island of Ireland, and particularly in relation to international connectivity. These deficiencies, allied with the significantly higher costs for bandwidth, resulted in the region being unable to compete with other regions of the UK and Ireland in terms of telecoms connectivity and as such was considered to have led to the region being significantly economic disadvantaged.

Looking more broadly at the island of Ireland, prior to Project Kelvin there was only one direct international telecoms link (Hibernia-South) which resulted in a relatively low resilience to major failures as a result of external factors such as damage to the network or security threats in the South of England. UK carriers' networks are now required by Ofcom[21] to offer 99.999% availability[22], which would not have been possible (within the Island of Ireland) in the absence of a second international telecoms link from the island of Ireland.

### *1.3.5 Anticipated Benefits*

It was envisaged that the following technical and economic benefits could potentially be achieved through the implementation of Project Kelvin:

**Table 1.3 Proposed Benefits of Project Kelvin**

| Type of Benefit | Projected Benefit | Commentary |
|---|---|---|
| Technical Benefits | Latency Reduction | It was proposed that the provision of a direct international telecoms link could reduce latency between the North West region (of the Island of Ireland) and North America by up to 25%. |
| | Single Point of Failure Reduction | By reducing the number of switched-hops, it was anticipated that the risk of a single point of failure in transmission would be reduced. |
| | Increased Resilience and Security of Supply | The provision of a second direct international telecoms connection aimed to provide a complete ring-structure between Ireland and North America. Therefore the island of Ireland would not be dependent on resilient connectivity via Great Britain; thereby providing increased security of supply. It was envisaged that the ring-structure would potentially encourage businesses based along the Eastern Corridor (e.g. Dublin and Belfast) to utilise Project Kelvin infrastructure to exit the island and achieve greater resilience. |
| Regional Economic Benefits | Cost Reductions for Local Businesses | The provision of a direct international link was anticipated to have a considerable effect on local industry by reducing the costs for regional backhaul and international connectivity. In turn, it was anticipated that businesses would be more profitable and be better positioned to compete on a global scale. |
| | Increased Competitiveness of the Region | By bringing down the costs of doing business in the region, it was anticipated that the region would become more competitive in its ability to attract and retain business. |
| | Providing a Marketing Tool | It was envisaged that the new infrastructure would provide a new impetus and integral marketing tool for the bodies (e.g. Invest NI, IDA Ireland, Enterprise Ireland etc.) tasked with attracting and retaining knowledge-economy industry and investment to the North West region. |

[20] 'Project Kelvin – Business Case & Economic Appraisal' (pp.22, Colin Stutt Consulting, 2008)
[21] Independent regulator and competition authority for the UK communications industry.
[22] Availability is defined in the Invitation to Tender for Project Kelvin (Schedule 1) as *"the fraction or percentage produced by dividing the time when an end-to-end circuit is available by the total time in the period of measurement. The circuit is considered as not available when no data is received at the final end point or when the quality of the signal is unacceptable or when there is more than 10 consecutive severely errored seconds".*

| Table 1.3 Proposed Benefits of Project Kelvin | | |
|---|---|---|
| **Type of Benefit** | **Projected Benefit** | **Commentary** |
| Impacts for the Telecoms Market | Potential to Attract New Competition | It was anticipated that Project Kelvin could serve to attract new operators (and thus enhance levels of competition) to the regional telecoms market by reducing the wholesale cost of international connectivity. The Feasibility Study noted that *"by building a direct international telecoms link, it will reduce costs in the marketplace, which will impact the incumbent's profit, but not drive it out of the market".* |
| | Lower Costs for High Bandwidth Users | Project Kelvin aimed to have a positive impact on the pricing structure for high volume connections, providing end users with more choice, lower prices and better quality. |
| | Impacts for Small Consumers | Whilst smaller end-users were not anticipated to benefit significantly from lower costs as it was anticipated that there would still be high costs required to deliver the tail-end of a circuit to these users, it was proposed that they would benefit from better quality connectivity (in terms of latency and resilience) to international destinations. |

### *1.3.6 Preferred Option*

On the basis of the existing (at that time) infrastructural deficiencies, the proposed benefits and assessment of the technical feasibility of the proposal to develop a direct international telecoms link, the Feasibility Study concluded that there was:

- A need to provide a direct international telecoms link into the North West region of the island of Ireland;
- A need for public sector intervention as the private sector was not anticipated to build such a link and operate it due to the significant investment required and the lack of financial returns anticipated within the investment timescales;
- The project was technically and physically feasible;
- An available supply of submarine cable systems (i.e. the Hibernia-North system);
- An available supply of terrestrial infrastructure to support the connectivity; and
- Business and consumer demand for better quality, choice and availability of telecommunications services, which would be enabled by such a cable.

The Feasibility Study considered options for the proposed development and recommended that DETI should procure a provider to undertake the following works:

1. Development of a spur route[23] cable to interconnect with the existing Hibernia-North submarine cable passing by the North Coast of the island of Ireland;
2. Build a landing point for the cable near Portrush in NI and connect to a local exchange which was already based in Coleraine and represented a Point of Interconnection (PoI)[24] for four telecoms providers; and
3. Purchase dark fibre[25] from an existing carrier to link the local exchange and a permanent exchange centre[26] which was proposed to be located in Derry~Londonderry.

Following the positive Feasibility Study, the Departments submitted a joint application for funding towards Project Kelvin to the Special EU Programmes Body (SEUPB) under INTERREG IVA Priority 2.2 - *Cooperation for a more sustainable cross-border region: Infrastructure: Environment* (see Appendix III for details of this priority).

[23] A spur route is a usually short route forming a branch from a longer, more important backbone route.
[24] A Point of Interconnection (PoI) is a location at which the physical interconnection between two or more different carriers/network operators can be provided.
[25] A 'dark fibre' or unlit fibre is an unused optical fibre, available for use in fibre-optic communication. Dark Fibre refers to the increasingly common practice of leasing fibre optic cables from a network service provider. The active network equipment required to support services over the Dark Fibre is provided by the entity leasing the Dark Fibre.
[26] It was proposed that the permanent exchange centre would provide an international peering point with a data centre. It should be noted that 'peering' is defined as a voluntary interconnection of separate internet networks for the purpose of exchanging traffic between the users of each network.

Subsequently, SEUPB commissioned an Independent Review and Assessment[27] of the Feasibility Study, to identify any gaps and update it where necessary to reflect the then current position (as at April 2008). The report supported the preferred option to deliver a direct international telecoms link into the North West of the Island and recommended that a Letter of Offer should be issued to DETI (as the appointed Lead Department) for funding of up to a maximum of €30m towards the development of a submarine-cable link to the existing Hibernia-North cable and subsequent routing to the Coleraine exchange and backhaul onwards to Derry~Londonderry. A letter of offer was subsequently issued to DETI on 21st July 2008 which awarded DETI €30m of grant funding towards Project Kelvin[28].

### *1.3.7 State Aid Considerations*

In June 2008, the Irish and the UK Governments both notified the European Commission (EC) of the intention to proceed with Project Kelvin. The notifications provided information on the following issues:

- The socio-economic deficiencies demonstrated in the North West (considered to be Coleraine, Limavady, Derry~Londonderry, Donegal and Strabane);
- The rationale for, and specific details on Project Kelvin; and
- The anticipated impacts of the project on the competitiveness of the North West.

On the 9th October 2008, the EC announced that it had approved up to €30m of public funding towards the provision of direct international submarine telecommunications connections to the North West of the island of Ireland.

### *1.3.8 Summary Conclusion*

The Departments recognised that there was a strategic and policy need to collaborate to invest in telecoms infrastructure in the North West region of the island of Ireland to address issues of economic disadvantage. Following a process of technical and economic assessment, it was determined that there was a need for public sector intervention to provide a direct international telecoms link into the North West region and up to €30m of funding was subsequently approved through the INTERREG IVA to enable the Contracting Authority to procure a private sector provider to design and construct the proposed link. Further details on the procurement process and the project delivery and implementation by Hibernia are provided in Section 2 of this Evaluation report.

[27] 'Independent Assessment and Review of Project Kelvin - North West Direct International Connectivity: DETI and DCENR' (Economic Appraisal Grant Thornton UK LLP, 2008)

[28] It should be noted that an Addendum to the original Letter of Offer was issued on 6th August 2009 which was as per the original Letter of Offer with the exception that the Addendum stipulated that documentation relating to Project Kelvin should be retained until 2020 (rather than 2018 as per the original document). A subsequent Addendum was issued on 24th August 2010 which further specified that documentation should be retained until 31st December 2020.

## 1.4 The Contracting Authority's Requirements

In accordance with best practice, DETI and DCENR have commissioned Cogent to complete an Interim Evaluation of the Project Kelvin. The Evaluation must comply with the Northern Ireland Guide to Expenditure, Appraisal and Evaluation (NIGEAE) and include assessment of:

- Economic impact of the project across the eligible region, both directly and indirectly, including:
  - Uptake by businesses;
  - The extent to which Project Kelvin has provided an incentive for new businesses to locate or existing businesses to remain in the eligible region;
  - Details/number of jobs created by the project, directly and indirectly;
  - The extent to which the project has improved linkages with North America and Europe; and
  - Other impacts of Project Kelvin in the region, positive or negative e.g. economic benefits and increase in e-business activity.
- Benefits the project has brought to the telecommunications sector, including how the project complements and links with other telecommunication infrastructure (fixed or wireless) in the eligible region and has been extended to additional towns/areas from those outlined in the original application.
- Extent to which the objectives of the economic appraisal are being met in that the costs of international connectivity in the region are more competitive.
- Have latency and availability obligations been achieved.
- Strengths and weaknesses with the project and key learning points.

## 1.5 Methodology

In completing the Interim Evaluation, Cogent employed a methodology that included:

- A robust desk-based analysis of pertinent materials relating to Project Kelvin, including the contract with Hibernia Networks (hereafter referred to as 'Hibernia') and other related documentation, such as:
  - The Feasibility Study completed by PA Consulting in April 2007;
  - The Independent Assessment and Review of Project Kelvin commissioned by SEUPB and completed by Grant Thornton in April 2008;
  - The Business Case and Economic Appraisal completed by Colin Stutt Consulting in November 2008;
  - Notifications of state aid on behalf of the UK and Ireland member states relating to Project Kelvin;
  - Progress reports collated by SEUPB throughout the development and implementation of Project Kelvin; and
  - A sample of the monthly monitoring reports provided to DETI and DCENR by Hibernia and the corresponding review reports completed by Analysys Mason[29].
- Consultation with the DETI Telecommunications Policy Unit and the DCENR Knowledge Society Division to agree upon the approach to the Interim Evaluation; and
- Consultation with key stakeholders including[30]:
  - Hibernia;
  - Analysys Mason;
  - IDA;
  - Invest NI;
  - SEUPB;
  - Local Authorities;
  - Chambers of Commerce; and
  - Users of the Project Kelvin infrastructure.

[29] Analysys Mason is an independent telecommunications consultancy firm appointed by DETI/DCENR to provide technical advisory services during the construction and operational stages of Project Kelvin.
[30] Please note that a full list of consultees is attached as Appendix IV.

# 2 PROJECT IMPLEMENTATION AND DELIVERY

Section 2 considers the implementation and delivery of Project Kelvin including the procurement process, appointment of Hibernia, implementation of the construction phase and the technical and financial performance.

## 2.1 Procurement Process

### *2.1.1 Invitation to Tender*

Following the successful approval of funding for Project Kelvin, in June 2008 the Departments advertised the Invitation to Tender in the Official Journal of the European Communities. The tender process was managed by Northern Ireland's Central Procurement Directorate (CPD) and the process complied with all relevant European Commission procurement regulations including notification in the Official Journal.

The instructions to tenderers (ITT) stated that the overall objectives of Project Kelvin would be:

- Increased competition in the telecoms market in the INTERREG area;
- Reduced communications latency between North America and the North West by 25%;
- Reduced communications latency between Mainland Europe and the North West;
- The cost of telecoms between North American telecoms hubs and the North West being comparable to those in major UK cities, for example Glasgow and Manchester, as well as Dublin;
- The costs of telecoms between European telecoms hubs, for example Amsterdam, and the North West being comparable to those in the major UK cities, for example Glasgow and Manchester, as well as Dublin; and
- Increased resilience of the telecoms networks in the INTERREG region and the island of Ireland.

The tender documents included a combination of mandatory and optional requirements. The technical performance that the new direct international link had to meet was specified but the evaluation criteria rewarded bids which exceeded the minimum specification. The table overleaf summarises the mandatory requirements as per the ITT.

| | |
|---|---|
| **Mandatory Locations** | Three 'mandatory locations were stipulated in the tender (Derry~Londonderry, Letterkenny and Monaghan) but the evaluation mechanism encouraged bidders to give access to additional towns and cities within the area covered by the INTERREG IVA Programme. |
| **International Connectivity** | The Tenderer's proposed solution was required to include provision for:<br>• A direct international telecommunications connection between the North West and North America (measurable to Hudson Street, New York) using Terrestrial Infrastructure and the Submarine Infrastructure and other infrastructure as necessary; and<br>• An improved international telecommunications connection between the North West of the Island of Ireland and Mainland Europe (measurable to AMS-IX, Amsterdam, Netherlands) using Terrestrial Infrastructure and other infrastructure as necessary. |
| **Terrestrial Infrastructure** | The 'terrestrial infrastructure' proposed by the Contracting Authority consisted of:<br>• The provision of an exchange centre facility in Derry~Londonderry;<br>• Diverse connections between the exchange centre facility and the MANs in Letterkenny and Monaghan;<br>• Terrestrial connection between the submarine landing point and the exchange centre;<br>• Terrestrial connection which would provide resilience to the service. |
| **Submarine Infrastructure** | The 'submarine infrastructure' proposed by the Contracting Authority consisted of:<br>• A new suitable submarine cable that would directly connect the terrestrial infrastructure at one or more suitable Transatlantic submarine cable(s) at a Transatlantic submarine cable's landing point; and<br>• The submarine landing point was required to either be at the coast of either County Antrim or County Londonderry. |
| **Mandatory Products** | The tender stipulated nine mandatory products which the providers were required (at a minimum) to offer. |
| **Carrier Neutral** | The service and the telecoms infrastructure were required to be carrier neutral[31]. |
| **Benchmark Pricing** | In any service month, the maximum price at which each mandatory product is sold to customers between the mandatory locations and Hudson Street, New York must not exceed the Benchmark Price[32] for that mandatory product. |
| **Availability** | In each service month, the service was required to have 99.999% availability between each of the mandatory locations (i.e. Derry~Londonderry, Letterkenny and Monaghan) and Hudson Street, New York. |
| **Latency** | In each service month, the provider was required to carry out separate latency tests on the service between each of the mandatory locations and Hudson Street, New York and each of the mandatory locations and AMS-IX, Amsterdam. The maximum latency level from the mandatory locations to Hudson Street, New York was not to exceed 120 msecs and not to exceed 90 msecs to Amsterdam. |
| **Investment Sum** | Tenderers were required to specify the amount of public funding which they would require in order to deliver the specified service, subject to a limit of €30m. |
| **Excess Annual Revenue Payment** | Tenderers were requested to accept the provision for excess annual revenue payments whereby the Departments would receive a repayment equal to 37.5% of the excess of revenues over costs in each year. The Departments could alternatively specify that the contractor should invest that sum in the telecoms infrastructure in the INTERREG Region. In addition, on the completion of the contract any increase in the value of the core assets associated with Project Kelvin was also to be shared with the Departments. |

[31] Carrier neutral is defined in the Invitation to Tender (Schedule 1) as being *"open to all customers to access and use on a non-discriminatory basis, including as to the technology that is required to connect to that telecoms infrastructure or service"*.
[32] The Initiation to Tender states that the Benchmark Price should be calculated based on the median price at which that product was available from other service providers in each of Glasgow, Manchester and Dublin for the month in question.

Three companies responded to the invitation to tender. One company was ruled out immediately for not meeting any of the mandatory requirements and therefore was deemed to be an invalid tender. A second tender was evaluated but on examination was found not to meet a mandatory network performance standard and was, therefore, ruled out as non-compliant. The remaining tender (submitted by Hibernia) was judged to meet each of the mandatory requirements and was assessed as the Most Economically Advantageous Tender (MEAT) subject to the completion of a Business Case.

### *2.1.2 Hibernia Proposal*

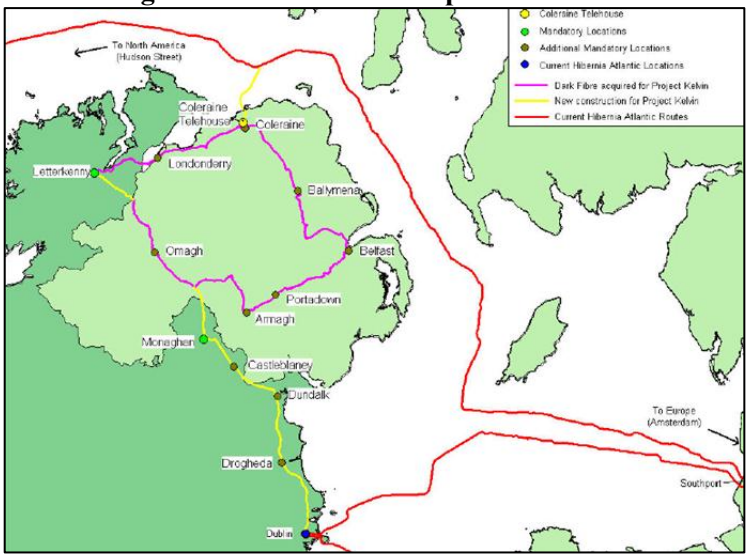
At the time of its Project Kelvin proposal submission, Hibernia was a privately owned submarine and terrestrial network operator which operates two transatlantic cables running from Dublin and Southport in Lancashire to Halifax in Nova Scotia. It also has terrestrial networks in the USA, Canada, Ireland, the UK and Europe with submarine connections between its networks in Europe. The cable from Southport to Halifax (Hibernia-North) lies off the North Coast of NI.

Hibernia proposed to provide the following infrastructure through Project Kelvin:

- A branching unit installed into the existing Hibernia-North submarine cable;
- 24km submarine cable from the branching unit to a landing point at West Strand, Portrush;
- 7km terrestrial fibre-optic cable from Portrush to the cable landing station and exchange centre which was proposed to be located in Coleraine;
- 3km terrestrial fibre-optic cable from the exchange centre facility to the Saturn ring[33];
- Acquisition and lighting of dark fibre on the Saturn ring;
- Acquisition and lighting of dark fibre from Letterkenny to Derry~Londonderry;
- 25km terrestrial fibre-optic cable from Letterkenny to Strabane on the Saturn ring;
- 171km terrestrial fibre-optic cable from Dublin via Drogheda, Dundalk, Castleblayney and Monaghan to Ballygawley on the Saturn ring;
- Establishment of telecoms PoIs in Armagh, Ballymena, Belfast, Coleraine, Derry~Londonderry, Omagh, Strabane and Portadown which were connected to the Saturn ring and establishment of telecoms PoIs to the MANs in Castleblayney, Drogheda, Dundalk, Letterkenny and Monaghan in RoI;
- A modification of Hibernia's UK network to allow for a more direct route and shorter distance between the North West and Amsterdam; and
- DWDM[34] equipment to light up one fibre pair on the above infrastructure.

Figure 2.1 presents the proposed Project Kelvin infrastructure as per Hibernia's proposal:

**Figure 2.1: Hibernia's Proposed Network**




[33] Virgin Media (formerly ntl:Telewest) operates the Saturn fibre network which links 12 towns and cities across NI including Belfast and Derry~Londonderry.
[34] Dense Wavelength Division Multiplexing (DWDM) is optical technology used to increase bandwidth over existing fibre-optic backbones.

As discussed, Hibernia's proposal was deemed to be fully compliant with each of the mandatory requirements stipulated by the Contracting Authority in the ITT. Indeed, in a number of cases the proposal exceeded the mandatory requirements and offered additional service provision over and above the minimum required. Key points to note in relation to the Hibernia proposal include:

- In addition to the mandatory locations required in the ITT (Derry~Londonderry, Letterkenny and Monaghan), Hibernia proposed to add a further 10 additional PoIs to the proposed terrestrial network in order to further enhance the international and regional connectivity of these towns and cities. The proposed locations included Armagh, Ballymena, Belfast, Coleraine, Omagh, Strabane and Portadown in Northern Ireland and Castleblayney, Drogheda and Dundalk in the Republic of Ireland.
- The ITT required that the cost of international connectivity in the North West region of the island of Ireland should be benchmarked to the cost of comparable connectivity in cities such as Glasgow, Manchester and Dublin. Hibernia exceeded this requirement by offering a discount of 20% when compared to those costs. As a result, an objective was developed for Project Kelvin to offer international connectivity at 80% of the comparable costs in cities such as Glasgow, Manchester and Dublin. The pricing was therefore anticipated to fluctuate alongside fluctuations in benchmark prices.
- Whilst the ITT was open to existing providers within the INTERREG region, as a new international telecoms carrier operating in the region, the introduction of Hibernia represented an opportunity to increase the competition in the telecoms market.
- Hibernia proposed that it would reduce latency between the North West region and New York from 150 msecs to 66 msecs which was significantly below the mandatory level of 120 msecs as per the Invitation to Tender. Similarly, it proposed that latency between the North West and Amsterdam would be reduced from 90 msecs to 13.9 msecs.
- The Hibernia proposal stated that it would provide one new direct international telecoms link to the North Coast as well as one resilient link to existing terrestrial infrastructure to increase the overall resilience of telecoms networks in the INTERREG region and the island of Ireland.
- Hibernia proposed to provide a new route linking Monaghan to Dublin which would connect the Project Kelvin international and terrestrial network to Dublin, as well as providing further connectivity and improved resilience throughout the island of Ireland. These works were in excess of the mandatory connectivity stipulated in the ITT.

Hibernia proposed that the total capital cost of Project Kelvin would be €69.5 million including €29.5m of funding from the Departments through the INTERREG IVA Programme[35] (i.e. €0.5m lower than the maximum funding limit of €30m) and €40m of leveraged funding from Hibernia. The projected capital costs are shown in the following table:

| Table 2.1 Capital Costs Proposed by Hibernia | |
|---|---|
| **Capital Requirement** | **Cost (€)** |
| Construction of new terrestrial fibre routes | 5,083,864 |
| Acquisition of dark fibre | 57,006,174 |
| Transmission equipment | 1,874,497 |
| Buildings and power brought to site | 2,466,443 |
| Construction and implementation of submarine branching unit | 3,016,779 |
| **Total** | **69,447,757** |
| Contribution from the Contracting Authority | 29,500,000 |
| Contribution from Hibernia | 39,947,757 |

### *2.1.3 Independent Assessment*

Following the submission of Hibernia's tender, the Departments commissioned an independent Business Case and Economic Appraisal[36] which assessed the monetary and non-monetary costs and benefits

[35] NB 25% of the €29.5m was anticipated to come from the Departments' own funding.
[36] 'Project Kelvin – Business Case & Economic Appraisal' Colin Stutt Consulting (2008)

associated with the Hibernia proposal. The Economic Appraisal validated that Hibernia's proposal had the potential to fulfil (or indeed exceed) each of the project objectives outlined by the Contracting Authority within its ITT and to offer excellent development potential throughout the INTERREG region.

[redacted]

The Economic Appraisal ultimately concluded that *"there is merit in proceeding with the project as a long-term strategic investment in the competitiveness of the INTERREG Region"*.

As such, the Hibernia proposal was presented to DETI Casework Committee (22nd November 2008), DFP (4th December 2008) and the DETI Minister (5th December 2008) as well as the Secretary General for DCENR and was approved to proceed.

## 2.2 Project Implementation

### *2.2.1 Contract Agreement*

On 22nd December 2008, DETI (for an on behalf of itself and on behalf of DCENR) entered into contract with Hibernia for the provision of an International Telecommunications Service (i.e. Project Kelvin) which included:

- A direct international telecommunications service between North America and the North West of the island of Ireland; and
- An improved international telecommunications service between Mainland Europe and the North West of the island of Ireland.

In signing the contract, Hibernia agreed to design, construct, build, lay, install, test, commission and maintain the infrastructure in line with the service levels included within its proposal document. The terms and conditions of the contract aligned with those stipulated within the original ITT, with amendments for the additional service components proposed by Hibernia in its tender document.

### *2.2.2 Construction Phase*

The Evaluation Team has provided a brief overview of the actual implementation milestones achieved by Hibernia through Project Kelvin based on information collated by SEUPB[37] and discussions with the Contracting Authority and Hibernia.

The construction of the Project Kelvin infrastructure was completed in three phases:

1. Physical insertion of a branching unit and new marine cable brought to shore in Portrush;
2. Utilisation of the existing Saturn ring network in NI by installing points of interconnection in Armagh, Ballymena, Belfast, Coleraine, Omagh, Portadown and Strabane as well as installation of all required equipment in the existing MANs in Castleblayney, Drogheda, Dundalk, Letterkenny and Monaghan; and
3. The physical construction of a terrestrial route from the eligible area (i.e. NI and the Border Region of RoI) to Dublin. This phase of works was ineligible for funding through the INTERREG Programme and was fully funded by Hibernia.

The contract document included an implementation plan, with each milestone acting as a trigger for draw-down of a proportion of funding from the INTERREG Programme. The table overleaf provides a comparison of the proposed timelines for each implementation milestone (as per the contract document) with a commentary on the actual implementation process:

[37] Quarterly Progress Reports from July 2008 to March 2011.

| Table 2.2 Implementation of Project Kelvin | | | | | |
|---|---|---|---|---|---|
| **Implementation Milestone** | **Proposed Completion Date** | **Proportion of Funding Due** | **Actual Completion Date** | **Full Funding Drawn-Down?** | **Commentary** |
| Effective date of contract | 22nd December 2008 | 10% | 29th December 2008 | ✓ | The effective date was the date when the contract agreement was executed by both parties. SEUPB approved this milestone and paid €2.95m (10%) of funding to DETI on 20th January 2009. Hibernia commenced the design, construction and build process at this time. |
| Factory acceptance of the submarine cable | 6th April 2009 | 20% | 27th May 2009 | ✓ | The submarine cable construction process was commenced in January 2009 and factory acceptance of the submarine cable was completed on 27th May 2009, indicating a delay of seven weeks versus the projected timeline. |
| Completion of installation of the submarine cable | 17th June 2009 | 20% | 1st October 2009 | ✓ | The submarine cable came ashore on the beach landing point in West Strand Portrush on 22nd June 2009 which marked the completion of the first phase of the transatlantic cable build.<br><br>Hibernia continued to install the submarine cable to connect with the Hibernia-North trans-Atlantic system between June and September 2009, and on 1st October 2009 DETI issued a milestone achievement certificate to Hibernia on the basis that an independent monitoring agent (Analysys Mason) had completed transmission performance, latency and measurement tools tests which confirmed that the installation of the submarine cable had been completed. This stage was completed 14 weeks later than the timeline detailed within the contract. In relation to the installation of the submarine cable, there was a requirement to have the cable connected to the 'Telehouse' facility in order to consider this milestone as complete. It is understood that the delay was a result of Hibernia needing to finalise the design of the Cable Landing Station and Telehouse. In addition, the requirement to move the 'Telehouse' from the Coleraine Cable Landing Station site to Fort George in Derry~Londonderry had an impact on the completion of the Cable Landing Station which as a result did not allow for the completion of the required tests until September 2009. |
| Completion of the terrestrial element of service | 30th October 2009 | 20% | 29th July 2010 | ✓ | The fourth milestone (completion of the terrestrial element of service) was completed in three distinct stages:<br><br>• The first stage connected the terrestrial service to the Saturn ring throughout NI and onto each of the PoIs, and was completed by 22nd January 2010. Funding of €4.4m was granted from SEUPB at this time.<br>• Between January and March 2010 terrestrial networks were completed between Bridgend and Letterkenny and a further payment of €1m was approved on 31st March 2010 in relation to this work.<br>• Finally, outstanding work was completed at the Exchange Centre in Derry~Londonderry between April and July and this work was completed on 29th July 2010. Funding of €500,000 was awarded in relation to this stage.<br><br>As such, the eligible terrestrial element of service was fully completed by 29th July 2010 and received total funding of €5.9m. This stage of works took 6 months in total to complete and was completed seven months after the date proposed in the contract document. According to the SEUPB Progress Reports, the delay was primarily due to the movement of the permanent telehouse from Coleraine to Fort George in Derry~Londonderry and the subsequent change in the building specification. |
| Provisional acceptance of service | 2nd January 2010 | 20% | 31st March 2010 | ✓ | The service was provisionally accepted on 31st March 2010 and DETI drew-down €5.9m of funding on 7th April 2010 in relation to this milestone. |
| Final acceptance of service | 31st March 2010 | 10% | 9th August 2010 | ✓ | The final acceptance of service was agreed on 9th August 2010 and DETI drew down the final 10% (€2.95m) of INTERREG funding towards Project Kelvin on 25th August 2010. |

In summary, Project Kelvin was delivered in line with the activities proposed within Hibernia's proposal with the exception that, following discussions with key stakeholders in the North West region it was agreed that the permanent exchange centre from Coleraine (where the cable landing station continued to be located) would be relocated from Coleraine to Fort George in Derry~Londonderry.

The eligible project activities were completed during a 20-month period from January 2009 to August 2010, which represented a five-month extension over the timeframes stipulated in the original contract.

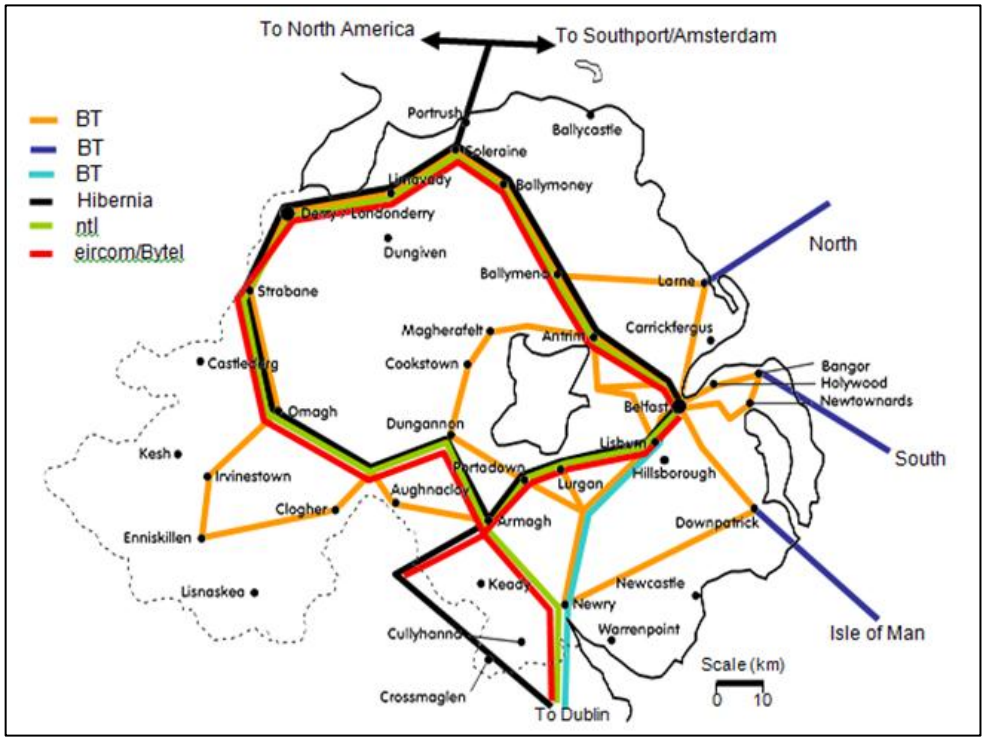
Following the completion of the project works, which were eligible for funding through the INTERREG Programme, Hibernia subsequently continued to construct terrestrial linkages onwards from Drogheda to Dublin thereby linking the Project Kelvin infrastructure to the existing Hibernia-South cable between Southport in GB and North America. This provided a complete resilient ring structure between the island of Ireland and North America.

Figure 2.2 shows the Hibernia network throughout the island of Ireland following the implementation of Project Kelvin:

**Figure 2.2: Hibernia's Network following Project Kelvin**

The following diagram shows how the Hibernia Kelvin infrastructure (shown in black below) fits into the overall network of telecoms infrastructure throughout NI[38]: Please note that this is the most recent diagram available.

**Figure 2.3: NI Telecoms Infrastructure following Project Kelvin (2010)**




### 2.2.3 *Construction Costs*

As previously noted, Hibernia's proposal projected that Project Kelvin would have a total capital cost of €69.5m including €29.5m of investment funded through the INTERREG Programme and €40.0m of investment leveraged from the private sector.

In February 2010, Hibernia issued a Form of Change request to the Contracting Authority which sought to make changes to the terrestrial fibre routes from Dundalk to Dublin, Ballygawley to Monaghan, Letterkenny to Derry~Londonderry and two routes from the Cable Landing Station to the Saturn Ring throughout the eligible region. These changes resulted in the costs of terrestrial fibre routes increasing from €5.08m as per the proposal document to €11.41m (representing an increase in costs of €6.33m). These additional costs were fully funded by Hibernia and therefore represented additional private sector funding leveraged by the public sector investment.

| **Table 2.3 Actual Project Kelvin Capital Costs** | |
|---|---|
| **Capital Requirement** | **Cost (€)** |
| Construction of new terrestrial fibre routes | 11,410,000[39] |
| Acquisition of dark fibre | 57,006,174 |
| Transmission equipment | 1,874,497 |
| Buildings and power brought to site | 2,466,443 |
| Construction and implementation of submarine branching unit | 3,016,779 |
| **Total** | **75,773,893** |

The original SEUPB Letter of Offer (21st July 2008) outlined a proposed budget of €30,000,000 for Project Kelvin. On 28th March 2012, an Addendum to the original Letter of Offer was issued by SEUPB

[38] Source: DETI (2010)
[39] It should be noted that the Evaluation Team was provided with a rounded figure of €11.41m. Therefore there may be slight differences in the actual cost due to rounding.

to DETI on the basis that the full funding allocation was not required for Project Kelvin. Instead the total grant drawn-down was as follows:

| Table 2.4 Actual Funding Required for Project Kelvin | |
|---|---|
| **Cost Category** | **Funding Required** |
| Capital Costs | €29,500,000 |
| Consultancy and Professional Fees | €144,290 |
| **Total INTERREG IVA Funding** | **€29,644,290** |

As such, the actual total costs associated with Project Kelvin were €75,918,183 (including consultancy fees) which received €29,644,290 of public sector funding and €46,273,893 of funding from the private sector. INTERREG IVA funding was €355,710 lower than the level proposed in the original Letter of Offer.

## 2.3 Technical Performance

### *2.3.1 Introduction*

The contract for Project Kelvin states that Hibernia is required to provide the Contracting Authority with a monthly service report throughout the duration of the contract (i.e. 22nd December 2008 to 22nd December 2018).

Running concurrently to Hibernia's delivery of the Project Kelvin contract, the Contracting Authority commissioned Analysys Mason (following competitive tender) to review the monthly service reports in order to assess content compliance and validate the content material and subsequent conclusions made by Hibernia from a technical telecoms perspective.

Based on a sample of 11 Hibernia monthly service reports and 9 Analysys Mason review reports which were provided to the Evaluation Team by the Contracting Authority the following subsections draw a number of key conclusions relating to the project's technical performance to date[40].

### *2.3.2 Reporting Requirements*

Analysys Mason has advised through consultation that the format for the monthly reports was agreed at the outset of the contract with all parties (i.e. Hibernia, the Departments and Analysys Mason) with the aim of ensuring that the reporting requirements were not overly onerous. The Analysys Mason review reports consistently state that the content of Hibernia's monthly service reports complies with the agreed format.

### *2.3.3 Latency Requirements*

The original contract required that Hibernia should test latency between each of the 13 mandatory locations to both New York and Amsterdam on a monthly basis. However, it was agreed by all parties (the Contracting Authority, Hibernia and Analysys Mason) that to conduct such testing on a monthly basis would require significant time and resources to complete.

[40] The Contracting Authority clarified (Clarification Log received 22nd January 2015) that an additional technical review is not required as part of this Interim Evaluation. Instead, the Evaluation Team has independently validated a sample of the monthly service reports against the monthly review reports prepared by Analysys Mason for the same service months.

Subsequently, a Change Request (CRN04) was agreed between the Contracting Authority, Hibernia and Analysys Mason which set out the revised approach to latency testing as follows:

| Table 2.6 Agreed Approach to Latency Testing | | |
|---|---|---|
| **Frequency of Testing** | **From** | **To** |
| Monthly | Dublin | New York (via Coleraine West) |
| Monthly | | Amsterdam (via Coleraine East) |
| Quarterly | | Coleraine (via Coleraine West) |
| Quarterly | | Coleraine (via Coleraine East) |
| Quarterly | | Londonderry |
| Quarterly | | Belfast |
| Quarterly | | Halifax |
| Quarterly and Monthly | | New York |
| Quarterly and Monthly | | Amsterdam |
| Annual | | All Mandatory Locations in the event of a major infrastructure change to the terrestrial network |

Across the sample of Hibernia monthly reports and Analysys Mason monthly review reports, on all but one occasion the latency figures have been in line with the requirements of the contract. In the one case where the latency to Amsterdam exceeded the allowed limits (as per the contract, October 2013) a comprehensive clarification explaining the basis for the service deficiency[41] was provided to the Departments and the deficiency fault was not considered to be material[42].

### *2.3.4 Availability Requirements*

The contract document (clause 10) states that *"in each Service Month, the Service must have 99.999% Availability between each of the Mandatory Locations and Hudson Street, New York"*.

To support the measurement of availability Hibernia established a protected test circuit ('DETITEST') between Dublin and New York over which test traffic is transmitted. The measurement of availability is therefore based on the availability measurement for the DETITEST circuit. Across the sample of monitoring reports provided to the Evaluation Team, the availability of service was consistently in line with the requirements of the contract.

[41] Clarification received from Hibernia on 10 December 2013 indicated that due to the fibre cut between Lowestoft and Zandvoort (from 20:47 GMT on 30 October to 17:07 GMT 18 Nov) the latency figure for the alternative route to Amsterdam (via Paris and Brussels to Amsterdam) was in the region of 27.27ms which exceeded the relevant maximum latency to Amsterdam (19.4ms).

[42] It should be noted that Clause 10.7 of the contract document states that *"in the event that either: 400 or more Deficiency Points are accrued for any reason whatsoever by the Service Provider over any two consecutive Service Years during the Term of this Agreement; or 1,000 or more Deficiency Points are accrued for any reason whatsoever by the Service Provider during the Term of this Contract, it is hereby agreed that the Service Provider shall be considered to be in material breach of this Agreement (in this case, a breach which-is incapable of remedy and the provisions of Termination shall apply"*.

## 2.4 Financial Performance

[redacted]

## 2.5 Maximum Product Pricing

An objective of Project Kelvin was to ensure that the costs of telecoms in the North West would be comparable with those in major UK cities. The Kelvin contract contains contractual measures to monitor that this was being achieved and includes a process for reviewing the Maximum Product Pricing.

Under the terms of the Agreement, Hibernia is required to make available a portfolio of agreed products ('Mandatory Products') to all Customers who use the Telecommunications Infrastructure at any one, or a combination, of the Mandatory locations. The availability of all Mandatory Products at the Mandatory Locations was confirmed by Analysys Mason as part of the Final Acceptance criteria at the conclusion to the network construction phase.

Furthermore, Hibernia is required to publish the installation and monthly service prices for each of the mandatory products stipulated in the contract. Based on the sample of Monthly Service Reports and

Monthly Review Reports provided to the Evaluation Team, the mandatory prices have consistently been publicly available on Hibernia's website. The mandatory product prices (as per Hibernia's website at the date of completion of this report) from the Project Kelvin Point of Interconnection to Hudson Street, New York are as follows:

| Table 2.5 Mandatory Product Prices (as per Hibernia's Website) | | | |
|---|---|---|---|
| **Mandatory Product** | **Service level (protected and unprotected services)** | **Installation Price ($)** | **Monthly Service Price ($)** |
| E1 | Protected services provided over 2 physically separated routes | 2,000 | 231 |
| 10Base-T | | 2,000 | 577 |
| STM-1 | | 5,000 | 2,952 |
| STM-4 | | 5,000 | 6,740 |
| STM-16 | | 5,000 | 9,800 |
| STM-64 | | 15,000 | 22,000 |
| 10GE LAN PHY | | 15,000 | 22,000 |
| 10GE WAN PHY | | 15,000 | 22,000 |
| 1GE | | 5,000 | 4,400 |
| 10G DWA | Unprotected service provided over a single route | 15,000 | 14,000 |

In accordance with Schedule 4, Appendix B of the Agreement, Hibernia is required to provide monthly reports for each month of the Kelvin network's operational period. Within these reports Hibernia are required to list all the circuits supplied during the previous month's operations (providing ongoing evidence of the availability of Mandatory Products at the Mandatory Locations).

During the course of this Evaluation exercise, Analysys Mason has confirmed that whilst Hibernia have the network infrastructure in place to provide all of the Mandatory Products at each of the 13 Mandatory Locations on the Project Kelvin terrestrial infrastructure as required under the Kelvin contract, the take-up of these services has been impacted by external market influences since the Kelvin network came into operation in 2010. These have included:

- Analysys Mason's analysis of live customer circuits on the Project Kelvin infrastructure indicates that, following some initial uptake of a wide range of products, customer requirements since the Kelvin network came into operation are mainly based on 1GE, 10GE and 10G products. Discussion with Analysys Mason indicates that this reflects an increase in demand amongst customers for higher capacity products/circuits, which has been driven by the growth of digital applications in the economy.
- In addition, Analysys Mason indicates that many customers are no longer availing of protected services from a single network provider, but instead are using multiple individual circuits from many different network suppliers to provide their own protected network. The practice of Kelvin's customers providing their own protected network routes was confirmed by Analysys Mason[43] during the consultation process.

Whilst customers are therefore availing of 1GE and 10GE services over the Project Kelvin infrastructure, they are not (as a result of the changes in the marketplace) availing of the fully protected Mandatory Product services available on the network. Instead, they are availing of individual (unprotected) 1GE and 10GE services on the Project Kelvin network, in combination with additional services from other network suppliers to provide their own protected service.

The overall impact of these developments is that the services taken up by customers are not the Mandatory Products as defined in the Kelvin contract. Instead, they are products similar to Mandatory Products but without the protected service (i.e. without a second protected route provided by Hibernia between the customers' locations).

[43] Analysys Mason also confirmed that TeleGeography (an international telecommunications market research and analysis company with a specific focus on international connectivity) also adjusted their reports to reflect the increasing global growth in demand of 1GE, 10GE and 10G services and the decline in demand for lower capacity services.

It is understood that, subsequently, as a result of limited or no uptake of many of the mandatory products, the completion of the maximum product pricing exercise has not been required. In view of how telecoms products and their delivery have evolved since the inception of the Kelvin network, it is not possible for the Evaluation Team to reach a conclusion as to the extent to which the costs of telecoms in the North West are comparable with those in major UK cities[44]. However, we note that our consultations with Kelvin's customers (see Section 3.3) indicate a consistent view that the introduction of Kelvin had a positive impact on pricing within the eligible area.

## 2.6 Summary Conclusions

The previous analysis has indicated the following:

- Hibernia's proposal not only met, but substantially exceeded a number of the mandatory requirements stipulated by the Departments including those relating to competition and connectivity (by accessing 13 rather than 3 locations), cost (by reducing the benchmark prices by 20%) and latency (by proposing faster speeds than those required).
- The proposal also provided the opportunity for the Departments to leverage significant (€40m) private sector financing towards international and regional backhaul infrastructure throughout the island of Ireland.
- As such, the Hibernia proposal offered the potential for the Departments to achieve value for money and efficiency by maximising outputs from a given set of inputs (i.e. the €30m of funding available from the public sector).
- The construction phase of Project Kelvin was delivered in line with the activities proposed within Hibernia's proposal and the implementation milestones stipulated by SEUPB in the original Letter of Offer. The Project was delivered for less than the agreed public sector budget and also leveraged an additional €6.3m from the private sector over and above the finance proposed in Hibernia's proposal.
- Since Project Kelvin became operational, the service provider has achieved its service obligations in relation to latency and availability. Where minor service deficiencies have occurred Hibernia has provided comprehensive clarifications to the Departments explaining the basis for the deficiency and action has been taken to remedy the deficiency within the allowable limits stipulated in the contract.
- [redacted]

[44] It is also not possible to compare the actual NPV (including cost advantages to companies in the region) with the NPV projected within the Business Case and Economic Appraisal.

# 3 IMPACT OF PROJECT KELVIN

## 3.1 Introduction

Section 3 considers the technical benefits and economic impacts which have been achieved to date in the INTERREG IVA eligible region of the island of Ireland as a result of Project Kelvin.

## 3.2 Impacts of Telecoms

Telecom networks are increasingly recognised as fundamental for economic and social development. They serve as a communication and transaction platform for the entire economy and have the potential to improve productivity across all sectors. The European Commission Digital Agenda for Europe (DAE) states that *"telecommunications networks and services are the backbone of our information society"* and recognises ultra-fast Internet access as a building block for growth and jobs.

Recognising the global digital agenda, the UK Government has prepared an Information Economy Strategy[45] which emphasises that the UK's ability to achieve strong sustainable growth is highly dependent on a thriving information economy and acceleration in the global race for digitalisation. The Strategy outlines that the UK's long term success will be underpinned by:

- A highly skilled digital workforce (whether specialists who create and develop information technologies, or non-specialists who use them); and
- The digital infrastructure (both physical and regulatory) and the framework for cyber security and privacy necessary to support growth, innovation and excellence.

Similarly, the Next Generation Broadband Taskforce in the Republic of Ireland (RoI)[46] reported that the global revolution in telecommunications technology presents Ireland with a *"once in a generation opportunity to become a truly connected society"*. Harnessed well, it is noted that telecoms will underpin competitiveness, create jobs and drive social inclusion and connection to all of society. The report emphasises that high speed broadband is a key enabler for a connected society. As such, there is an ongoing need for investment in high speed broadband infrastructure and services. These services are recognised as a driving force in job creation and rebuilding Ireland's economy.

Both OECD[47] and the UK Broadband Impact Study[48] have highlighted various mechanisms through which improved telecoms provision can lead to economic impacts, as follows:

| | |
|---|---|
| **Increased Productivity** | Continual improvements in Information and Communications Technology (ICT) and broadband service offerings for both business and consumer markets stimulate innovation in business models, and this serves to improve overall productivity levels in the economy. Enhanced telecoms facilitate the globalisation of services, making it feasible for producers and consumers of services to be in different geographical locations. Outsourcing of processes and operations is made easier for small businesses, which helps them focus on improving their core strengths while reducing operational costs. ICT-enabled globalisation of services is having a fundamental impact on the way economies work and on the global allocation of resources, contributing to productivity growth by expanding markets, increasing business efficiency and reinforcing competitive pressure.<br><br>McKinsey Global Institute[49] conducted research on the contribution of the Internet to GDP and economic growth in the G8 economies and five other key countries at various levels of economic development (Brazil, China, India, South Korea and Sweden). In the 13 countries studied, it was found that the Internet has contributed on average 3.4% to GDP, weighting more than agriculture, energy and other better-established industries. Furthermore, approximately 75% of the GDP impact was from industries not directly linked to the Internet, |

[45] HM Government (2013) 'Information Economy Strategy'
[46] DCENR (2012) ' Enabling a Connected Society' Report of the Next Generation Broadband Taskforce
[47] OECD (2007) 'Broadband and the Economy'
[48] SQW (2013) 'UK Broadband Impact Study'
[49] McKinsey & Co. (2011) 'Internet Matters: The Net's Sweeping Impact on Growth, Jobs and Prosperity'

| | |
|---|---|
| | with the value of the Internet primarily coming from increased productivity. The level of impact on productivity differed among industries, depending on the intensity with which they used ICT. For instance, the OECD reported that companies adopting broadband-based processes improved their employees' labour productivity on average by 5% in the manufacturing sector and by 10% in the services sector.<br><br>Looking specifically at the contribution of telecoms infrastructure, a key study found that across the OECD countries between 1996 and 2007, there was an increase in GDP of between 0.9% and 1.5% for every additional 10 broadband lines per 100 people[50]. Furthermore, a BT report[51] suggests that the provision of 'Superfast Broadband' across the UK could create between £143 million and £19.8 billion in additional GVA. This would equate to an annual increase of GVA between 0.3% and 0.5%.<br><br>Across each of these studies, it can be seen that there is a clear correlation between the improved provision and increased utilisation of telecoms and the overall productivity and rate of growth of the economy. |
| **Spillover Effects** | As an infrastructure investment, telecoms network deployment produces spillover effects to all sectors of the national economy. The adoption of faster broadband by firms stimulates further investment in wider ICT systems and applications taking advantage of the improved connectivity, and results in business process restructuring, more informed decision making, and productivity gains. |
| **Business Creation** | Faster broadband helps to support the creation of new businesses, and the easier access to market information helps to reduce barriers to entry. |
| **Innovation** | In recent history, ICT has been a dynamic and fast growing sector and also a pre-requisite for advances in other industries. From this perspective, the role of broadband as a source of potential innovation needs to be seen from two different angles: one related to innovation within the ICT sector itself, and the second as triggering innovation in other fields of economic activity. Broadband has enabled advancement in a variety of fields including: telemedicine, online education, video-on-demand, or new forms of commerce and financial transaction.<br><br>Broadband is also increasingly the primary mechanism for accessing information via the Internet, which is becoming essential for economic activity and government administration. In this sense, broadband is an effective means of fostering research and development activities for industry, as well as the transfer of technical and other types of knowledge. Broadband provides access to new technologies, and allows companies to explore new business opportunities, access customers and obtain information about market prices.<br><br>Easy access to information about government services and activities helps to improve accountability and the quality of the services that an administration provides. In addition, by making it easier and cheaper to access information, broadband connectivity is becoming a key facilitator of good governance. |
| **Restructuring the 'Value Chain'** | Broadband is also an important factor in changing the composition of the value chain in many sectors. Reliable and affordable high-speed connectivity encourages enterprises to move into international markets by removing geographical barriers, and its minimal usage costs create incentives to adjust value chains to the new reality in communications. New services offered over the Internet, as well as the use of remote services such as virtual call centres or cloud computing, can help to optimise operational costs. |

[50] Czernich, N., Falck, O., Kretschmer, T., and Woessman, L. (2011) 'Broadband Infrastructure and Economic Growth': The Economic Journal, Volume 121, Issue 552, pages 505–532, May 2011.
[51] Regeneris for BT Group (2012) 'Superfast Broadband Boosting Business and the UK Economy'

'This is for Everyone: The Case for Universal Digitalisation' (2012) was written by Booz & Company with Go ON UK and its founder partners. Its purpose was to present the socioeconomic case for universal digitisation. Key points to notes include:

- Booz's assessment of the UK's digital potential is based on a comparative analysis of the digital maturity of nations, using econometric modelling techniques to estimate the impact that digitisation can have on a nation's GDP. The index is calculated by quantifying 23 key metrics, which provide either direct or proxy indicators for the maturity of the country's digital foundations and digital usage. Based on 10 years of historical data, the Booz & Company Digitization Index has been stress tested for statistical significance and correlation with changes in GDP. Correlation is not causality, of course, but a close look at the index suggests that over the previous five years, digitisation may have contributed as much as £860 billion to world GDP. These gains are not distributed evenly among nations with countries which invest heavily in digital technology enjoying higher levels of economic growth than their more analogue-constrained neighbours.
- By all measures, the UK is considered to be leading digital nations. It is ranked 12 out of 150 on the Booz & Company Digitization Index, which compares the state of progress for nations around the world. In its digital foundations—the confluence of an affordable, fast, and robust broadband network of infrastructure, public-and private-sector digital services, and residents with a high level of education - analysis shows that the UK has a very strong platform for future development.
- But, according to Booz, it is not where it could be and the UK's current digital status may not be enough to remain competitive in a highly turbulent global economy. Booz suggests that the UK is not maximising the potential offered by digital technologies, because too many individuals and organisations are either not using them to their fullest or not using them at all. Booz estimates that the UK could have increased its annual 2011 GDP by up to £63 billion if it had achieved global leadership in digitisation.
- Booz proposes a three-pronged strategy to fully unlock this potential:

    - First, it is suggested that the UK needs to continue investing in the digital foundations to improve the ***digital infrastructure***, develop more and better online services, and bolster human capital.
    - Second, we need to ***promote Internet usage***. This means reaching out to individuals and organisations that are not online to ensure they have easy access to digital technologies, are aware of the benefits of being online, and have the basic digital literacy skills needed to engage with the digital world.
    - Third, we need to ***encourage the innovations and entrepreneurship*** of the private and not-for-profit sectors. As digital platforms expand through the UK, companies and organisations will create new forms of value-adding enterprise. This needs to be encouraged and abetted.

- In their report, Booz argues that universal digitisation has the potential to unlock substantial economic and social benefits for four sectors in particular: individuals, SMEs, charities, and government. In relation to SMEs, Booz argues that digital technology can enable SMEs to unlock as much as £18.8 billion in incremental revenue. Furthermore, they suggest that digitisation can help channel scarce resources and help businesses expand more effectively by streamlining their cost base. Finally, Booz suggests that as they invest in digitising their offerings, SMEs could improve customer satisfaction and retention.
- Booz considers that the challenge for the UK is to further enhance its position at the leading edge of digital advancement, leveraging the full range of transformative technologies to deliver economic and social benefits to all of society. It suggests that this can be accomplished, in part, by building up the country's digital foundations. Strong digital foundations have three core elements. There needs to be an affordable, accessible, fast, and robust digital broadband ***infrastructure***. This needs to be populated with innovative, high-quality public-and private-sector digital ***services***. Finally, sufficient levels of ***human capital*** (including technical expertise) must exist to drive technological advancement and spur innovation.
- In relation to infrastructure, Booz notes that for those individuals and organisations that are online, an ***affordable, fast, and robust infrastructure*** underpins the digital experience. Since 2005, average headline broadband speeds have improved at a rate of 46% per year, and UK prices have dropped 8% per year. However, according to Booz, although its average speed is adequate for most users today, the UK is lagging behind several other countries in the overall rollout of superfast broadband.
- But speed in itself is not enough to encourage usage. Ofcom has noted that in 2011 superfast coverage of the UK was at 60%, but only 6.6% of all connections were taking advantage of the top speeds. This suggests that focusing on availability is no guarantee of deriving full benefit from the investment.
- Therefore, according to Booz, the digital foundations represent only half the story. The other half of the story is usage, the extent to which people are active with digital technologies and applications, incorporate them into their lives and work, and gain benefit from them. Booz suggests that it is possible to create a virtuous circle of benefits from digitisation—in which improvements in quality of life and lowering of costs continually reinforce each other. That means putting in place the services, access points, and training necessary to allow people and businesses to take advantage of the technology.

- Booz notes that the UK already has world-class, if not world-leading, digital services, across the private and public sectors. For example, UK citizens are twice as likely as their average OECD counterparts to order or purchase goods online. They spent £68.2 billion on online shopping in 2011. The UK's proportion of retail sales conducted via the Internet was 9%, second-highest in the world, behind South Korea. However, the lion's share of this revenue is being earned by large multinationals. Amazon alone accounts for 21.4% of the online entertainment market. UK firms, particularly smaller companies, are failing to capture the opportunity afforded by high domestic demand for online retail.
- Booz indicates that three main factors reduce usage of the Internet amongst individuals and businesses:

  - *Access:* Cost of service and lack of hardware can be barriers to getting online.
  - *Awareness:* Many people are not online because they are not aware of the range of benefits available.
  - *Skills:* Using the Internet requires only the most basic digital literacy, yet lack of skills is cited as a key reason many people are not online.

The Booz & Company SME digitisation survey suggests that only one in three SMEs communicates with its customers online. A Lloyds Banking Group PLC survey of UK SMEs and charities indicates that almost 20% of charities do not have a website, and many do not perform even the most basic of business tasks online. It also notes that 23% of SMEs and 35% of charities stated that they would require training and support to develop basic online skills. This lack of skills and usage, on the part of both individuals and organisations, is a key reason the UK is not fully maximising digitisation's value.

**The value of digital leadership**

Booz ran three simulations using its econometric model to demonstrate the potential value to the UK of moving up to the top in each of the 23 Digitization Index metrics— the equivalent of having world-leading digital foundations and near-universal usage among individuals and organisations. Under each scenario, it measured the incremental GDP the UK might have had today under changed circumstances.

- *Scenario 1* shows results if the UK scored the same as Norway in each metric. (Norway tops the ranking of 150 countries);
- *Scenario 2* depicts the UK if it ranked fifth for each metric (a world-class ranking); and
- *Scenario 3* shows the UK moving to the first position for each of the metrics. In this scenario, the UK would be positioned as the world's most advanced digital nation, in terms of both its digital foundations and its usage.

The implications of the model's correlations are compelling. By matching Norway (Scenario 1), the UK could have increased GDP by £14 billion. By moving into fifth place for each metric (Scenario 2), it could have added 1.7% to GDP, or £26 billion. Finally, by achieving the top spot in digitisation (Scenario 3), it could have increased its GDP by up to £63 billion, a 4.2% boost.

In specific relation to SMEs, Booz notes that they make up the most dynamic, innovative sector of the UK economy. They generate 48.8% of private-sector turnover in the UK and employ 59% of private-sector personnel. They grew 3% in the first half of 2012, while the rest of the economy flat-lined; still, they are not growing nearly as much as they could. In general, although it is impossible to prove causality from correlation, Booz suggests that there is a clear link between online engagement and revenue growth.

Larger firms within the SME segment are relatively digitally mature, and are already reaping significant benefits from digitisation. By comparison, most UK SMEs lag far behind their international peers—in both the front and back office. If these enterprises adopted digital technologies, thereby growing as fast as more digitised SMEs, Booz & Company estimates that they could unlock up to £18.8 billion of annual incremental revenues.

Will the growth potential from digitisation translate into actual revenue growth for SMEs? That depends in part on the level of innovation and new enterprise that results. Some observers have suggested that revenue growth is a zero-sum game: that customers will simply migrate from less-digitised to more-digitised businesses, without growing the economic pie. But, according to Booz, there is reason to think that genuine revenue growth will occur: that new forms of digital manufacturing, online retail, marketing, and other innovative businesses will create new sources of revenue— and, not coincidentally, new jobs for programmers, designers, and technologically skilled people, especially among SMEs.

The economic impact of other factors associated with digitisation - such as globalisation and the need for new skills - is also not clear. Studies specifically measuring the effect of teaching digital skills and promoting internationalisation to SMEs have not yet been conducted, and consequently the degree of cannibalisation from

untrained firms is uncertain. However, the UK Department for Business, Innovation and Skills estimates these effects suppress the gains from digitisation by around 20%.

In the end, even if the economic benefit of digitisation is mitigated to some extent, it is suggested that it also yields the kinds of innovation that should, over time, produce higher levels of turnover. Enhancing the digital foundations and driving usage can help the economy move away from being a zero-sum game, where every gained job must replace one that was lost.

To understand how digitisation is affecting small businesses, Lloyds Banking Group interviewed a representative sample of 677 business owners from different sectors of the economy. Those who are using the Internet across their business report significant benefits:

- *Faster growth:* 51% increased sales due to effective marketing and wider geographic reach.
- *Reduced costs:* 54% cut costs through back-office automation and electronic communications.
- *Improved customer service:* 54% improved levels of customer satisfaction, service, and retention.

For many of these companies, the move online was driven by customers or suppliers; business owners said they are three times as likely to implement technology because they feel they have to than because they think it will make them more competitive. Rather than waiting for their customers to prod them into action, however, SMEs should fundamentally rethink their approach to deploying technology and take proactive steps to exploit the Internet.

**Reducing costs**

Booz & Company undertook an analysis of the levels of digitisation in the back office of more than 500 SMEs in four western European countries (the UK, France, Germany, and Netherlands) and one developing nation (Brazil). UK SMEs noticeably lag behind their international peers in the digitisation of three key business functions:

- *Commercial processes,* such as sales management and customer relationship management (CRM);
- *Financial processes,* including budgeting, planning, accounting, and reporting;
- *People processes,* including payroll, benefits management, and flexible working arrangements.

Paper-based processes are still used for most transactions, and only micro businesses (typically sole proprietorships) and larger SMEs have managed to automate more than half of their commercial processes. Automating these processes using cloud-based online software would save money, increase productivity, and reduce environmental impact. (The "cloud" is the collective group of software and data facilities available online, operated remotely in technology centres, not owned by individuals or companies but accessed on a need-to-use basis.) Market research firm Gartner Inc. has projected that cloud technologies will provide a 10% to 13% lower total cost of ownership than on-premise software tools. A more recent study by the European Commission found even more dramatic savings; 80% of all organisations could reduce costs by 10% to 20% from the move to the cloud.

Cloud technologies can also lead to increased productivity. A survey of more than 1,000 firms found such technologies helped standardise data processes in 35% of businesses, and productivity rose in almost half the cases. Switching to the cloud also reduces environmental impact and energy consumption. As resources are pooled, less power is used per business. A company can achieve up to a 90% reduction in its energy footprint by moving tasks online. However, 86% of SMEs are unaware of the potential savings.

**The way forward**

According to Booz, SMEs should be made aware that the benefits of digitisation can apply to them, even more than to big multinationals - with a resulting impact on the economy that could be immense. In summary, the report concludes that ***"there is a role for the public sector to provide targeted support to help SMEs make the most of the investment in the infrastructure"***.

The research findings outlined above highlight the potential economic benefits that can be achieved through enhanced digitalisation and investment in telecoms. However, it is also important to recognise that the Internet began as an important tool for improving communication but has transformed into a ubiquitous technology supporting all sectors across the economy. In fact, telecoms infrastructure is now widely considered a fundamental infrastructure in OECD countries, in much the same way as electricity, water and transportation networks. In economics this is referred to as a general purpose technology

(GPT) and corresponds to other phenomena such as electricity (Guerrieri and Padoan, 2007; Carlaw *et al.* 2007).

A recent report by the OECD[52] identifies that measuring the Internet and its economic and social impacts presents a number of significant data challenges. These include all of the same ones that have bedevilled efforts to estimate the economic impacts of computers, broadband, and other ICT components.

Although a number of firm-level studies were able to demonstrate the positive productivity contributions of computers in the 1990s (Brynjolfsson and Hitt, 1998; Lehr and Lichtenberg, 1999,) it was not until after 2000 that the large contribution of ICTs to economic growth was demonstrable in macroeconomic data (Oliner and Sichel, 2000; Jorgenson, 2001; Colecchia and Schreyer, 2002a; Pilat 2004). The so-called Solow's paradox still applies.

The challenges of measuring the impact of faster and more reliable telecoms connectivity are largely related to its general and transformational economic character. In fact it is often argued that ICTs, including broadband are a "special" technology in the sense that they affect a multitude of sectors and economic activities, and most importantly make other sectors more productive. The idea of ICTs and broadband connectivity as GPTs is based on concepts associated with ICT and investments going beyond the notion of conventional capital equipment and being more of an "enabling technology" (Jovanovic and Rousseau, 2005).

In firms, it is possible to observe how the Internet enables and facilitates information sharing. Faster information processing may allow firms to think of new ways to communicate with suppliers or arrange distribution systems. Processes can be reorganised and streamlined, which allows for a reduction in capital needs through better utilisation of equipment and reduction in inventories or space requirements. Increased communication also reduces co-ordination costs and the number of supervisors required. More timely and widespread transfers of information enable better decision making and reduce labour costs (Arvanitis and Loukis, 2009; Atrostic *et al*., 2002; Gilchrist *et al*., 2001). Lower communication and replication costs also help businesses innovate by offering new products (Brynjolfsson and Saunders, 2010).

Scholars interested in transaction costs consider communication technologies as lowering the fixed costs of acquiring information and the variable costs of participating in markets (Norton, 1992; Leff, 1984), thus initiating a shift towards efficient market-based solutions. In these examples, the productivity enhancing effects of ICT and broadband connectivity previously mentioned are associated with spillovers. Spillovers constitute positive externalities and lead to excess rates of social return over private rates of investment eventually affecting many sectors in the economy. The main characteristics of a GPT are the following:

- Applicability across a broad range of uses – "pervasiveness";
- Wide scope for improvement, experimentation and elaboration, continuously falling costs – "improvement"; and
- Facilitating further product and process innovations – "innovation spawning".

Although the concept of spillovers is intuitively appealing, in practice it can take a long time to fully transform business processes to reap the full benefits of GPTs (David, 1990; David and Wright, 1999). The spillover effects from ICT and the Internet are reflected in the dramatic price decreases leading to a substitution of ICT equipment for less productive assets (Jorgenson, 2005). Indeed, there is at least some indication that efficiency gains from the implementation of more productive investment equipment spill over to industries that heavily used these new technologies. It is particularly this latter characteristic that convincingly suggests that ICTs should be considered GPTs since computers and related ICT equipment are now used in most sectors of the economy. Although it might be reasonable to claim that productivity gains from ICT can be found all around daily business life, quantifying the effect of spillovers from ICT is difficult, especially as these effects are hard to isolate.

[52] OECD (2013), "Measuring the Internet Economy: A Contribution to the Research Agenda", *OECD Digital Economy Papers*, No. 226, OECD Publishing. http://dx.doi.org/10.1787/5k43gjg6r8jf-en

Therefore quantifying the benefits deriving from enhanced telecoms connectivity is not a straightforward task precisely because it is so pervasive. As the Internet becomes a universal basic infrastructure and adoption saturates, the Internet economy will become increasingly indistinguishable from the overall economy. What will matter is how different firms, workers, or consumers utilise the Internet; measuring that utilisation becomes inherently more difficult.

More granular data will be needed at the business location or unit level, or even better, at the worker activity level to understand how telecoms connectivity is being used in productive activities. This is due in part to the fact that the connectivity enables the creation of virtual organisations and flexible outsourcing of business activities, blurring the boundaries between firms and markets and also between work and social life. Increasingly detailed business and labour surveys will be needed to track how the Internet is being used to accomplish the varied tasks that go into business production. Initially, focus might be placed on the time spent using the Internet in different business functions (e.g. research and development, supply chain management or retailing) or worker activities (e.g. web browsing, word processing or communications).

However, in the increasingly *always-on/everywhere connected* world, one may find the time not spent utilising telecoms connectivity to be the exception. Even more granular data on the location and intensity of usage will be needed – the volume of traffic, input/output activity, and perhaps even, the level of attention of the worker (*i.e.* was use of telecoms intrinsic to performing the activity or in the background?).

Moreover, as one seeks to measure the Internet itself by counting first the number of broadband connections, and more recently, the number of broadband connections by speed tier and for increasingly smaller geo-locations, one will find that the resources one needs to track are becoming more varied and complex.

For example, there are a number of important trends emerging in the Internet ecosystem. These include mobility, cloud computing, social networking, and sensor-based networks. All of these trends are central to current strategic business decision-making about ICT usage and to enabling the heralded future of *smart everything* (grids, homes, business processes, energy, healthcare, transport and government). Yet, none of these issues is readily measurable.

The need for a broad range of granular data suggests yet another problem that commonly arises in Internet measurement (but is also commonly associated with the measurement of other complex phenomena). In short, no single metric is sufficient because the Internet is a bundle of complementary components that are used in different proportions in different contexts. Composite indices are commonly used to summarise a variety of metrics.

**In summary, measuring the impact that the provision of a direct international telecoms link and improved terrestrial links has had on the businesses within the North West region of the island of Ireland which adopted the infrastructure, is not a straightforward task and is a challenge already at the data level.** The continuously evolving Internet has changed from a service used by some to an essential, basic economic infrastructure that will soon be used by nearly everyone in nearly all places. It affects almost all economic activities and its impact is found in numerous short and long-term economic processes. For this reason, the Evaluation Team does not consider it prudent to try and form outcome metrics for Project Kelvin. That is, clearly, the large spectrum of possible impact areas would necessarily result in a trade-off between precision and scope of measurement.

In the absence of appropriate quantifiable metrics, the Evaluation Team has sought to assess the economic impacts which have been achieved to date through primary research with Project Kelvin customers and strategic stakeholders, supplemented with the findings of recognised secondary research studies. The salient findings of this analysis are detailed in the following sub-section.

## 3.3 Economic Impacts

### *3.3.1 Uptake by Businesses*

In many situations, Project Kelvin acts as a *'carrier's carrier'* network whereby Hibernia sells telecoms circuits (including sub-10 Gigabit (G) circuits, 10G circuits and dark fibre) to businesses who typically either split the circuit into multiple circuits and sell connectivity to smaller businesses (i.e. other registered telecoms providers) or those businesses which have a requirement for very high bandwidth (e.g. data centres). As such, Hibernia's customer base consists of a relatively small number of high-profile large business customers. However, per our discussion at Section 3.2, the impacts of the improved connectivity enabled by Project Kelvin are likely to filter through the economy in a number of layers as Hibernia's customers sell connectivity to smaller suppliers who ultimately sell connectivity to homes and SMEs throughout the INTERREG IVA eligible region of the island of Ireland.

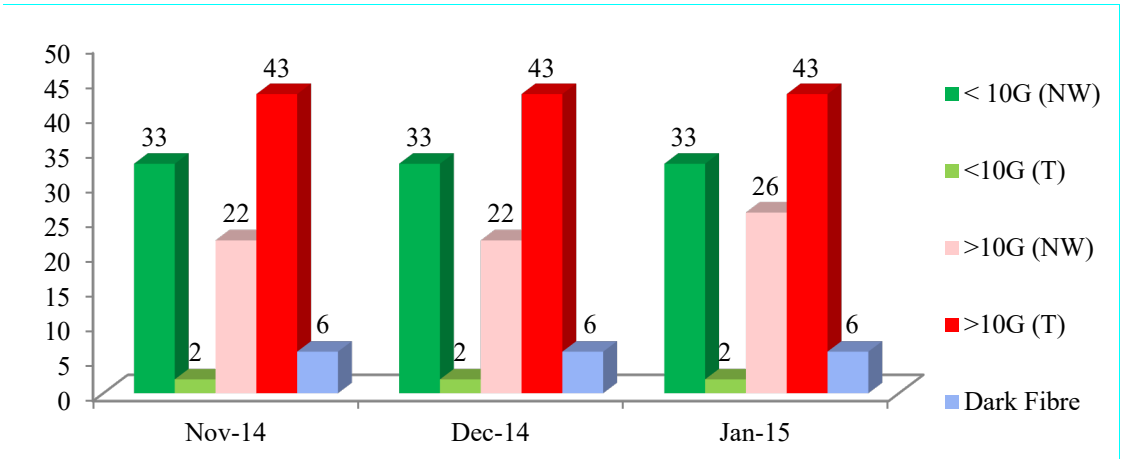
Therefore, whilst a large number of businesses of all sizes and across all sectors of the NI and RoI economies potentially experience benefits as a result of reduced latency, improved resilience and lower costs for telecoms connectivity through Project Kelvin infrastructure they are unlikely to be fully (or at all) aware that they have engaged with Project Kelvin. It is therefore not possible for the Evaluation Team, or indeed Hibernia, to provide a robust estimate of the number of businesses throughout the eligible region which have ultimately benefitted from Project Kelvin.

In terms of its own client base, Hibernia monitors the number of live circuits in operation each month broken down as follows:

- Capacity of circuit (i.e. sub-10G, 10G or dark fibre); and
- 'North West' (NW) and 'Transit' (T) circuits. It should be noted that a North West circuit has an end-point in the North West region of the island of Ireland (i.e. any business based near one of the 13 mandatory locations where Hibernia has located a PoI) and a Transit circuit does not have an end-point in the eligible region but is utilising the Project Kelvin infrastructure (e.g. a circuit from Dublin to Amsterdam which exits the island of Ireland via Portrush).

The chart below illustrates the number of live circuits operated by Hibernia which utilised the Project Kelvin infrastructure between November 2014 and January 2015[53] broken down into these categories:

**Figure 3.1: Number of Live Project Kelvin Circuits**




[53] Source: Analysys Mason (2015) 'Report for DETI/DCENR Review of January 2015 Monthly Report'

Key findings relating to the previous chart include:

- There were 104 live circuits in January 2015 plus six leased dark fibres which represented an increase of 4 circuits (10G North West circuits) since November 2014.
- The 104 live circuits consisted of 35 circuits (34%) which were sub-10G capacity and 69 (66%) which were of 10G capacity. It is understood that in February 2012, only half (50%, N=54) of live circuits were of 10G capacity. This indicates an increasing preference amongst Hibernia's customers/businesses for higher-capacity products than earlier in the contract period. Whilst specific prices for each product were not available to the Evaluation Team, discussions have suggested that it is often more cost effective for customers to purchase higher-capacity circuits than a number of smaller circuits. This therefore encourages customers to 'trade-up' through the range of available products.
- In January 2015, there were 59 circuits which had an end-point in the eligible region which represented 56% of the total live circuits. Over half (56%) of the North West circuits were in the sub-10G capacity range. In contrast, the vast majority (96%) of the transit circuits were of the higher 10G capacity. This indicates that businesses based within the INTERREG IVA eligible region of the island of Ireland typically require lower bandwidth than their counterparts based outside the eligible region (in all probability likely to be based in the Greater Dublin area) and suggests that they may potentially be smaller companies.
- Consultation indicates that the transit customers are likely to be utilising the Project Kelvin infrastructure along with one or more additional international telecoms link (e.g. Hibernia-South) in order to improve the resilience of the connectivity.

It should be recognised that there are client confidentiality and commercial sensitivities associated with Hibernia's customer portfolio which have prevented the Evaluation Team from receiving a complete list of live customers (although information in the public domain indicates that customers include businesses such as Tibus and Novosco). In the absence of this information, Hibernia has advised that on average a customer is likely to purchase two circuits in order to provide increased resilience. On the basis of this proxy, it is estimated that approximately 52 businesses are currently contracting with Hibernia to operate 104 telecoms circuits connected to the Project Kelvin infrastructure.

Hibernia has confirmed that the customer base includes both:

- Indigenous businesses which require fast and reliable international connectivity for transferring large packets of data to North America and Europe e.g. businesses in the film industry; and
- Foreign MNCs[54] , some of whom have invested in the INTERREG IVA eligible region of the island of Ireland. Hibernia considers that is likely to be partly as a result of the world-class connectivity.

Key sectors that are represented amongst Hibernia's Project Kelvin customer base are understood to include telecoms providers, data centres, financial services businesses, educational institutions and creative and digital media businesses.

Representatives from Hibernia have suggested that the uptake of Project Kelvin by businesses based in the North West region has not fully been in line with the expected levels [redacted] Uptake by Transit businesses (i.e. those outside the eligible region) is understood to have been more favourable[55].

[54] Multinational corporations
[55] NB Many reasons potentially influence this scenario, including the Republic of Ireland's ability to attract large international MNCs.

### *3.3.2 FDI Impacts*

A study commissioned by DETI[56] highlights that the importance of FDI in the global financial landscape continues to grow at pace. In 2013, total global FDI inflows rose to an estimated US$1.46 trillion, up 11% from US$1.32 trillion in 2012.

Looking specifically at NI, the study reported that NI has a strong track record in attracting FDI. In the five years from 2006/07 to 2010/11, Invest NI assisted over 120 foreign companies to invest in greenfield FDI projects in NI, creating nearly 12,000 new jobs in their subsidiaries. Software and IT, business and professional services, and financial services accounted for 71% of these new jobs.

The research showed that there were 17 determinants considered by potential inward investee companies when selecting a region to locate business. These included the following:

| **Table 3.1 - Determinants in Selecting a Location for FDI** | |
|---|---|
| • Agglomeration (stock of foreign companies)<br>• Corporation Tax<br>• Experienced labour pool<br>• Financial incentives (e.g. grants)<br>• Inexperienced labour pool<br>• Infrastructure<br>• Innovation<br>• Labour costs<br>• Labour regulations | • Market size<br>• Openness to FDI<br>• Productivity<br>• Property costs<br>• R&D<br>• Skills<br>• Tightness in the labour market<br>• Quality of life |

It can be seen from the table above that infrastructure is one of the factors considered when selecting an investment location, and telecoms infrastructure would represent a key component of this aspect. However, the research showed that the most important factors considered were corporate tax, labour costs, market size and agglomeration.

Historically, foreign firms have contributed significantly to the economic growth and development of the RoI. FDI is important to the Irish economy in terms of employment, employment growth, industrial output, productivity growth and for the expansion and diversification of Irish exports. A recent study[57] highlighted that *"Ireland has significant advantages over its direct FDI competitors in terms of its location, language and financial infrastructures. In contrast to these advantages, Ireland's competitive position continues to fall behind that of other EU and OECD countries in terms of transport, energy and* ***broadband infrastructure".***

Therefore, despite having a strong performance on FDI, Ireland continues to have a less developed broadband infrastructure when compared to some EU competitors.

Project Kelvin sought to overcome the relative remoteness and enhance the competitiveness of the North West region of the island of Ireland in terms of lowering the costs of doing business and to provide infrastructure which was comparable with the network provision in telecoms hubs such as London and Amsterdam. As such, it was proposed that Project Kelvin would encourage increased FDI activity throughout the North West region, particularly from large MNCs given the capacity of circuits proposed to be sold by Hibernia.

Furthermore, it was proposed that the enhanced resilience offered throughout the island of Ireland through the development of multiple international 'exit points' from the island would be attractive to MNCs wishing to spread their service failure risks away from traditional hubs such as London and New York. The improved latency through the direct linkage was proposed to be of particular importance to businesses from certain knowledge-based and high-bandwidth usage sectors such as financial services, ICT and digital media industries.

[56] FDI Intelligence (2012) 'Improving the Quality of Foreign Direct Investment to Northern Ireland' Commissioned by DETI.
[57] Grant Thornton (2014) ' Foreign Direct Investment in Ireland: Sustaining the Success'

The provision of world-class telecoms infrastructure across the island of Ireland sought to provide the bodies (e.g. Invest NI and IDA) tasked with attracting and retaining industry and investment in knowledge economy jobs with a significant tool to promote the economy effectively on a global scale. Discussions with key representatives from both of these organisations have confirmed that provision of telecoms infrastructure (including Project Kelvin) carries significant collateral when marketing the island of Ireland (and particularly the North West region) to potential foreign direct investee companies. Specifically, it was noted that the two unique selling points of the international telecoms offering are:

- The diversity of telecoms linkages off the island which provides highly resilient connectivity to businesses and is of particular importance for data centres; and
- The low latency of connectivity from the island to North America given the relatively close proximity across the Atlantic Ocean when compared with other competitor cities throughout GB and mainland Europe.

At present, only the Hibernia infrastructure (i.e. the two separate international links exiting the island) offers the ability to maintain these unique selling points to encourage FDI to the island of Ireland, which illustrates the strategic and economic importance of Project Kelvin. Consultees noted that for financial services and digital sector businesses and for ICT data centres in particular, the provision of world-class telecoms connectivity is of critical importance when considering regions in which to potentially invest and locate. In this regard, the consultees reported that the INTERREG IVA eligible region of the island of Ireland is in a strong negotiating position, and furthermore, there has generally been a positive response from potential investors in relation to the connectivity available.

However, in line with the Evaluation Team's own research, the consultees within the IDA and Invest NI emphasised that telecoms connectivity is, for the vast majority of potential investors, a general purpose technology. That is, whilst it is an integral factor in the investment decision making process, it is only one of a large portfolio of factors which may incentivise FDI to a particular location, but it is not amongst the more influential factors. Indeed, for most businesses (with the potential exception of very high-bandwidth users such as multi-national data centres), resilient and available telecoms connectivity is 'taken as a given'. The consultees suggested that in most cases the general costs of doing business and the labour force available within both NI and RoI are the primary distinguishing features in securing FDI over and above other locations considered. When comparing NI with RoI, the favourable corporation tax conditions in RoI were cited as continuing to provide a comparative advantage for RoI in securing inward investment.

Whilst it should be recognised that there is rarely a direct cause and effect relationship between the enhancement of telecoms infrastructure and the securing of FDI, consultees within both the IDA and Invest NI emphasised the importance of the *counterfactual position* i.e. 'what would the FDI landscape in the INTERREG IVA eligible region of the island of Ireland look like in the absence of Project Kelvin?'.

It was suggested by the consultees that, in order for the region to compete on a global scale for FDI opportunities, it is necessary that there are, as a minimum, adequate international and terrestrial telecoms networks which are (at a minimum) in line with the offerings provided in other regions/ countries. In the absence of Project Kelvin, it was suggested that is likely that the INTERREG IVA eligible region would have remained at a competitive disadvantage when compared with other regions/ countries and would not have been in a position to meet the minimum GPT requirements which subsequently enable FDI businesses to consider and negotiate in relation to other factors such as human capital, taxes and financial incentives (e.g. grants). It was noted by the consultees that costs for telecoms that were greater than benchmark regions, or telecoms with high latency or low resilience would be prohibitive to businesses considering the region for investment when there are many other locations worldwide (e.g. Singapore, Manchester, Dublin) which would offer enhanced telecoms connectivity.

Representatives from Invest NI highlighted that the NI Executive has an agenda to promote the region as a knowledge-based economy with a highly-educated workforce and is seeking to secure FDI from value-added sectors including creative and digital industries and ICT in order to create quality

employment and drive economic growth. It was noted that in the absence of adequate telecoms infrastructure, including direct international linkages to North America and mainland Europe, it would be challenging to market the region effectively to businesses within these knowledge-based sectors.

In summary, whilst the world-class telecoms connectivity provided throughout the INTERREG IVA eligible region (including, but not limited to, Project Kelvin) represents an integral factor in incentivising new businesses to locate in the region, it primarily serves to address the comparative disadvantage which existed in the region when compared with other locations competing for FDI, rather than being a distinguishing factor or competitive advantage. As such, there is an ongoing need to ensure that the telecoms infrastructure provision throughout the region is continually maintained/ upgraded to enable the INTERREG IVA eligible region of the island of Ireland to compete for FDI opportunities on a global scale. However, such investment needs to be made hand-in-hand with investment in the other determinants of FDI (e.g. corporation tax and labour forces) and other infrastructural developments in order to incentivise high-quality inward investment.

### *3.3.3 Impacts for Indigenous Businesses*

Telecommunications and connectivity are of vital, and increasing, importance to businesses of all sizes and there is a recognised cause-and-effect relationship between increasing demand for higher bandwidth and faster speeds, and increased capability amongst businesses. That is, as businesses identify and recognise the value of additional skills and operating tools which require bandwidth such as video-on-demand (e.g. for training or instructional videos) and online file transfers, their need for greater connectivity correspondingly increase.

The high costs of international connectivity were considered to be a particular disadvantage for indigenous businesses within the INTERREG IVA eligible region of the island of Ireland, stymieing the ability to diversify and win new business (e.g. through new sales channels or innovative products and processes requiring high bandwidth) as well as reducing the overall profitability of the businesses. In turn, this placed limitations on the growth and job creation potential of indigenous businesses. As such, businesses located within the region were at a competiveness disadvantage when compared with businesses on the East coast of Ireland, GB and mainland Europe. It was proposed that the enhanced connectivity achieved (in terms of increased latency and resilience and lower costs) would increase the competitiveness of indigenous businesses located in the North West region.

The majority of indigenous businesses within the INTERREG IVA eligible region are SMEs and therefore are unlikely to have required sufficient capacity so as to have directly contracted for connectivity from Hibernia through Project Kelvin. However, SMEs will contract for telecoms provision from one of a number of retail service providers (e.g. NW Electronics, BT, eir, Virgin Media, Sky etc.), some of which are direct customers of Hibernia. As such, it is likely that the improved resilience, lower latency and lower costs which have been achieved as a result of Project Kelvin are likely to have ultimately reached these indigenous businesses, thereby providing them with the opportunity to operate on a global scale (e.g. through e-business) and reducing their cost base.

In support of this, Ofcom recently completed a survey[58] with 338 SMEs in NI to assess their views on telecoms. Key findings, drawn from this survey, include:

- Over four fifths (83%) of SMEs surveyed agreed that communication services were **fundamental** to their business and without them they could not achieve their goals.
- Over three quarters (78%) of SMEs in NI are operating online and almost a quarter (23%) use fibre broadband. This level is higher than the UK national average of 13%.
- NI SMEs reported that they use the internet for the following purposes:
  - 83% order goods and services online;
  - 58% make payments online;
  - 69% have a company website;
  - 40% use online marketing;

[58] Ofcom Communications Market Report: Northern Ireland (2014)

- 40% take orders online;
- 38% take payments online; and
- 28% use online data storage and/or back-up.

- Most (88%) SMEs agreed that the needs of their business are well catered for by the communications market in NI.

The Ofcom research emphasises the importance of adequate connectivity to small and medium sized businesses in NI and the wide range of uses of the Internet demonstrated by SMEs including sales, purchases and marketing. It is therefore critical that infrastructure is continually enhanced to ensure that indigenous SMEs throughout the island of Ireland can compete with large companies and operate on a global platform.

As part of the Interim Evaluation, Cogent requested, where possible (given issues relating to client confidentiality and commercial sensitivities associated with Hibernia's customer portfolio) that Hibernia provide details of a selection of Project Kelvin 'users' to ascertain their views on the impact that the project had on their operations[59]. Contact e-mail address were provided for 24 Project Kelvin users, 7 of whom were willing to participate in the study. We have detailed below, key findings drawn from those seven consultations, followed by two case-studies providing specific examples of the impact that Project Kelvin has had on two businesses (one based in the Republic of Ireland and one located in Northern Ireland).

Key feedback received from Project Kelvin users includes:

- Project Kelvin provides reassurance amongst large data users and their customers relating to 'resilience and security of supply', through the provision of a second direct international telecoms link off the island of Ireland;
- One consultee suggested that *'they are always asked about the reliability of connectivity when they are trying to sell overseas'* as the Island of Ireland *'is viewed as being a remote location'*. In this context, latency and cost-effectiveness were also considered to be key considerations by this consultee;
- None of the consultees have experienced any issues relating to latency;
- All of the consultees were of the view that the introduction of Kelvin, to some extent, had a positive impact upon costs, through the creation of a greater level of competition, which the market reacted to. Some consultees noted that Project Kelvin was likely to have been only one contributory factor as prices were reducing across Europe at that time. However, even in the context of significant price erosion in transatlantic broadband prices, it was suggested that the introduction of Project Kelvin has served to speed the process up;
- Within the INTERREG region context (i.e. Northern Ireland and border counties of the Republic of Ireland), the introduction of Project Kelvin was considered to have partially addressed what was considered to have been an 'almost monopolistic position' that was held by two providers (one in NI and one in RoI), through the introduction of competition for international circuits;
- Consultees reported having experienced 'significant reductions' in the cost of bandwidth in recent years. However, they were not in a position to determine to what extent Project Kelvin influenced this; although all were confident that it had played a part;
- A number of consultees (it should be noted that this view was reflected within our discussion with local authorities and Chambers of Commerce) were of the view that there are many misconceptions about Project Kelvin within the marketplace. These included:

    - A misconception that Project Kelvin could directly benefit all businesses within the INTERREG eligible area. Whilst the consultees were of the view that Project Kelvin had contributed to generally lower costs, it was suggested that Project Kelvin could, for the most part, only be directly accessed by broadband carriers or businesses which have a requirement for very high

[59] It is noted that the initial request for such information was made during March 2015, with a second request made during April 2015. The Evaluation Team was provided with the e-mail addresses of 24 Project Kelvin users during late August 2015. Each of the 24 individuals were e-mailed during late August 2015 to ascertain their willingness to participate in the study, with a follow-up e-mail issued during mid-September 2015.

bandwidth (e.g. data centres). It was noted that most businesses (that are not located adjacent to a PoI) have to utilise the infrastructure of other providers before they can access the Project Kelvin infrastructure. It was suggested that the prices offered by the providers that own the infrastructure that connects to Project Kelvin are not particularly competitive. In relation to this point, it was suggested that for Project Kelvin to be truly beneficial to the broader base of SMEs within NI, a fibre ring similar to that operated by BT would need to be created which connected to Project Kelvin;

- That Project Kelvin would bring FDI to areas of NI outside Belfast. It was suggested that, for the most part, no discernible FDI impacts have been seen outside Belfast as a result of Project Kelvin. A common view was that Project Kelvin, whilst representing a crucial investment for the Island, had been 'oversold' and that an accurate representation of what it brings to the marketplace is not particularly well known;

- Some consultees were of the view that Hibernia is a 'Tier 1' provider (i.e. a 'wholesale broadband provider'[60] or a provider to individual businesses that require very high bandwidth), and is not particularly interested in or suited to dealing directly with smaller businesses;
- Furthermore, it was suggested by some consultees that there is potentially a very substantial opportunity to utilise and leverage Project Kelvin to attract 'Tier 1' businesses and large FDI propositions, such as Data Centres and drug discovery businesses to NI. Consultees pointed towards the Republic of Ireland's work in attracting such projects, and the beneficial spin-offs that have been achieved as a result (often sometime after the initial data centre investment was made, as it was recognised that data centres are often, in and of themselves, not directly responsible for creating large numbers of jobs);
- Project Kelvin was described by two consultees as being akin to a railway line, but it was suggested that little consideration, has been given, to date, to providing it with or connecting it to effective railway stations;
- One consultee recommended that DCENR/DETI should explore options to create more direct connectivity to mainland Europe;
- A consultee suggested that their experience of being a customer of Hibernia (and therefore of Project Kelvin) as being both 'good and dreadful'. They commented positively upon the connection to the USA and how they were able to sell this to their customers. The consultee commented upon some issues that they had with service provision, but recognised, on behalf of Hibernia, issues relating to the lack of a 'critical mass' of demand for large scale broad band provision in NI. The NI based business was also of the view that a number of its customers would likely have explored moving to Dublin, had it not been for the introduction of Project Kelvin;
- Consultees were confused as to 'who owns what' in relation to the Saturn Ring and that Project Kelvin is only an aspect of addressing NI's connectivity issues. There was a suggestion that these issues have not yet been addressed by DETI. The consultees suggested that their understanding was that the utilisation of the Saturn Ring would bring lower cost and resilient broadband provision to locations across NI. However, many were of the view that the provision in those locations and others in NI continues to be 'poor'. Another consultee summed the issue up as "the out-of-the-Island aspect of broadband provision is working well; the within NI aspect is not". Even greater levels of competition are suggested to be needed, as well as more initiatives such as the recent 'Super connected Cities' project in Belfast and Derry/Londonderry. However, consultees were conscious that connecting the 'last leg' (i.e. to areas not located immediately adjacent to a PoI) is likely to be cost prohibitive for the private sector.
- Some consultees raised concerns as to what will happen once DETI/DCENR's current contract with Hibernia expires, suggesting that *"there is no or limited dark fibre in the Northern segment from Derry/Londonderry/Coleraine to Belfast, and there is a real risk that Hibernia's commercial terms will therefore increase substantially"*;
- In relation to whether Project Kelvin is being promoted sufficiently within NI, some consultees suggested that more could be done, but queried whether Northern Ireland has, at present, a sufficiently large number of business that require very large bandwidths. This again was suggested to be a concern and risk for the medium term;

[60] NB This reflects a misconception within the marketplace, as Hibernia is a 'wholesale bandwidth provider' rather than a 'wholesale broadband provider'.

- All NI based consultees considered that more investment is required in infrastructure to connect to Kelvin and the PoIs, with some noted that individual PoIs have very few customers. It was suggested that Project Kelvin was largely for businesses that utilise large bandwidth, but NI is largely comprised of SMEs. It was suggested that stakeholders need to consider whether NI's provision is suitable for that market;
- Questions were also raised as to Project Kelvin's longevity as it was noted that at some point the cable will become non-economic to repair. Consultees queried whether plans were in place to address this risk.

### *3.3.4 Case-Studies of Indigenous Businesses*

The following provides two case-studies of specific examples of the impact that Project Kelvin has had on two businesses (one based in the Republic of Ireland and one located in Northern Ireland).

**Project Kelvin Case Study - enet[61]**

enet is a wholesaler of telecoms services within the Republic of Ireland. It buys backhaul connectivity from the owners of infrastructure e.g. BT, eir, ESB Telecoms, Hibernia and sells it onto over 60 telecoms service providers such as Vodafone, Digiweb, UPC etc.

The company is committed to the development of open access networks for the delivery of affordable, state of the art broadband services. It operates the Irish State's Metropolitan Area Networks (MANs) which has become known as regional Ireland's fibre optic infrastructure. These networks are capable of delivering cutting-edge communications and information services, such as superfast broadband, in 94 towns and cities throughout Ireland. The MANs operate on an open-access basis meaning that all licenced carriers can have access. This model is contrary to traditional operators' exclusivity of network, and allows for competition in a way that has not previously happened within the Republic of Ireland.

In operating the MANs, enet has transformed the Irish telecommunications industry by stimulating competition, reducing bandwidth costs and accelerating Ireland's broadband position. The MANs underpin a policy of balanced regional development by removing a barrier to Foreign Direct Investment (FDI) and there is demonstrable evidence to highlight that MAN towns now secure the vast majority of FDI jobs.

In addition to operating 94 Metropolitan Area Networks (MANs) on behalf of the Irish State, enet has also developed a significant and complementary business providing national backhaul services to these towns. Taken together, enet's network coverage represents a single, integrated, nationwide platform and this allows service providers to develop products and serve markets on a genuinely nationwide basis

Our consultation with enet indicated the following:

- enet is a wholesaler of telecoms services. It buys backhaul connectivity from the owners of infrastructure e.g. BT, eir, ESB Telecoms, Hibernia and sells it onto client-facing telecoms service providers such as Vodafone, Digiweb, UPC etc.
- enet has an ongoing relationship with Hibernia and is a subscriber to its backhaul services throughout the RoI. According to enet, *"Our preference, based upon the commercials, is to use Kelvin backhaul where available. Hibernia/Kelvin's presence has positively disrupted the backhaul market"*[62].
- According to enet, Project Kelvin opened up new routes and access to backhaul where there had either previously been none, or where there had been limited competition. Project Kelvin therefore provided alternative options for telecoms providers.
- In addition, the entry of Hibernia created competitive pressures within the marketplace, which in turn drove prices down.
- enet acknowledged that prices had been decreasing on an international basis, and so the company was unable to determine exactly what proportion of the cost reductions that have been evident since the introduction of Kelvin. However, the consultee was in no doubt that the introduction of Kelvin has "certainly had an impact" and had meant that prices decreased quicker and to a greater than would have been the case otherwise.

[61] enet was recommended as a 'Kelvin' consultee by the IDA
[62] NB The consultee provided, in confidence, the Evaluation Team with commercially sensitive information to support this statement.

**Project Kelvin Case Study - enet[61]**

- enet is of the view that Project Kelvin has offered greater resilience for its customers whereby they can, for example, utilise Kelvin infrastructure in one direction and ESB Telecoms infrastructure in the other direction or many other combinations of travel.
- According to enet, towns with MANs such as Letterkenny, Dundalk and Drogheda have been shown to attract more FDI and create more employment than those without MANs.

During August 2014, enet announced that it would build a "fibre to the business" (FTTB) network in Ardee, Co. Louth. The FTTB network is aiming to provide a better broadband experience, eliminate bandwidth bottlenecks and enable local businesses to fully enter digital markets and exploit online applications. Crucially, enet stresses that this is a genuine fibre rollout, with fibre optic cables being delivered directly into premises (whereas other fibre services connect to a local telecoms exchange or cabinet and then rely on copper networks to reach premises). The fact that fibre is delivered directly into businesses offers the potential to transform broadband capabilities with speeds of up to 250Mb per second being supported from day one, making it the fastest fibre delivered broadband speeds in Ireland.

Our discussion with enet indicates that Project Kelvin is a vital enabler of the Ardee FTTB project through the provision of backhaul bandwidth. The project itself will enable approximately 180 SMEs in Ardee with fibre connectivity (directly terminated in businesses as opposed to cabinets). Entry level product, available from Ripplecom over the network, is 50Mbs broadband.

Whilst cautioning that more specific information in relation to its customers, enet suggested that on a more general level that the influence of Kelvin can be seen in the following:

- Kelvin towns were 'lit' earlier than comparative non Kelvin Towns;
- Kelvin towns have more connections (more than double the number in the cases below);
- Kelvin towns are trafficking more bandwidth (again multiples more).

The Evaluation Team notes that enet provided us with comparative data for Castleblayney compared with Cahir and Cashel (i.e. a smaller town comparison), and Monaghan compared to Dungarvan (i.e. a larger town comparison) to support these points. However, the information was provided on a 'commercially sensitive' basis, and for that reason, we have not presented it within this report.

**Project Kelvin Case Study – North West Electronics**

North West Electronics (NWE) Wireless Networks was established in 1991 to provide services to the mobile radio industry. From these humble beginnings, it is now the largest independent Broadband Networks operating throughout Northern Ireland and County Donegal. Its WiMAX Service is considered to be one of the newest and most innovative internet service providers in the North West of Ireland providing a wireless internet service in the Foyle Basin and Donegal area. It is also one of the largest cellular site installers in Ireland. The company has expanded into the development and installation of wireless networks.

Our consultation with NWE indicated the following:

- The company has a number of large connections to the Project Kelvin infrastructure, through which it supports over 6,000 individual customers (of which 75% are resident customers and 25% are business customers);
- The consultee has found the resilience and latency of the Project Kelvin infrastructure to be 'largely very impressive';
- The consultee suggested that the introduction of Project Kelvin led to a substantial decrease in the prices of higher bandwidth in the North West region of the Island of Ireland and pointed (as an indicator of Kelvin's influence) to the fact that at that time, prices were not decreasing in either Dublin or London;
- However, it was suggested that Project Kelvin has had little impact on the prices of lower bandwidth. Although, it was recognised that Hibernia is primarily a wholesaler of broadband and not a retailer;
- The consultee suggested that this decrease in price *"expanded their scale of opportunity significantly"* and has contributed to their considerable growth;
- Additionally, Project Kelvin allowed the company to offer a quantity of bandwidth in rural areas that was not previously possible. It was noted that other initiatives such as Super Connected Cities have also helped this.

### 3.3.5 *Potential Medium-Term Impact – Coleraine Enterprise Zone*

It is notable that all of the local authorities in the North West of the Island considered that Project Kelvin has had, to date, limited impact on their local economy. One local authority (Causeway Coast and Glens Borough Council) has plans to address this. Our discussion with the Council indicated the following:

- In 2014, the Chancellor of the Exchequer announced that Northern Ireland's first Enterprise Zone would be in Coleraine, linked to a data centre investment that had received planning permission some six months earlier. The data centre planning permission is on land adjacent to the University of Ulster, Coleraine Campus which has a Centre of Excellence in relation to 'cloud computing'.
- The Council anticipates that the data centre development, enabled by a combination of the Project Kelvin digital cable, the Enterprise Zone designation and the cloud computing centre of excellence at the adjacent University of Ulster, can now act as a catalyst for significant economic development.

### 3.3.6 *Employment Impacts*

Broadband (and faster broadband in particular) has a complex relationship with employment creation at a national level. There appears to be a 'creative destruction' effect at work, in which employment growth may be suppressed to some extent by improvements in business process efficiency (businesses doing more with less), while better connectivity may also lead to employment growth opportunities through new business models and emerging sectors. For instance, research[63] has indicated that for every 1% increase in broadband penetration rates, there is an increased employment rate of 0.2% to 0.3% per year.

There is greater consensus however, that the relative availability and quality of broadband has a significant impact on employment growth at a local level. Areas of the UK and Ireland with poor broadband tend to 'lose out' to areas with better connectivity. In the event that there was a persistent and widening digital divide, then this local effect would lead to adverse national level impacts over time, as jobs lost or foregone in areas with poor broadband would not be replaced by jobs created in areas with good connectivity.

Publicly funded interventions to reduce the digital divide can therefore help safeguard net employment and the associated GVA at the UK level, as well as at local levels. This is of particular importance for an intervention such as Project Kelvin which seeks to address infrastructural imbalances in telecoms on a regional level.

The UK Broadband Study highlights that there are employment impacts related to the construction of telecoms networks. The investment of public funds into faster broadband infrastructure, together with the leveraged private sector investment, itself creates (or safeguards) economic activity in the relevant telecoms companies and their supply chains in the construction phase: e.g. in manufacturing the required additional equipment, undertaking civil engineering for new ducts, installing new fibre cable and cabinets etc.

Similarly, a report[64] from Columbia Business School highlights the requirement of significant investment in the upgrading of existing infrastructure or the construction of new broadband networks in the movement to high-transmission capacity internet. The author highlighted that through this investment, both direct and indirect effects are to be expected. The scope and scale of these effects will directly relate to the investment undertaken and the timeframe. Even though the impact of broadband construction is much smaller than the utility derived from the use of networks[65], it is an important factor that needs to be taken into account when developing strategies for deploying broadband infrastructure, and in particular strategic private or public investment programmes.

[63] Crandall, R., Lehr, W., and Litan, R. (2007) 'The Effects of Broadband Deployment on Output and Employment: A Cross-sectional Analysis of U.S. Data'
[64] Dr. Raul L. Katz, Columbia Business School - Estimating broadband demand and its economic impact in Latin America (2009)
[65] Pantelis Koutroumpis - Imperial College London - The Economic Impact of Broadband on Growth: A simultaneous approach (2008)

In general, there are three types of network construction effect:

- First is the *direct* effect upon jobs and output. In the course of deploying network facilities, additional employment and economic production is generated. There will also be increased demand in the labour market for the construction workers and telecoms technicians who are needed during this phase.
- Second, the *indirect* effects refer to employment and production generated by buying and selling in support of direct spending.
- The third type of effect of broadband network construction consists of the *secondary jobs and output* generated by household spending based on the income earned from the direct and indirect effects, such as sales of consumer durables, and increased retail trade or consumer services.

Discussions with Hibernia have indicated that there were approximately 30 full-time equivalent (FTE) employees directly employed during the construction phase of Project Kelvin. Details on the roles, responsibilities and salary levels of these employees were not provided to the Evaluation Team. Since the completion of the construction phase, one FTE has been employed by Hibernia and based in NI who is responsible for maintaining and operating the Project Kelvin infrastructure.

Whilst it is not possible to quantify the number of jobs which have been indirectly created as a result of Project Kelvin, consultations with key stakeholders have indicated that there has been job creation in the INTERREG IVA eligible region of the island of Ireland which is likely to have been at least partially attributable to Project Kelvin. This includes both:

- Indigenous businesses such as telecoms providers across the island of Ireland which have had the opportunity to provide a more competitive service as a result of improved connectivity and ultimately to expand their businesses and create more employment in recent years; and
- Inward investee businesses which have located in the INTERREG IVA eligible region of the island of Ireland which have created employment.

Furthermore, the ultimate end-users of the services provided by telecoms providers (who are, in turn, customers of 'Hibernia/Project Kelvin') may have been able to create employment in recent years as a result of lower telecoms costs and enhanced competitiveness.

Over and above job creation, the UK Broadband Impact Study[66] noted that the provision of improved broadband provision can provide other labour force impacts. For instance, improved levels of connectivity reduce the barriers to employment for certain parts of the working age population e.g. a proportion of carers, or people with disabilities. Similarly, Ericsson[67] reported that faster broadband provision boosts personal productivity and allows for more flexible working arrangements as well as opening up possibilities for more advanced home-based businesses as a replacement, or complement to, a person's traditional 'day-job'. These factors contribute to enhancing the welfare of employees.

As such, it is likely that Project Kelvin has contributed to direct and indirect employment impacts in the INTERREG IVA eligible region of the island of Ireland since 2009.

### *3.3.7 Costs and Competition*

The Feasibility Study for Project Kelvin showed that the cost of telecoms from the North West region to North America and mainland Europe was approximately 20 times greater than the cost of equivalent communications from London or Dublin. These high costs of telecoms were considered to be prohibitive for attracting FDI into the region and detrimental to the profitability and growth potential of indigenous businesses located in the region. It was considered that cost differentials were partially as a result of the fragmented telecoms infrastructure throughout the region, and partially as a result of the dominant position of a small number of providers in certain locations.

It should be noted that the mandatory product prices monitored by the Contracting Authority and discussed in Section 2.3.3 represent only a small number of the potential product options which can be

[66] SQW (2013) 'UK Broadband Impact Study'
[67] Ericsson –Socioeconomic Effects of Broadband Speed (2013)

availed of by Hibernia customers and due to commercial sensitivities, Hibernia is not contractually required to provide the Contracting Authority with a full breakdown of the detailed contract arrangements (and associated pricing) which are in place with each of its customers. Therefore quantitative data is not available in relation to the actual pricing strategy employed by Hibernia throughout the Project Kelvin contract to date.

Similarly, the pricing structures offered by other telecoms providers (e.g. BT, eir, ESB Telecoms etc.) is not transparent for the public and is typically subject to negotiations with potential customers.

As such, it is not possible to directly compare the prices charged for international and terrestrial bandwidth following Project Kelvin (by Hibernia and other telecoms providers) with those charged prior to project implementation. However, discussion with stakeholders indicates that Project Kelvin has had an impact on the cost of telecoms throughout the North West region of the island of Ireland, based on the following points:

- The international telecoms link provided through Project Kelvin was a more direct (and shorter) route from the North West to North America than was previously available so packets of data were required to make fewer switched hops which results in lower costs for connectivity. Consultations have suggested that at least a proportion of the cost savings from the new telecoms infrastructure were passed on to the customers through lower pricing.
- Hibernia was a new entrant in the telecoms market in the North West when it submitted (and delivered) its proposal to offer direct international and terrestrial telecoms services throughout the region. Therefore Project Kelvin provided a new competitor to the telecoms industry in the region.
- Hibernia has stated through consultation that it typically adopts a "disruptive, aggressive approach" to pricing and sought to win new customers by competing with the existing providers on price and quality. It was therefore reported that this approach drove down the overall prices for international and terrestrial connectivity in the market.
- One Hibernia customer has provided the Evaluation Team with details of their telecoms backhaul costs prior to Project Kelvin (utilising a competitor's infrastructure) and their costs for the same backhaul following Project Kelvin utilising Hibernia's infrastructure. For commercial reasons the customer has requested that the figures are not included within this report but the Evaluation Team can confirm that the costs have decreased by over one third. The customer confirmed that for commercial reasons it is their preference to utilise the Kelvin infrastructure.

It should be recognised that whilst the costs of international connectivity have reportedly declined in the INTERREG IVA eligible region of the island of Ireland since the implementation of Project Kelvin, there has been a corresponding decrease in the costs of international connectivity globally. Data provided by Analysys Mason and sourced from TeleGeography indicates that the monthly lease price of Trans-Atlantic connectivity (from London to New York) and Inter-European connectivity (from Frankfurt to London) has fallen year on year since 2009, as shown in the table below:

**Table 3.2 – Reductions in Costs of International Connectivity (2009-2014)**

| | Monthly Lease Price for 10 Gbit/s Wavelength | | | | | |
|---|---|---|---|---|---|---|
| **Route** | **2009 ($)** | **2010 ($)** | **2011 ($)** | **2012 ($)** | **2013 ($)** | **2014 ($)** |
| London to New York | 12,875 | 11,000 | 9,750 | 8,500 | 7,750 | 6,200 |
| Frankfurt to London | 6,000 | 4,500 | 3,000 | 2,500 | 1,650 | 1,250 |

This data indicates that the cost of a monthly lease of a 10 Gbit/s connection from London to New York decreased by 52% from $12,875 to $6,200 between 2009 and 2014 and the cost of a similar connection from Frankfurt to London decreased by 80% across the same period. Comparable data is not available for the INTERREG IVA eligible region of the island of Ireland (or the comparison cities of Dublin, Glasgow and Manchester as per the original project objectives). However, these figures suggest that it is likely that the costs of international connectivity from the North West region would have decreased to an extent regardless of the introduction of Project Kelvin, but consultation with stakeholders indicates that Project Kelvin presented the opportunity to create a 'level playing field' for telecoms providers to compete on costs similar to those seen in other cities.

## 3.4 Technical Benefits

In addition to its potential for driving economic growth within the INTERREG IVA eligible region, Project Kelvin sought to improve the quality (in terms of latency and resilience) of the international and terrestrial telecoms infrastructure provision within the North West of the island of Ireland, and connectivity throughout the island as a whole.

The following table considers the technical benefits which have been derived from the implementation of the Project to date:

| Table 3.3 Technical Benefits Derived through Project Kelvin | |
|---|---|
| **Technical Benefit** | **Discussion** |
| Reduced latency to North America and mainland Europe | As previously noted, latency is the time taken for a message/ packet of data to traverse the network from source to destination.<br><br>Prior to Project Kelvin, a message/ packet of data required approximately 20 switched-hops to travel from Derry~Londonderry to New York[68] which resulted in high latency. The original Economic Appraisal (November 2008) estimated that the latency from NI to New York was approximately 150 msecs. Similarly a packet/ message of data was required to travel from Derry~Londonderry to Dublin or London prior to onwards travel to mainland Europe which resulted in high latency (estimated to be 90 msecs from NI to Amsterdam in the original Economic Appraisal).<br><br>Businesses require low latency connectivity to compete on a global scale and thus the high latency demonstrated in the North West region of the island of Ireland resulted in the region being comparatively disadvantaged when competing with other regions. Furthermore, with each additional switched-hop there is an increased risk of a single point of failure leading to outages in connectivity.<br><br>Across the island of Ireland as a whole, each of the existing international telecoms links exited the island from the East Coast. This provided a 'long-way-round' to North America and often involved switched-hops in GB, both of which increased latency. As such, latency throughout the island of Ireland was not optimal when compared with other hubs throughout Europe such as Amsterdam.<br><br>Project Kelvin provided a direct international telecoms link from the North West region of the island of Ireland to North America and improved international telecommunications connectivity to mainland Europe. The number of switched-hops for a message/ packet of data to travel from Derry~Londonderry to New York subsequently reduced from approximately 20 to 5 (Derry~Londonderry – Coleraine – Halifax, Nova Scotia – Boston – New York). This direct link significantly reduced the latency of transmission and reduced the risk of single points of failure. Hibernia provided significant financial investment (c. €40m) to connect the Project Kelvin infrastructure to the existing terrestrial routes to Dublin and onwards to the Hibernia South network from Dublin via Southport to North America. As such, businesses throughout the island of Ireland are now able to connect to a direct link which travels West to North America rather than travelling East prior to travelling West (as was previously the case) which has lowered latency levels across the island as a whole.<br><br>The Economic Appraisal for Project Kelvin included an objective to lower latency between North America and the North West by 25% (from a baseline level of 150 msecs from NI to New York).<br><br>The expected latency which was agreed between Hibernia, the Contracting Authority and Analysys Mason from Dublin to Hudson Street, New York (via each of the PoIs in the North West region) and exiting the island of Ireland at Coleraine West in any service month was 70.7 msecs. This represented an anticipated reduction in latency of 53% from the baseline level.<br><br>Based on our review of a sample of monitoring reports and discussions with Hibernia and Analysys Mason, it is clear that the actual service delivered has consistently been in line with (if not lower than) the expected latency. Therefore, the objective relating to latency to North America has been met and exceeded by Project Kelvin to date. |

[68] Including terrestrial changes throughout NI and onwards to New York either via London or Dublin.

| Table 3.3 Technical Benefits Derived through Project Kelvin | |
|---|---|
| **Technical Benefit** | **Discussion** |
| | Similarly the expected latency from Dublin to AMS-IX, Amsterdam (via each of the PoIs in the North West region) and exiting the island of Ireland at Coleraine East in any service month was 19.4 msecs. This represents an anticipated reduction in latency of 78% compared with the baseline level of 90 msecs (as per the Economic Appraisal).<br><br>With the exception of one service deficiency in October 2013 (discussed at Section 2.3.4), the actual latency recorded between the North West and mainland Europe has been in line with the anticipated latency (i.e. approximately 19.4 msecs). Therefore, the objective relating to latency to mainland Europe has also been fulfilled by Project Kelvin.<br><br>As such, it is clear that Project Kelvin has reduced the latency of international telecoms connectivity across the island of Ireland, and in particular from the North West region, thereby contributing to the competitiveness of the region on a global scale, particularly in sectors where speed of connections is of critical importance such as financial services. |
| Increased Resilience of the Telecommunications Networks in the INTERREG Region and the island of Ireland | Project Kelvin provided an independent ring network between North America and the island of Ireland by providing a resilient link to the existing Hibernia-North submarine cable and provided terrestrial linkages throughout the island of Ireland to link with the existing Hibernia networks to Europe and North America from Dublin. These three entry and exit points to the island of Ireland provided capability for 99.999% availability to each of the 13 mandatory locations and enabled Hibernia to provide the most resilient international telecoms network on the island of Ireland at the time of Project Kelvin. To date, the actual availability of service has consistently been in line with this 99.999% availability requirement.<br><br>In practice, the diversity of telecoms connections off the island has reduced reliance on GB for connectivity with North America and means that a business located anywhere on the island of Ireland (e.g. Dublin) can connect directly to North America both using the Hibernia-South and the Hibernia-North networks along with terrestrial networks. |

## 3.5 Summary Conclusions

Our analysis and discussion presented in this section of the report indicates that Project Kelvin has successfully contributed towards the achievement of each of the project objectives included within the Economic Appraisal report, as summarized in the table below:

| Objective | Achieved to date |
|---|---|
| Increased competition in the telecoms market in the INTERREG area. | ✓ |
| Reduced communications latency between North America and the North West by 25%. | ✓ |
| Reduced communications latency between Mainland Europe and the North West. | ✓ |
| The cost of telecoms between North American telecoms hubs and the North West being comparable to those in major UK cities, for example Glasgow and Manchester, as well as Dublin. | ✓[69] |
| The costs of telecoms between European telecoms hubs, for example Amsterdam, and the North West being comparable to those in the major UK cities, for example Glasgow and Manchester, as well as Dublin. | ✓ |
| Increased resilience of the telecoms networks in the INTERREG region and the island of Ireland. | ✓ |

[69] Consultations with key stakeholders have confirmed that Project Kelvin lowered the costs of international telecoms in the region through more direct infrastructure and increased competition.

# 4 CONCLUSIONS

## 4.1 Overarching Conclusion

At a global level, the prevalence of broadband connectivity has seen exponential growth over the last decade – enabling both businesses and citizens to participate in digital activities of different sorts. However, within this context, many businesses (and particularly those operating within the 'knowledge economy') require greater bandwidth and more reliable connectivity than ever before. This means that regions can quickly become disadvantaged from both the perspective of being viable investment locations or for those businesses that are already operating the region, but are or aspire to trade with other areas of the world, if the local broadband infrastructure does not offer equal or better connectivity at competitive prices when compared with competing locations.

Project Kelvin sought to address such issues of comparative disadvantage within the INTERREG IVA eligible region of the Island of Ireland and ensure that the region could offer connectivity of a similar standard and price to other locations within both the United Kingdom and the Republic of Ireland. In relation to this, all information that was accessible to the Evaluation Team indicates that Project Kelvin has successfully addressed those issues.

Our review indicates that Project Kelvin has:

- Benefitted both businesses and citizens within the INTERREG IVA eligible region of the Island of Ireland. Indeed, the benefits of Project Kelvin have extended to businesses throughout the Island of Ireland;
- Provided adequate digital infrastructure to ensure that the INTERREG IVA eligible region of the Island of Ireland is not disadvantaged (in relation to broadband connectivity) compared to other regions as a place to invest in, do business in, work in or live in;
- Provided the platform to achieve economic and social benefits within the eligible region through the optimal use of digital technology;
- Contributed to the achievement of many policy objectives that exist on both sides of the Irish border, including:

  - The development of modern and efficient telecommunications infrastructure;
  - Overcome disadvantages experienced by the North West region of the island of Ireland, as a result of its peripheral location through the ability to offer comparable provision as other regions of the UK and RoI, and its ability to relate to, and integrate with, the wider global environment and economy on an equal footing (in terms of telecoms provision);
  - Facilitating enhanced, cross-border co-operation, particularly in relation to telecommunications infrastructure provision;
  - Providing the platform for the bodies tasked with attracting and retaining industry and investment to the North West region (e.g. Invest NI, IDA Ireland, Enterprise Ireland etc.) to promote the eligible region as an attractive location for knowledge-intensive foreign direct investment (such as high-technology and financial services);
  - Encouraging the competitiveness of indigenous businesses (through lower costs) and enhancing their digital operations.

- Enhanced the level of competition in the telecoms market within the eligible region; resulting in lower costs for regional backhaul and international connectivity; the benefit of which have cascaded down to indigenous and FDI businesses.
- Ultimately, led to:

  - Reduced communications latency between North America and Mainland Europe and the North West;
  - Increased resilience of the telecoms networks in the INTERREG region and the island of Ireland;
  - Increased competition in the telecoms market in the INTERREG area;
  - Ensured that the cost of telecoms between North American and European telecoms hubs and the North West are comparable to those in major UK cities, as well as Dublin.

## 4.2 Achievement of Technical Objectives

Our review indicates that Project Kelvin has successfully addressed the technical issues that faced the North West region of the island of Ireland prior to its introduction:

- Prior to Project Kelvin there was no direct international telecoms link to the North West region of the island of Ireland (or to any part of Northern Ireland). As such, bandwidth from the North West (e.g. Derry~Londonderry) was required to make more 'switched-hops' to reach North America than equivalent bandwidth from Belfast or Dublin. There is an inverse relationship between the number of switched-hops and the level of resilience and latency of a telecoms connection. As such, the international connectivity in the North West region was less reliable and slower than for the East of the island.
- Poor connectivity and limited levels of competition in certain areas had also resulted in a disparity in the cost of bandwidth connectivity between the East and the West of the island. Indeed, the cost of backhaul and onward connectivity in Derry~Londonderry was approximately three times higher than the equivalent costs from Belfast.
- The combination of technical deficiencies, allied with the significantly higher costs for bandwidth, resulted in the region being unable to compete with other regions of the UK and Ireland in terms of telecoms connectivity and as such resulted in the region being significantly economic disadvantaged.

Specifically, our review of the Analysys Mason monitoring reports indicates that:

- Project Kelvin has reduced the latency of international telecoms connectivity across the island of Ireland, and in particular from the North West region, thereby contributing to the competitiveness of the region on a global scale, particularly in sectors where speed of connections is of critical importance such as financial services. We note that:
  - An objective was established to lower latency between North America and the North West by 25% (from a baseline level of 150 msecs from NI to New York). However, Hibernia proposed to reduce this to 70.7 msecs (i.e. a reduction in latency of 53% from the baseline level). Our review of monitoring information indicates that the actual service delivered has consistently been in line with (if not lower than) the expected latency. Therefore, the objective relating to latency to North America has been met and exceeded by Project Kelvin to date.
  - Similarly the expected latency (per Hibernia's proposal) from Dublin to Amsterdam was 19.4 msecs. This represents an anticipated reduction in latency of 78% compared with the baseline level of 90 msecs. With the exception of one service deficiency in October 2013[70], the actual latency recorded between the North West and mainland Europe has been in line with the anticipated latency. Therefore, the objective relating to latency to mainland Europe has also been fulfilled by Project Kelvin.

- Availability of service was consistently in line with the requirements of the contract (i.e. the Service was expected to have 99.999% Availability between each of the Mandatory Locations and Hudson Street, New York). Indeed, we note that UK carriers' networks are now required by Ofcom to offer 99.999% availability. The achievement of this would not have been possible (within the Island of Ireland) in the absence of a second international telecoms link from the island of Ireland.

Furthermore, the introduction of Kelvin created a second direct international telecoms link (alongside Hibernia-South) which has substantially enhanced levels of resilience throughout the Island and minimise the risk of major failures as a result of external factors such as damage to the network or security threats in the South of England.

[70] In the one case where the latency to mainland Europe exceeded the allowed limits, a comprehensive clarification explaining the basis for the service deficiency was provided to the Departments and the deficiency fault was not considered to be material.

### 4.3 Economic Impact

Assessing the specific impact of Project Kelvin has proved somewhat problematic as a result of a number of key factors, including:

- In many situations, Project Kelvin acts as a *'carrier's carrier'* network whereby Hibernia sells telecoms circuits to businesses who typically either split the circuit into multiple circuits and sell connectivity to smaller businesses (i.e. other registered telecoms providers) or those businesses which have a requirement for very high bandwidth (e.g. data centres). As such, Hibernia's customer base consists of a relatively small number of high-profile large business customers. However, much of the information relating to users of the Kelvin infrastructure is considered by Hibernia to be commercially sensitive, and so was not made available to the Evaluation Team, and so it was not possible for the Evaluation Team to fully establish the total number of businesses that ultimately avail of the infrastructure. We were also only able to make contact with only a small number of Hibernia's customers to ascertain their views as to the impact that Kelvin may have had upon their operations;
- Most stakeholders were only in a position to discuss the merits or otherwise of Project Kelvin in a general sense, rather than cite any specific examples of impact; and
- It is now widely accepted that the internet and broadband connectivity is a ubiquitous technology supporting all sectors across the economy. In fact, telecoms infrastructure is now widely considered a fundamental infrastructure in OECD countries, in much the same way as electricity, water and transportation networks. In economics this is referred to as a general purpose technology (GPT). In this sense, it is very difficult (except in some specific situations) for businesses and stakeholders to identify its financial or economic impact. The challenges of measuring the impact of faster and more reliable telecoms connectivity are largely related to its general and transformational economic character. That is, it affects a multitude of sectors and economic activities, and a business' investment in broadband goes beyond the notion of conventional capital equipment, as it is more of an "enabling technology". Therefore quantifying the benefits deriving from enhanced telecoms connectivity is not a straightforward task precisely because it is so pervasive. As the Internet becomes a universal basic infrastructure and adoption saturates, the Internet economy will become increasingly indistinguishable from the overall economy. What will matter is how different firms, workers, or consumers utilise the Internet; but measuring that utilisation becomes inherently more difficult.

However, within this context, the Evaluation Team is of the view that:

- Telecom networks are fundamental for economic and social development. They serve as a communication and transaction platform for the entire economy and have the potential to improve productivity across all sectors. Therefore, given the economic and social aspirations of the governments of both the Republic of Ireland and Northern Ireland, it was essential that investment was made in securing ultra-fast Internet access throughout the INTERREG IVA eligible region of Ireland, so as to provide an essential building block for growth and jobs.
- We consider that Project Kelvin has successfully delivered on each of its technical objectives, and has also resulted in greater competition and lower telecommunications costs within the region. By extension, this provides businesses, across all sectors and of all sizes, with a platform to:

    - Implement innovative new business models, including outsourcing processes and operations;
    - Enhance their productivity and reduce operating costs;
    - Trade on an international basis, by removing geographical barriers;
    - Create new enterprises.

In addition, we note the following:

- Hibernia's Project Kelvin customer base consists of a relatively small number of high-profile large business customers. However, the impacts of the improved connectivity enabled by Project Kelvin are likely to filter through the economy in a number of layers as Hibernia's customers sell connectivity to smaller suppliers who ultimately sell connectivity to homes and SMEs throughout the INTERREG IVA eligible region of the island of Ireland.
- During January 2015, there were 104 live circuits plus six leased dark fibres operating on the Kelvin infrastructure. Hibernia has advised that on average a customer is likely to purchase two circuits in order to provide increased resilience. On the basis of this proxy, it is estimated that approximately

52 businesses are currently contracting with Hibernia to operate 104 telecoms circuits connected to the Project Kelvin infrastructure. However, many of those c52 Hibernia/Kelvin customers are likely to have further split the circuit purchased and sold the smaller sub-circuits onto their own customers;

- Therefore, whilst a large number of businesses of all sizes and across all sectors of the NI and RoI economies potentially experience benefits as a result of reduced latency, improved resilience and lower costs for telecoms connectivity through Project Kelvin infrastructure they are unlikely to be fully (or at all) aware that they have engaged with Project Kelvin.
- Discussion with Hibernia indicates that sectors represented amongst Hibernia's Project Kelvin customer base include telecoms providers, data centres, financial services businesses, educational institutions and creative and digital media businesses;
- The 104 live circuits consisted of 35 circuits (34%) which were sub-10G capacity and 69 (66%) which were of 10G capacity. Information presented indicates an increasing preference amongst Hibernia's customers/businesses for higher-capacity products than earlier in the contract period. Whilst specific prices for each product were not available to the Evaluation Team, discussions have suggested that it is often more cost effective for customers to purchase higher-capacity circuits than a number of smaller circuits. This therefore encourages customers to 'trade-up' through the range of available products.
- In January 2015, there were 59 circuits which had an end-point in the eligible region which represented 56% of the total live circuits. Over half (56%) of the North West circuits were in the sub-10G capacity range. In contrast, the vast majority (96%) of the transit circuits were of the higher 10G capacity. This indicates that businesses based within the INTERREG IVA eligible region of the island of Ireland typically require lower bandwidth than their counterparts based outside the eligible region (in all probability likely to be based in the Greater Dublin area) and suggests that they may potentially be smaller companies.
- Consultation indicates that the transit customers are likely to be utilising the Project Kelvin infrastructure along with one or more additional international telecoms link (e.g. Hibernia-South) in order to improve the resilience of the connectivity.

Representatives from Hibernia have suggested that the uptake of Project Kelvin by businesses based in the North West region has not fully been in line with the expected levels [redacted] Uptake by Transit businesses (i.e. those outside the eligible region) is understood to have been more favourable[71].

In relation to specific FDI impacts, all stakeholders agreed the introduction of Kelvin was vital, so as to ensure that the region's technical offering and cost structure remained competitive, and all those that were involved in promoting the region or specific areas within the region to prospective FDI businesses indicated that they regularly cite Project Kelvin in their promotional messages. However, they each agreed that Project Kelvin was rarely, if ever, amongst the key influencers in the decision to invest in the INTERREG IVA eligible area. Instead, it was considered that infrastructure such as Kelvin is almost considered to be a pre-requisite before discussions even commence. The key message was that whilst it is difficult to attribute any investment specifically to the existence of Project Kelvin, had it not been in place, many subsequent FDI investments may not even have reached the negotiation stage.

In relation to employment, discussions with Hibernia have indicated that there were approximately 30 full-time equivalent (FTE) employees directly employed during the construction phase of Project Kelvin. Details on the roles, responsibilities and salary levels of these employees were not provided to the Evaluation Team. Since the completion of the construction phase, one FTE has been employed by Hibernia and based in NI who is responsible for maintaining and operating the Project Kelvin infrastructure.

Whilst it is not possible to quantify the number of jobs which have been indirectly created as a result of Project Kelvin, consultations with key stakeholders have indicated that there has been job creation in the INTERREG IVA eligible region of the island of Ireland which is likely to have been at least partially attributable to Project Kelvin.

[71] NB Many reasons potentially influence this scenario, including the Republic of Ireland's ability to attract large international MNCs.

Furthermore, the ultimate end-users of the services provided by telecoms providers (who are, in turn, customers of 'Hibernia/Project Kelvin') may have been able to create employment in recent years as a result of lower telecoms costs and enhanced competitiveness.

### 4.4 Value for Money

Whilst the necessary information was not available (largely for commercially sensitive reasons) for the Evaluation Team to undertake a comparative analysis of the actual NPV position compared with that projected at the outset of the project, Project Kelvin appears to represent value for money from a number of perspectives:

The company (Hibernia) commissioned to deliver the project not only met the Contracting Authority's mandatory requirements, but also in a number of cases exceeded the mandatory requirements and offered additional service provision over and above the minimum required. For example:

- In addition to the mandatory locations required by the Contracting Authority (Derry~Londonderry, Letterkenny and Monaghan), Hibernia has successfully utilised the pre-existing Saturn ring network in NI as well as installing all required equipment in five existing MANs in the Republic of Ireland to achieve a further 10 additional PoIs to the terrestrial network (7 in NI and 3 in RoI[72]) in order to further enhance the international and regional connectivity of these towns and cities;
- Stakeholder consultation indicates that Hibernia has offered businesses in the North West region of the island of Ireland costs for international connectivity that are comparable to those available in cities such as Glasgow, Manchester and Dublin.
- By virtue of Hibernia's introduction into the INTERREG region, as well as their subcontracting arrangements with other providers, Project Kelvin has ensured greater competition in the telecoms market.
- Levels of latency achieved between the North West region and New York and Amsterdam are substantially below the mandatory levels;
- At its own cost, following the completion of the contractual Kelvin project works, which were eligible for funding through the INTERREG Programme, Hibernia continued to construct terrestrial linkages onwards from Drogheda to Dublin. Thereby linking the Project Kelvin infrastructure to the existing Hibernia-South cable between Southport in GB and North America. This provided a complete resilient ring structure between the entire island of Ireland and North America.
- The total investment required from the INTERREG IVA Programme was €29.6m (i.e. €0.4m lower than the maximum funding limit of €30m). However, the total cost of the Kelvin project was €75.9 million. Therefore, €46.3m of private sector investment was leveraged.

It is noted that all aspects of the implementation plan that was drawn up as part of the contract document with Hibernia appear to have been delivered in full, with the exception that, following discussions with key stakeholders in the North West region it was agreed that the permanent exchange centre from Coleraine (where the cable landing station continued to be located) would be relocated from Coleraine to Fort George in Derry~Londonderry.

[72] Points of interconnection were installed in Armagh, Ballymena, Belfast, Coleraine, Omagh, Portadown and Strabane, whilst the MANs were utilised in Castleblayney, Drogheda, and Dundalk.

Specific feedback received from Hibernia's customers that utilise the Project Kelvin infrastructure indicates that:

- Project Kelvin provides reassurance amongst large data users and their customers relating to 'resilience and security of supply', through the provision of a second direct international telecoms link off the island of Ireland;
- None of the consultees have experienced any issues relating to latency;
- All of the consultees were of the view that the introduction of Kelvin had a positive impact upon costs, through the creation of a greater level of competition, which the market reacted to. Some consultees were of the view that Project Kelvin was likely only one contributory factor as prices were reducing across Europe at that time. However, even in the context of falling prices, it was suggested that the introduction of Project Kelvin has served to speed the process up;
- Within the Northern Ireland context, the introduction of Project Kelvin was considered to have partially addressed what was considered to have been an 'almost monopolistic position' that was held by a provider.

## 4.5 Financial Performance

[redacted]

## Appendix I – Strategic and Policy Context

### Introduction

There is a considerable body of evidence from around the world that the development of telecommunications infrastructure is critical to a country's future macroeconomic development and competitiveness. NI and RoI Governments acknowledged the central role an expanded telecommunications / broadband infrastructure could play in future economic development and sought to build upon existing telecoms strengths to ensure future economic competitiveness.

The following sub-sections consider the contribution of Project Kelvin to the various EU, NI, ROI and cross-border strategic objectives and imperatives that existed (or continue to exist) during the development and implementation of Project Kelvin.

### European Strategies

Europe 2020

Europe 2020 puts forward three mutually reinforcing priorities:

- Smart growth: developing an economy based on knowledge and innovation;
- Sustainable growth: promoting a more resource efficient, greener and more competitive economy; and
- Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

The EU needs to define where it wants to be by 2020. To this end, the Commission proposes the following EU headline targets:

- 75 % of the population aged 20-64 should be employed.
- 3% of the EU's GDP should be invested in R&D.
- The "20/20/20" climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right).
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree.
- 20 million less people should be at risk of poverty.

Europe 2020, specifically includes a telecommunications stream built around delivery of access to broadband services, unleashing the potential of the digital economy, deployment of wireless services, effective use of radio spectrum and advanced use of the internet.

Project Kelvin fully aligned with Europe 2020 by providing world-class telecommunications infrastructure to support knowledge-based industries such as ICT and the digital economy. The infrastructure has enabled the North West region (and the island of Ireland as a whole) to compete with other regions of Europe to compete for FDI thereby offering job opportunities.

European Commission Digital Agenda for Europe 2010

The overall aim of the Digital Agenda is to deliver sustainable economic and social benefits from a digital single market based on fast and ultra-fast internet and interoperable applications. The objective of this Agenda is to chart a course to maximise the social and economic potential of ICT, most notably the internet, a vital medium of economic and societal activity: for doing business, working, playing, communicating and expressing ourselves freely. Successful delivery of this Agenda will spur innovation, economic growth and improvements in daily life for both citizens and businesses.

Wider deployment and more effective use of digital technologies will thus enable Europe to address its key challenges and will provide Europeans with a better quality of life through, for example, better health care, safer and more efficient transport solutions, cleaner environment, new media opportunities and easier access to public services and cultural content.

The ICT sector is directly responsible for 5% of European GDP, with a market value of € 660 billion annually, but it contributes far more to overall productivity growth (20% directly from the ICT sector and 30% from ICT investments). The development of high-speed networks today is having the same revolutionary impact as the development of electricity and transportation networks had a century ago.

The Agenda notes that more needs to be done to ensure the roll-out and take-up of broadband for all, at increasing speeds, through both fixed and wireless technologies, and to facilitate investment in the new very fast open and competitive internet networks that will be the arteries of a future economy. Action needs to be focused on providing the right incentives to stimulate private investment, complemented by carefully targeted public investments, without re-monopolising our networks, as well as improving spectrum allocation.

**UK Strategies**

DBIS and DCMS National Broadband Strategy: Britain's Superfast Broadband Future 2010

The National Broadband Strategy states that for the UK to be competitive in global markets, it is essential that that there is a world class communications network capable of delivering world class services. This will ensure that the UK has a firm basis with which to drive forward technological and service innovation through high-technology and high-skilled sectors. The strategy notes that it is not possible to 'stand still' in the provision of telecommunications infrastructure, as global competitors are continually growing and improving their networks.

Consumers continually require greater choice and lower costs for their telecoms connectivity as demand for higher limits and faster usage continually increases. The benefits of high-quality broadband infrastructure have an impact across the whole economy from SMEs and microbusinesses to large multi-national companies.

**Cross-Border Strategies**

InterTradeIreland 'The Comprehensive Study of the All-Island Economy'

The Comprehensive Study of the All-Island Economy was published by the two governments in October 2006. It set out a vision of *"an island characterised by a strong competitive and socially inclusive island economy with strong island-wide economic clusters whose development is not impaired by the existence of a political border"*.

The Study considered the need and the opportunities for enhanced cross-border co-operation across a range of sectors including:

- Interventions to support research and development and the development of the knowledge economy;
- Interventions in the education and training systems to enhance human capital;
- Enhanced co-operation in the provision of health and educational services;
- **Enhanced co-operation and co-ordination in the provision of key infrastructure including energy, transport and telecommunications;**
- Co-operation on trade and investment promotion;
- Enhanced co-operation in support of enterprise and business development; and
- Improved regulatory environment (including fiscal measures).

INTERREG IVA Programme

The INTERREG IV Operational Plan states that one of the key themes is Cross Border Co-operation. It recognises the importance of business networking and that entrepreneurial opportunities are increasingly being linked to network capacity and activity. As a result of globalisation, increased mobility and better communication systems, the marketplace is becoming increasingly competitive. Therefore, greater collaboration, whether local, cross-border or international, will allow businesses and organisations to be adaptable and more responsive to market demands.

## Northern Ireland Strategies

NI Programme for Government 2008-2011

The Programme for Government (PfG) 2008-11 set out the Northern Ireland Executive's strategic priorities and key plans for the period 2008 - 2011. The overarching aim of the strategy was to *"build a peaceful, fair and prosperous society in Northern Ireland, with respect for the rule of law and where everyone can enjoy a better quality of life now and in years to come."*

Under its 'Growing a Dynamic Innovative Economy' Priority (the top priority over the lifetime of the PfG), the Government acknowledged that *"our companies must become more innovative and invest more in research and development"*.

Key PSAs which sought to support the 'Growing a Dynamic, Innovative Economy Priority' and were particularly pertinent for Project Kelvin included:

- PSA 1: Productivity Growth - Improve Northern Ireland's manufacturing and private services productivity; and
- PSA 3: Increasing Employment - Subject to economic conditions, increase employment levels and reduce economic inactivity by addressing the barriers to employment and providing effective careers advice at all levels.

Within PSA 1, one of the objectives was to *"ensure a modern sustainable economic infrastructure to support business"* and within that objective one of the actions was to:

*"Undertake a range of broadband stimulation activities to encourage the take up and innovative use of telecommunications. Also develop Northern Ireland's next generation network and establish a direct international communications link"*.

The Northern Ireland Budget which was published by the Executive in February 2008 further noted that:

*"DETI intends to connect directly into the transatlantic submarine networks to deliver significant improvements in the speed, resilience and cost of voice and data transfer services to business here. At present, the cost of backhaul services and latency in the telecoms network make locations such as the North West less attractive for companies who need to exchange data internationally. The Department will work with the private sector to enhance telecoms infrastructure, improving the competitiveness of local business and attracting internationally mobile investment in the high-technology and tradable services sectors"*.

NI Programme for Government 2011-2015

The NI Programme for Government (PfG) 2011-2015 (published March 2012) sets out that the Executive has taken the important step of making the economy its top priority.

The PfG contains 5 key priorities, one of which is: *"Growing a Sustainable Economy and Investing in the Future"*. The primary purpose of this Priority is to achieve long term economic growth by improving competitiveness and building a larger and more export-driven private sector. To do this, the PfG notes that we must *rebuild* the labour market in the wake of the global economic downturn and *rebalance* the economy to improve the wealth and living standards of everyone.

Primarily, Project Kelvin offered the potential to contribute to the NI Government's associated objective of 'growing the private sector' with the improved telecoms infrastructure making NI more competitive for FDI and indigenous businesses.

In terms of specific 'key commitments', Project Kelvin offered the potential to facilitate the delivery of *'Achieving £1 billion of investment in the Northern Ireland economy.*

Investment Strategy for Northern Ireland (ISNI) 2008-2018 & 2011-2021

The 2008-2018 ISNI identified priority areas for investment and was intended to assist Government and its private sector partners to plan ahead for the challenge of delivering the largest ever investment programme in Northern Ireland.

One of the key pillars of the ISNI was Networks. The strategy stated *"high quality transport, communication and energy networks are the vital arteries of today's most successful economies….investing in efficient reliable competitive and sustainable networks is critical if we are to deliver our top priority of growing a dynamic and innovative economy."*

It is noted that the key challenge in NI telecoms was to leverage fully the opportunities of greater connectivity, and to keep the region at pace with technological developments in speed and capacity (bandwidth) to maintain economic competitiveness and attract inward investment, with a view to supporting a more balanced development and a consequent reduction in regional disparities (with specific reference to the North West region).

Key goals and milestones included within the ISNI which were of specific relevance to Project Kelvin included:

- Improved communications networks, maintaining technological pace with the best in Europe in terms of increased internet connectivity speed, capacity and availability; and
- **The establishment of a new International Communications link in the North West directly connected to North America and Europe by the end of 2009**.

The 2011-2021 ISNI is an update to the 2008 Strategy and establishes that the Executive is focused on prioritising infrastructure programmes that will deliver the best returns in the period ahead.

Of particular relevance to Project Kelvin is the fact that ISNI (2011-2021) continues to recognise the importance of supporting investment in the telecoms network to ensure that NI keeps pace with developments, allowing local businesses to remain competitive and attracting inward investment.

The 2011-2021 ISNI specifically recognises Project Kelvin as a key achievement since 2008, noting:

*"Significant improvements in the reliability, cost and speed of international data transfer to North America and across Europe are being made possible by Project Kelvin. The new section of submarine cable provides a high-speed transatlantic internet connection and increases our competitive edge in a globalised world."*

NI Regional Development Strategy

In June 2008 the Minister for Regional Development published the results of a review of Shaping Our Future, the Regional Development Strategy (RDS) for Northern Ireland. The adjusted strategy for the North West of Northern Ireland and for the city of Londonderry is based around Strategic Planning Guideline 1 – *'to develop a strong North West centred on Derry'.* Within that Guideline, under the heading of strengthening the economy of the North West actions include:

- Develop Derry as the key strategic employment location of the North West and central focus of the north west development corridor extending into Donegal towards Letterkenny, and support the continuing economic development of the main hubs of Limavady and Strabane;
- Identify and safeguard strategic locations for employment growth in the west and east side of the Foyle;
- Upgrade strategic transport links to the rest of the Region and cross-border;
- Intensify the use of the port and airport; and diversify the energy infrastructure, encouraging the extension of the natural gas network to Derry;
- Facilitate the promotion of inward investment and local enterprise in world class manufacturing, high technology and knowledge-based businesses and the development of the creative business sector;
- Enhance education, innovation, research and skills training; in particular through developments at the University of Ulster at Magee and North-West Regional College (formerly known as North West Institute of Further and Higher Education); and

- Develop the Science Park outcentres at Magee and in Coleraine, convenient to the North West.

Economic Vision for Northern Ireland

The Economic Vision for Northern Ireland (2004) set out a broad framework for NI to address the productivity and competitiveness gap between NI and other regions of the UK and also to contribute to the UK strategy for addressing the productivity gap between the UK and leading competitor countries.

The Vision outlined four drivers for global competitiveness in Northern Ireland as being:

- Increased investment in R&D and promotion of innovation and creativity;
- Promotion and encouragement of enterprise;
- Skills development; and
- Infrastructure.

As such, it was recognised that enhanced infrastructure was critical for NI's global economic competitiveness.

NI Economic Strategy

The NI Executive's Economic Strategy aims to improve the economic competitiveness of our economy and, in doing so, realise its vision for 2030 to have created *"an economy characterised by a sustainable and growing private sector, where a greater number of firms compete in global markets and there is growing employment and prosperity for all."* The NI Economic Strategy suggests that we must rebalance our economy by growing the private sector by (amongst other things):

- Stimulating innovation, R&D and creativity;
- Improving employability and the level, relevance and use of skills;
- Competing in the global economy;
- Encouraging business growth; and
- Developing our economic infrastructure.

As part of the Strategy, in achieving its priority of 'business growth' the NI Government acknowledges the needs to *"promote £400m of investment and 6,300 jobs in locally owned companies (with 50% paying salaries above the Private Sector Median) and a further 6,500 new jobs in new start-up businesses".*

DETI Corporate Plan 2008-2011

DETI's 2008-2011 Corporate Plan stated that the Department's goal was *"to grow a dynamic, innovative economy"*. As part of achieving this goal, DETI was committed to contributing to a number of relevant Public Service Agreements (PSAs), including PSAs 1 and 3, and established a number of key objectives relating to these. Project Kelvin contributed to the following DSOs within PSA 1 and PSA 3:

| ***PSA*** | **DSO** |
|---|---|
| PSA 1: Productivity Growth | **DSO1** - Promote a Competitive and Outward Looking Economy<br>**DSO2** - Attract and support high quality investment, both foreign and locally-owned<br>**DSO3** – Ensure a modern and sustainable economic infrastructure to support business. |
| **DSO/Indicator/Target** | **Potential Project fit** |
| PSA 3: Increasing Employment | **DSO3 -** Increase employment opportunities by attracting high quality inward investment and supporting domestic investment<br>**DSO4 -** Promote business growth |

In particular, Project Kelvin aimed to provide a direct international telecommunications link to NI in order to ensure that modern and sustainable economic infrastructure was in place to support business. The Corporate Plan stated:

*"Our small size and peripheral location has presented particular challenges in ensuring that our businesses and communities, especially in rural areas, can benefit from a competitive and sustainable energy and telecommunications infrastructure. Both play a key role in facilitating balanced economic and social*

*development across the region… High quality telecoms infrastructure is needed to help drive up competitiveness and attract mobile investment in the high-technology and tradable services sectors".*

Furthermore, the Corporate Plan specifically referenced that linking directly to North America and Europe should improve the attractiveness of NI as a base for knowledge-based industries operating in key markets. This has the potential to deliver improvements in speed, resilience and cost of telecommunications.

The associated target *"by 2009, reduce latency on communications between the North West and North America by approximately 25% and bring international communications costs in line with those in major UK cities (e.g. Glasgow and Manchester)".*

DETI Corporate Plan 2011-2015

In-line with the NI PfG and Economic Strategy, DETI's current Corporate Plan places focus on creating wealth and employment through a focus on export-led economic growth. In reflection of this, the Department's goal over the life of the Plan is to *"promote the growth of a competitive and export led economy".*

The Plan highlights the need for the NI Government to place focus on *rebalancing* and *rebuilding* the Northern Ireland economy, i.e. focusing on actions that will deliver the necessary rebalancing of the economy over the longer term, while taking immediate steps to rebuild the local labour market after the recession.

Within the Strategic Framework, a number of key priorities have been identified under the twin themes of rebuilding and rebalancing the economy. Of particular relevance to Project Kelvin, the Plan highlights the need to increase private sector productivity by (amongst other things) 'developing economic infrastructure' including taking forward initiatives to enhance NI's telecommunications infrastructure.

Invest NI Corporate Plan 2011-2015

Invest NI's Corporate Plan for the period 2008-2011 stated that the priority of the Corporate Plan was to increase business productivity, the means by which wealth can be created for the benefit of the whole community. It was anticipated that this would be achieved by:

- Realising the potential of existing businesses - In realising this objective, the Corporate Plan suggested that this would require businesses to innovate at all levels. As such, Invest NI committed to promoting and embedding an innovation culture in its clients levels of their businesses;
- Shifting the sectoral focus towards higher value-added sectors; and
- Nurturing the development of frontier technologies in our companies and in universities.

The Invest NI Corporate Plan was developed within the strategic framework set out in DETI's Corporate Plan and the PfG for the same period. As such, the main actions, outputs and targets for the Corporate Plan have been developed in this context.

Invest NI Corporate Plan 2011-15

In-line with the NI PfG, Invest NI's 2011-2015 Corporate Plan sets out the organisation will contribute to the rebalancing and rebuilding of the NI economy to increase the overall standard of living by driving productivity growth and increasing employment. The Plan states that the support provided will be fully aligned with the drivers of economic growth (including 'competing in the global economy').

Invest NI states that it will *"compete in the global economy by helping our businesses to maximise their export sales and by attracting high quality inward investments.* In doing so it is envisaged that this will lead to increased export intensity and high levels of quality job creation.

Specific Corporate Plan targets that Project Kelvin offered the potential to contribute to under the theme of 'competing in the global economy' include:

- Promote 5,900 jobs from inward investors, of which 75% (4,425) will pay salaries above Northern Ireland Private Sector Median.

- Secure investment commitments of £375 million and £145 million per annum of wages and salaries, reflecting the establishment and growth of externally owned businesses.

DETI Telecommunications Action Plan for NI 2011-2015

The DETI Telecommunications Action Plan states that digital information and communications is one of the key and largest sectors in the economy, accounting for around 8% of UK GDP. It underpins the whole economy and builds national competitiveness. Telecommunications offers increased access to information for businesses and citizens.

The Action Plan recognises the telecommunications progress in NI and the Border Region of RoI through the joint delivery of Project Kelvin, stating that the project delivered direct international business-level telecoms connectivity with North America.

However, it is further recognised that the telecommunications market is fast moving and competitive advantage can be quickly eroded or lost in the region if appropriate investment is not made in latest technologies or activities undertaken to maximise the benefits of legacy networks and infrastructure.

In 2007, an independent report into the operations of DETI's Telecoms Policy Unit concluded that "*the existing infrastructure in Northern Ireland, which is world-class according to technological, extensiveness or economic measures, will not remain world class if it does not continue to evolve in step with leading broadband countries worldwide. So the policy objective of a world class telecommunications infrastructure is a dynamic objective, requiring a series of calculated interventions or forbearance over time in step with international comparisons based on meaningful (and changing) objectives".*

The two key objectives of the Telecommunications Action Plan are to:

- Maintain Northern Ireland's current position as a region which can offer customers access to a reliable broadband service regardless of where they live or do businesses; and
- Explore options to build on previous investments to deliver cost-effective, highly valued, faster telecommunications and broadband services, addressing the digital inclusion agenda.

ILEX Regeneration Plan

ILEX was established to promote the physical, social and economic regeneration of Derry~Londonderry. In December 2005 ILEX published its Regeneration Plan which outlined its priorities for the Derry~Londonderry region over the next number of years. Primary Sectoral Priorities which related to Project Kelvin included:

- Expand the internationally traded sector in order to increase employment and wealth creation; and
- Compete with other locations in NI and other regions of Europe in terms of the attractiveness of the area as a place to reside.

ILEX 'The One Regeneration Plan for Derry~Londonderry'

During 2011, the One Regeneration Plan, which sets out what the Derry ~ Londonderry Strategy Board wants to achieve, was published. The One Plan prioritises five Transformational Themes and eleven Catalyst Programmes that it considers are 'game changers' for the City, and necessary for realisation of the Vision of a Competitive, Connected, Creative and Caring City. One of the Transformational Themes that is of relevance to Project Kelvin is

- **Transformational Theme 1: Employment and Economy** – Stimulating the demand for employment through attracting investment in new business both from outside through inward investment and from inside through promotion of entrepreneurialism and the growth of indigenous business. This will be supported by supply side policies to improve the skills and qualifications of our children and young people and of all those currently living in disadvantaged households and to improve the attractiveness of the City as a place in which to invest and work.

The Employment and Economy theme includes a Catalyst Programme related to "Growing the Digital Economy". The Programme specifically references the opportunities to exploit Project Kelvin and the enhanced broadband infrastructure which is available throughout Derry~Londonderry as a result of the Project.

The Plan states that:

*"Derry~Londonderry is at the forefront of 21st Century Digital development. We will work to ensure that Derry~Londonderry can avail of state of the art, affordable broadband technology that provides the maximum bandwidth possible to our businesses and homes. We will build upon the unique position of Derry~Londonderry with respect to its physical and human resources".*

The Strategy therefore recognises the contribution that Project Kelvin has made towards creating a unique position in Derry~Londonderry with regards the physical resources available through broadband infrastructure and the opportunities which arise from this position in terms of growing indigenous businesses and encouraging FDI activity, particularly within digital sectors.

**Republic of Ireland Strategies**

National Development Plan 2007-2013

The National Development Plan (NDP) 2007-2013 entitled Transforming Ireland – A Better Quality of Life for All, was a high level strategic document which set out an economic and budgetary framework and seven year investment programme for a range of sectoral areas in Ireland. Overall, the NDP 2007-2013 focused on the priorities for investment in public, economic and social infrastructure in transport, environmental services, housing, education, health, childcare and research and development fields, and for investment in human resources in the education and training fields.

Of particular relevance to the North West was the inclusion of investment priorities to promote all-island co-operation. The NDP provided a framework of North-South co-operation in a number of areas including:

- Infrastructure provision and spatial planning;
- Science, technology and innovation;
- Trade, tourism and investment;
- Human capital;
- Enterprise promotion;
- The provision of public services (health and education);
- Environment;
- Agriculture and fisheries;
- Sport, culture and heritage; and
- Social inclusion.

The NDP stated that the economies in the North and South of the island of Ireland both faced common challenges which were identified and agreed by the two Governments in the context of the Lisbon Agenda:

- To continue to grow employment and employment rates;
- To increase productivity;
- **To build world-class infrastructure;**
- To promote and to develop the role of science, technology and innovation;
- To enable people to acquire and maintain the skills needed for a modern, dynamic knowledge economy and to adapt to changes over their working lives;
- To promote enterprise and entrepreneurship and to provide a positive climate for business, including through better regulation;
- To remove barriers to physical, labour and academic mobility as part of the completion of the European single market;
- To promote social inclusion; and
- To maintain the highest standards of environmental protection.

The NDP noted that the Letterkenny-Derry Gateway was the critical Gateway for the North West region. The Plan committed the Irish Government to pursue opportunities to underpin the development of this Gateway through cross-border cooperation under the North West Gateway Initiative. Priorities included:

- The implementation of an integrated spatial planning strategy for the Gateway;
- Further improvement in road links to the region;
- Enhancing the capacity and resilience of energy support networks;
- **Strengthening telecoms infrastructure throughout the region;**
- Development of the City of Derry airport;
- Cross-border collaboration in the development of the skills base in the region; and
- Improvements in access to health and educational services on a cross-border basis.

DCENR Delivering a Connected Society: A National Broadband Plan for Ireland 2012

The National Broadband Plan sets out the strategy to deliver high speed broadband throughout Ireland. Specifically, it seeks to facilitate broadband download speeds of 70Mbps with a minimum of 40Mbps generally available and 30Mbps available in harder to reach rural areas.

In order to drive commercial rollout of high speed broadband, the Government stated its commitment to a range of actions that would facilitate the more efficient rollout of infrastructure including addressing planning and road opening challenges, assisting in getting citizens and businesses online, measures relating to spectrum policy and maximising the use of State assets where possible.

The National Broadband Plan notes that previous intervention projects led to services becoming available for the first time, or led to significant improvements in the quality of services available and specifically references that Project Kelvin enhanced international connectivity considerably.

The National Broadband Plan targets are as follows:

- 70Mbps - 100Mbps available to at least 50% of the population with a majority having access to 100Mbps;
- At least 40Mbps, and in many cases much faster speeds, to at least a further 20% of the population and potentially as much as 35% around smaller towns and villages; and
- A minimum of 30Mbps available to all.

DCENR 'Enabling a Connected Society: Report of the Next Generation Broadband Taskforce'

The report of the Next Generation Broadband Taskforce states that the global revolution in telecommunications technology presents Ireland with a once in a generation opportunity to become a truly connected society and harnessed well, it will underpin competitiveness, create jobs and drive social inclusion and connection to every corner of Irish society.

However, the full range of opportunities that a new digital economy presents can only be further unlocked if the requisite infrastructure is in place to support the development of new applications; new connectivity; new ways of doing business; and new ways of delivering public, private and community services to citizens.

The availability of high speed broadband can have a transformative impact on society. Many persuasive reports from well-respected sources have highlighted the benefits of high speed broadband as outlined below.

1. **Economic growth** – In a study completed for the European Commission, the McKinsey Global Institute estimates that the Internet accounts for on average 3.4% of GDP and as much as 6% of GDP in advanced economies. In a number of countries, the Internet has accounted for 10% of GDP over the last 15 years and has doubled to 21% in the last five years.
2. **Jobs** – SMEs are a significant driver of innovation and job creation in Ireland. SMEs with a strong web presence have been shown internationally to grow twice as quickly, export twice as much and create twice as many jobs as those who have a minimal web presence.
3. **Competitiveness** – In its November 2011 report "Ireland's Advanced Broadband Performance and Policy Priorities", Forfás advocates the provision of advanced broadband infrastructure for all towns with a population greater than 1,500. Forfás has stated that advanced broadband services are crucial to achieve

the productivity growth necessary to improve competitiveness, sustain high-level incomes and ensure Ireland captures new opportunities for entrepreneurship and jobs across all sectors.

4. **Continued Attraction of Foreign Direct Investment** –The availability of high speed broadband will enable the most advanced uses of cloud computing technology all across Ireland and deliver additional jobs and investment from global corporations. FDI already accounts for 240,000 direct and indirect jobs in Ireland.
5. **Healthcare Reform** – eHealth technologies such as remote monitoring and remote diagnosis provide a tangible opportunity to shift the balance of healthcare away from the hospitals and into the community with benefits for patients and the healthcare system as a whole.
6. **Transport** – Use of high speed broadband for increased e-Working and interactive traffic management will reduce peak traffic flows, impacting positively on energy use, carbon emissions and efficiency generally.
7. **Education and eLearning** – High speed broadband provides a platform to transform the educational experience by bringing dynamic resources into the classroom and enabling seamless communication between teachers, students and parents. The Government's 100Mbps to Schools Programme will provide the infrastructure necessary to underpin a transformation in the delivery of education at second level.
8. **Citizens, Consumers and Government** – Ubiquitous high speed broadband gives all citizens access to the same information and opportunity regardless of age, class or location. Studies have shown that the consumer savings generated by the Internet in 2009 ranged from €7 billion in France to €46 billion in the United States (US). In the United Kingdom (UK), average household savings of £1,000 per annum have been identified as a result of shopping and paying bills online. Interaction with Government through Internet services provided by the Department of Social Protection, the Revenue Commissioners and the Property Registration Authority, among others, can be measurably more efficient for both citizens and Government. As the range of e-Government, eHealth and e-Education services inevitably expands, the need for higher bandwidth will follow.
9. **Regional Development** – Deployment of high speed broadband helps to resolve many of the key issues associated with remote regions thereby enhancing the local productivity capacity of local economies.

<u>DCENR 'Doing more with Digital: National Digital Strategy for Ireland' (2013)</u>

This National Digital Strategy is a foundation step in helping Ireland to reap the full rewards of a digitally enabled society. It is part of the overall Government commitment to a more digitally empowered society which involves a suite of complementary national measures.

The Digital Strategy includes a number of key strands of activity to grow the digital sector. Of particular relevance to Project Kelvin is Strand 1 – Trading Online and Entrepreneurship for indigenous businesses. This strand includes a specific target to get 10,000 Irish businesses online for the first time and to achieve a further 2,000 small Irish businesses trading online over a period of two years.

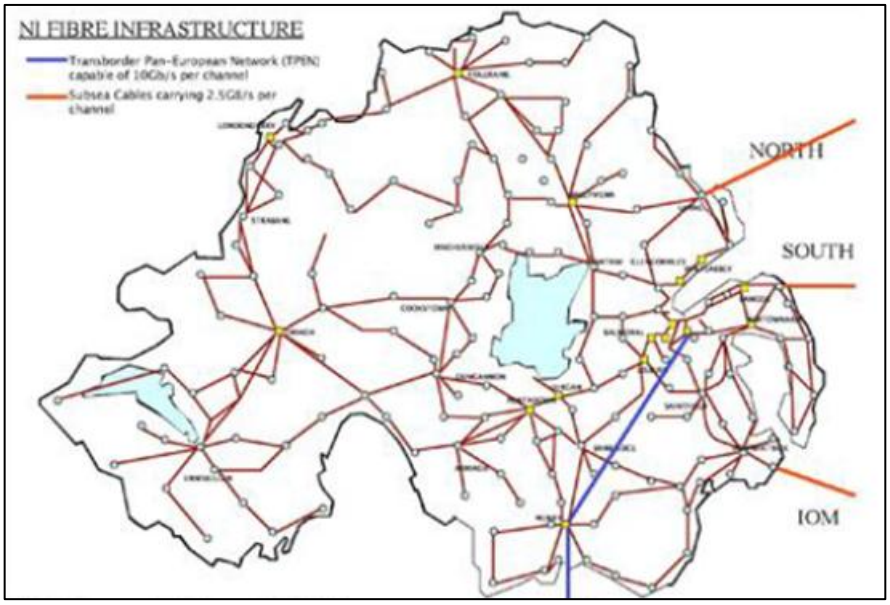
## Appendix II –Terrestrial Telecoms Infrastructure Prior to Project Kelvin

This appendix provides a series of maps/ information in relation to the terrestrial telecoms infrastructure in NI prior to Project Kelvin. Please note that all maps have been sourced from the 2007 Feasibility Study report for the Project.

### BT Networks

The following map shows the BT fibre infrastructure which was in place throughout NI during the development of Project Kelvin.

**Figure: BT Fibre Infrastructure (2007)**

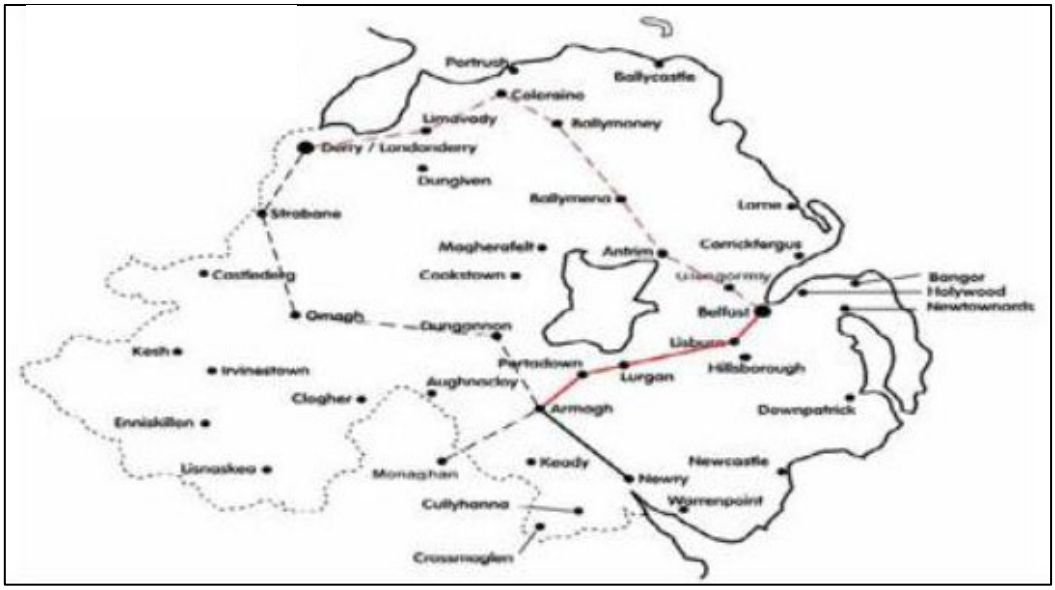



### NTL (Virgin Media) Networks

The following map shows the NTL (Virgin Media) fibre infrastructure which was in place throughout NI:

**BYTEL Networks**

The following map shows the BYTEL fibre infrastructure which was in place throughout NI prior to Project Kelvin:




**eir**

eir had ducting throughout NI except for a 20km stretch from Glengormley to Belfast as well as cross-border linkages from Armagh to Dublin and from Letterkenny to Derry~Londonderry. At the time of the Feasibility Study eir was completing a fibre connection from Armagh to Derry~Londonderry which was to provide a resilient ring network for the North-West region of the island. Eir was further continuing to install fibre on their network around the North Coast through Limavady, Coleraine and back to Belfast to complete the ring.

## Appendix III - INTERREG IVA Priority 2.2 – Co-operation for a Sustainable Programme Region: Infrastructure

The INTERREG IV Programme is a European Union supported Structural Funds Programme which aims to promote greater territorial cohesion. In particular, the Programme focuses on developing a dynamic economy, supporting infrastructure and promoting innovative ways of addressing specific Programme problems.

Programme Rationale

The rationale for the Programme is driven by the existence of land and maritime borders between Northern Ireland, the Border Region of Ireland and Western Scotland. Such borders are identified within SEUPB's INTERREG IV Operational Programme as having in some respects, contributed towards exacerbating economic, social and environmental problems in the region. The borders are suggested as causing natural markets to fragment along territorial lines, reducing economic interaction and the opportunity to develop economies of scale. The borders are also considered to distort infrastructure and communication networks resulting in unbalanced economic growth, with different policy approaches making it more difficult to promote cohesive service delivery and address common problems.

Furthermore, unlike most other regions in Europe, the conflict in NI and the associated political problems which are particular to the region has in the past, severely restricted cooperation and the development of border areas, although in a new era of peace, cooperation is improving.

These key problems are evidenced in two main ways:

| | |
|---|---|
| **Economic and social development** | In general, Northern Ireland, the Border Region of Ireland and Western Scotland experience lower levels of economic and social development than the national averages for the UK and Ireland. |
| **Limited infrastructure** | Borders distort and disrupt networks and movement and this has impacted on the development of transport, communication linkages and energy and utility networks in the border areas. Separate and differing policy approaches adopted in areas such as health, education and economic development have also limited programme opportunities and relationships and make it more difficult to address the common problems of Border Regions. |

With regard to economic and social development, productivity in the eligible areas has remained low compared to the respective national averages. More particularly, there are a number of structural problems in the economies of the Border Region of Ireland, Western Scotland and Northern Ireland which are mainly centred on an overdependence on agriculture, manufacturing and the public sector. The eligible area is also underperforming in relation to its potential to achieve a successful knowledge-based local economy, has lower levels of entrepreneurial activity than the average for the UK and Ireland and has an underdeveloped tourism industry.

Furthermore, areas in the eligible region have specific problems in relation to long-term unemployment and economic inactivity. Earnings for Western Scotland, the Border Region of Ireland and Northern Ireland also all fall below the national averages.

Separate and differing policy approaches adopted in Northern Ireland, Ireland and Scotland in areas such as health, education and economic development have also had a detrimental effect on border areas. This has restricted programme opportunities and relationships, made it more difficult to address the common problems of Border Regions and had implications for public service provision in some areas and communities that have been cut off from their natural hinterlands.

Furthermore, the Operational Programme notes that the existence of land and maritime borders has also created difficulties in addressing problems which are inherently trans-jurisdictional in nature. For instance, waste and environmental issues and protection of the natural heritage and marine environment, including the drive to meet CO2 emissions under the Kyoto agreement, are key areas in which an integrated response on a programme basis is required.

An independent review of socio-economic conditions in Northern Ireland, the Border Region of Ireland and Western Scotland (2006) and the Ex Ante evaluation process that accompanied the Programme preparation identified the following conditions relating to 'energy', 'in the eligible area.

Compared to other EU Member States, the **utilisation of renewable energy in Northern Ireland, Ireland and Scotland is considerably lower**. In 2003, the percentage share of electricity produced from renewable energy sources in EU25 and EU15 was 12.80% and 13.7%, respectively, while the Northern Ireland (1.9%), the UK (2.8%) and Ireland (4.3%) recorded much lower levels. Situated on the western seaboard of Europe, the natural environment of the region offers unique opportunities to further develop renewable energy production particularly in the areas of wind, wave and biomass energy, and thus enhance sustainable economic development at a local level.

Programme Aim and Priorities

With a view to addressing the economic and social problems which have been exacerbated by the existence of land and maritime borders and to promoting greater territorial cohesion, the primary objective of the INTERREG Programme is *"to support strategic Programme co-operation for a more prosperous and sustainable region."* This overall aim translates into two specific aims at Priority level:

- **Priority 1: Co-operation for a more prosperous cross border region**: this Priority aims to diversify and develop the economy of the eligible region by encouraging innovation and competitiveness in enterprise and business development, and promoting tourism; and
- **Priority 2: Co-operation for a sustainable programme region**: this Priority aims to support activities that promote Programme co-operation in policy development and improve access to services so as to improve the quality of life for those living in the eligible area.

Priority 2: Co-operation for a more sustainable programme region focuses on two key areas:

- 2.1 – Collaboration; and
- **2.2 - Infrastructure**.

The proposed activity that is subject to this Appraisal is under Priority 2.2, as detailed below.

Aim of Priority 2.2 - Co-operation for a more sustainable programme region – Infrastructure

Priority 2.2 aims to *"aims to support a number of selected programme infrastructure projects in the areas of telecommunications, transport, energy and utilities and the environment"*. In particular, the Priority will seek to support programme approaches to address issues of environmental protection and develop alternative energy sources to reduce carbon emissions and improve the environment. It is envisaged that investment in programme infrastructure will improve access to services and business opportunities for those living in the eligible area.

Quantified targets and indicators

Of relevance to the proposed project, the specific outputs, results and impacts of the Priority will be monitored and evaluated using the indicators and targets set out in the following table.

| **Table 2.2: Priority 2.2 Targets and indicators** | |
|---|---|
| **Infrastructure - Telecommunications** | |
| **Output** | **Result** |
| 2 telecommunications projects funded – telecommunication line/infrastructure installed | • 25%Reduction in time taken to transmit data between North America and North-West;<br>• 5 percentage point increase in the take up and use of Broadband by business |

The overall indicators for Priority 2 will focus on the following impact indicators are as follows:

- No of innovative programme projects funded/still in existence 2 years after the end of the Programme;
- No of solutions to programme problems addressed through joint action;
- No of participants entering – progressing within education/training/employment in defined sectoral areas; and
- Population served by enhanced infrastructure projects.

Target Beneficiaries

The following list identifies those final beneficiaries that will be targeted by this Priority that are of relevance to proposed project:

- Public bodies and other relevant stakeholders promoting strategic collaborative approaches to address programme problems;
- Research organisations;
- Public, private and social partner organisations involved in networks with stakeholders in other EU Member States that focus on addressing programme issues; and
- Providers which deliver infrastructure projects in the areas of telecommunications, ICT, transport, energy, waste and utilities.

Indicative Operations

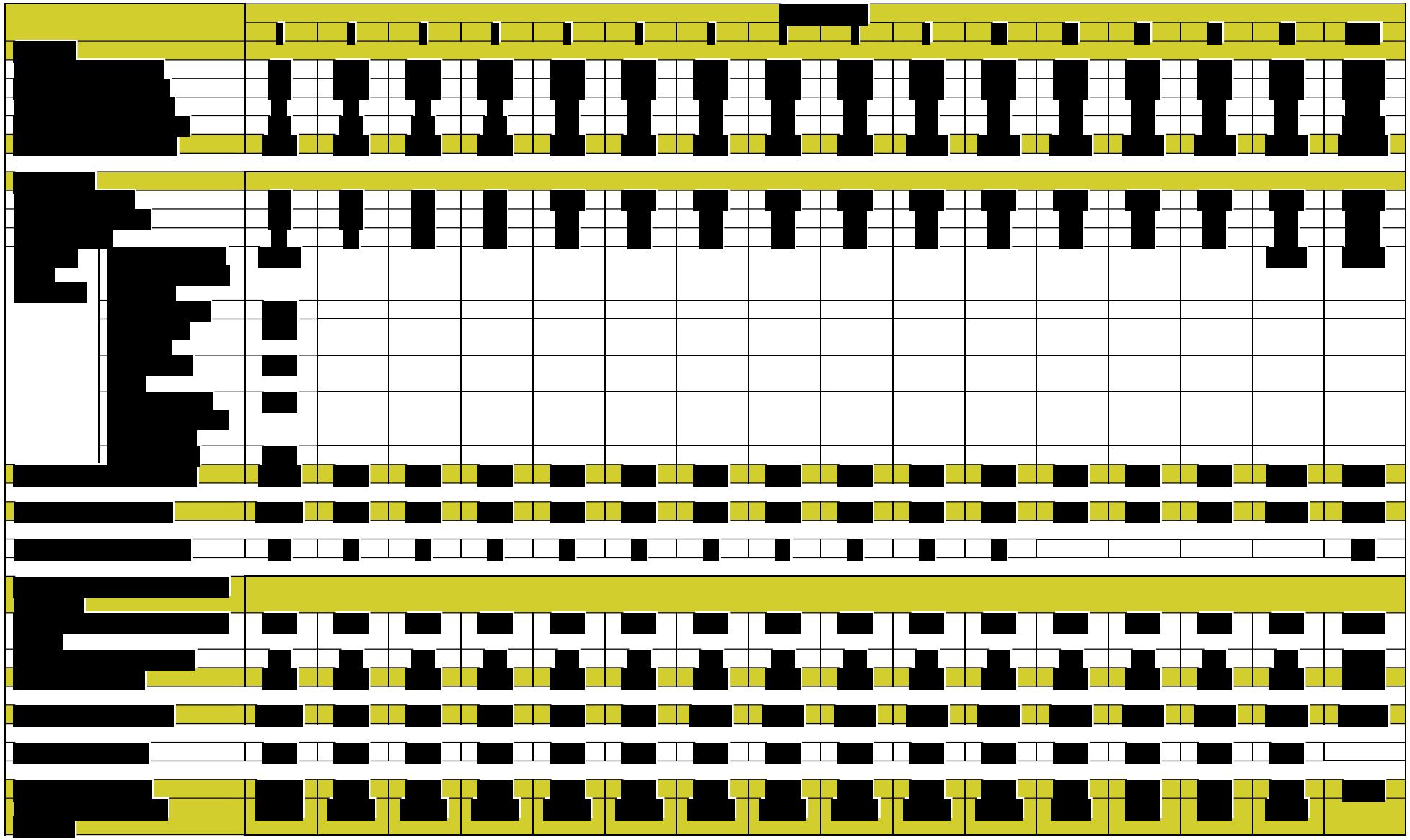
The following list identifies indicative operations that will be funded by this Priority that are of relevance to the proposed project:

- Programme projects that develop innovative ways of addressing specific programme problems, delivering public services within border areas and promoting sustainable communities. These services could be in the areas of health, environmental protection, spatial planning, education, emerging planning (programme fire and emergency services) marine and coastal management, rural and social development and the promotion of civic networks and partnerships;
- Strategic plans that promote programme collaboration between local authorities;
- The development of joint plans, strategies or action plans for delivering programme public services;
- Research projects to determine the feasibility/potential of delivering programme public services and infrastructure projects;
- Programme research and analysis which can improve the evidence base and quality of comparable information to assist spatial planning and policy making;
- Programme infrastructure projects in the areas of telecommunications, transport (road, rail and sea), energy and utilities.

## Appendix IV – Primary Research Consultees

| Organisation | |
|---|---|
| DETI | |
| DCENR | |
| Hibernia Networks | |
| Analysys Mason | |
| Invest NI | |
| IDA | |
| SEUPB | |
| Ulster University | |
| Local Councils | Causeway Coast and Glens Borough Council (Coleraine Office) |
| | Causeway Coast and Glens Borough Council (Limavady Office) |
| | Derry City and Strabane District Council |
| Letterkenny Chamber of Commerce | |
| Hibernia Customers | [redacted] |

[redacted]



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