

Shetland Islands Council

Next Generation Access / SHEFA-2 Interconnect
Public Consultation

5th August 2010

1 Introduction

The Shetland Next Generation Access (NGA) project forms part of Shetland Island Council's (SIC) strategy to improve broadband connectivity in the Shetland isles. The purpose of this document is to provide an overview of the purpose of the project, its proposed methodology, and how it sits with wider broadband and next generation broadband initiatives in Scotland and across the UK.

The project relates to encouraging a more rapid deployment of broadband networks in Shetland, and relates to providing next generation broadband connection between Lerwick, the main town in the Shetland Islands, and an existing sub-sea cable, SHEFA-2, which is operated by Faroese Telecom and lands in the south of the Shetland Islands.

In order to define the business and procurement model for the project, SIC has considered a range of possible investment models, and their implications. This has been informed by advice from Analysys Mason Limited ('Analysys Mason'). From this work, the recommended model has been identified as being one where public-sector are used to extend high-speed broadband connectivity beyond the sole usage of the public sector, to the private sector and citizens of Shetland. SIC's preferred implementation model to achieve the project's objectives is to form a special purpose vehicle (SPV) to provide wholesale NGA services to the private sector in the Shetland Islands, at current market prices. It is expected that this measure will be sufficient to incentivise the private sector to then use this wholesale access to provide new retail broadband services to businesses and citizens in Shetland.

In the remainder of this paper, we refer to this SPV as "Shetland Telecom", being an arms length SIC entity from the main Council operation.

1.1 Structure of document

This report is structured as follows:

- Section 1: Introduction
- Section 2: Background
- Section 3: Description of the Proposal
- Section 4: Alignment with European and national strategies
- Section 5: Survey of existing services
- Section 6: Market Size
- Section 7: Conclusions
- Section 8: Correspondence

2 Background

Shetland is an archipelago of over 100 islands located over 130 miles north of the Scottish mainland. It has a population of approximately 22 000 dispersed over 15 inhabited islands.

Telecoms backhaul to and from Shetland and the Scottish mainland is currently provided by two wireless microwave links operated by BT and Cable & Wireless. These have been in place for a number of years, and have shown to be susceptible to technical failure and outages due to certain weather conditions. They are also thought to be reaching the limits of their capacity, and therefore insufficient to accommodate NGA.

This limited backhaul connectivity in turn limits the quality, reliability and resilience of telecoms access services available on the islands, in turn affecting the livelihoods of both businesses and citizens living and working there.

Like other remote communities, the islands are reliant upon telecommunications connectivity to maintain essential services operating from the islands (including its airport, ports, emergency services and local authority services). Shetland has previously suffered significant disruption to its communication and economic infrastructure in the past when the microwave links have been affected by local weather conditions, as shown in Section 2.1.

Given the reliance that the islands have upon reliable telecommunications connectivity, SIC has, over the past few years, sought to encourage development of improved backhaul connectivity, with a view to replacing the ageing microwave links that the Shetland isles currently rely on and provide a more resilient, future-proof service that the community can rely on.

In 2008, Faroese Telecom completed installation of a high-capacity submarine cable, SHEFA-2, to improve its own backhaul connectivity to the Faroe Isles. This submarine cable passes through Shetland, but does not connect to the local telecommunications networks on Shetland.

Investment in the SHEFA-2 cable was deemed necessary for the continued development of the Faroe Islands. This investment has enabled Faroe to develop and expand its economy and helped maintained critical services to the Islands. Many of the technical and geographical disadvantages that inspired this investment by Faroe apply equally to Shetland.

In order to utilise the SHEFA-2 cable, new infrastructure is required to connect the cable to a central PoP in Lerwick, from where NGA services can be provided to the businesses and citizens of Shetland. If this 20km gap can be bridged, it could be used to improve backhaul connectivity to the Scottish mainland.

It has been identified through previous work that SIC has commissioned that the optimum method for making this connection is through a resilient fibre-optic cable, (shown in Figure 1), from a PoP located at the SIC offices in Lerwick to the SHEFA-2 cable.

Phase 1 will connect Lerwick to the SHEFA-2 cable at Sandwick; Phase 2 and Phase 3 will connect Lerwick to Scalloway and then Scalloway to the SHEFA-2 cable to provide fully diverse connections.



Figure 1: Proposed fibre routes in the Shetland Islands [Source: Shetland Island Council, 2010]

SIC has commissioned independent analysis of potential options for how the procurement of a high-speed fibre-optic connection between the SHEFA-2 cable and a PoP in Lerwick could be further utilised to maximise the full economic potential of NGA to the Shetland Islands. The options analysis has identified that the optimum method to maximise the full economic potential is one where public-sector funds would be used to extend high-speed broadband connectivity beyond the sole usage of the public sector, to existing Telcos who would then deliver services to the

private sector and citizens of Shetland. The network will be used by local authority partners, by businesses, and by the citizens of Shetland.

SIC's preferred model to implement the project is to form a special purpose vehicle (SPV) to provide NGA services at the wholesale level in the Shetland Islands, at current market prices.

2.1 Prospect of NGA being deployed in the Shetland Islands

Microwave link to the mainland

Telecoms traffic in Shetland is currently backhauled to the Scottish mainland via two microwave links operated by BT and Cable & Wireless. The quality of service provided by these links is adversely affected by weather, and their capacity is thought to be insufficient for peak times of bandwidth demand, which can lead to a slowdown in broadband speeds and unreliable service. In addition, despite there being two separate microwave links, these share the same air space and, for some parts of their route, the same land infrastructure. Neither operator has a resilient connection. This means that faults in one part of the network can result in complete service outage, as in June 2009.¹

In recent years, the demand for bandwidth through the microwave link has grown, but this growth in demand has not been met by any major upgrades to the link to increase the available bandwidth. The provision of suitable backhaul is critical in the development of NGA in Shetland in terms of social-economic development. To reflect the lack of available bandwidth in the microwave link, SIC has been in discussions with the incumbent microwave link providers to ascertain what future plans have been made to upgrade the link.

It is SIC's view that the microwave link is operating at full capacity and is now not suitable to accommodate future requirements. Current and planned NGA deployments in the UK and Europe have focussed on urban and suburban areas, and the very few NGA deployments in rural areas have been delivered without significant public-sector support. Without intervention, it is SIC's view that Shetland would be economically and socially hindered in comparison with the rest of the UK.

¹ <http://www.broadbandgenie.co.uk/broadband-news/bt-fault-hits-shetland-broadband-users/>

Microwave Link Resilience

The lack of resilience in the microwave link was made apparent when a lightning strike hit the Sanday microwave relay station in Orkney on 19 June 2009. A briefing report² prepared by SIC on the impact of the lightning strike concurred:

Sumburgh Airport: lost all communications from landlines, Vodafone mobile network, fax and e-mail. Aeronautical Fixed Telecommunication Network (AFTN) services, through which weather and other information is co-ordinated, was also lost. The situation was described at the time as the airport being completely 'cut off'.

As a result of the total loss of communications, Sumburgh Airport and the emergency services an emergency response could not be guaranteed and therefore the decision was made to close the airport from 1100 to 1630. **Sumburgh Airport provides lifeline services which include emergency medicinal flights to the Scottish Mainland. As a result of the loss of communications on 19 June 2009, emergency medical services both to and from Shetland were not available effectively putting islanders life at risk.**

Coastguard Services through the loss of the microwave link, lost communication from their network of VHF and MF aerials, as well as the 999 service.

Coastguard auxiliaries had to be mobilised to keep distress watches at Scousburgh and Saxa Vord, and operators at Sullom Voe and Orkney Harbour were required to keep listening watches until communications could be restored.

Shetland Health Board experienced problems with emergency communications. Patient transfers to the mainland were affected due to the closure of Sumburgh Airport, and accessing specialist advice from the mainland was complicated due to landline communications being interrupted. Communications between the ambulance service and Inverness were disrupted, as ambulances could receive but not transmit to Inverness.

Shetland Police Force experienced the same external communications problems as those above. Shetland police co-ordinated with SIC Emergency Planning to ensure that emergency response protocols remained in place for the duration of the communications outage.

Retail Services suffered a significant trading disruption as a result the lightning strike. 85% of businesses in Shetland use the Internet and/or e-mail to trade. 17% of businesses use electronic data interchange to process invoices and orders. 14% of business trade through a dedicated e-commerce website. As such, as a result of the communications outage that was experienced on 19 June 2009, trading and retail operations in Shetland were severely disrupted.

Retail organisations were not able to process credit/debit card purchases. This included online and in-store purchases where as PIN & Chip readers were not able to verify payment details as a result

² Shetland Island Council Report – Lightning strike on the Sanday Relay Station 19 June 2009

of the communications outage. Cash transactions were also affected as cashline machines were also affected by the outage.

Core network

Shetland was not part of BT's announcement in July 2008 regarding planned NGA availability to ten million homes in the UK by 2012³ using fibre to the curb (FTTC). Shetland was not named in the initial 29 exchanges⁴ announced for upgrade in March 2009. BT's plans focused on densely populated urban areas; no rural or remote areas, including Shetland, were in the list.

³ <http://btplc.com/News/Articles/ShowArticle.cfm?ArticleID=efd7b1fa-52ed-45bb-b530-734fac577e94>.

⁴ <http://www.btplc.com/News/Articles/ShowArticle.cfm?ArticleID=9c80bcc-31c8-4588-b11a-e10c7d47e991>.

NGA networks

NGA networks provide broadband services that are capable of delivering sustained bandwidths significantly in excess of those currently available using existing local access infrastructures or technologies. It is the view of SIC that the development of an NGA network is critical to the development of a modern, competitive, sustainable, high-value Shetland economy.

NGA networks have already been deployed in regions across Europe; the UK is lagging behind other areas of Europe, and Europe as a whole is lagging behind parts of Asia and North America. Shetland, as a remote, sparsely populated rural region with aspirations to develop a high-value knowledge-based economy, has as much, if not more, to gain from NGA than many other European regions. Independent research has shown that there is no business case for a private sector-led NGA deployment in Shetland in the short, medium and, perhaps, the long term.

Beyond the NGA deployment, a range of complementary business-support and demand-stimulation activities will be delivered, aimed at maximising the full economic potential of NGA to the Shetland community.

3 Description of the Proposal

3.1 Aim

The aim of the NGA project is to transform Shetland both economically and socially, by providing access to a public sector high speed fibre network that will be managed and operated at the wholesale level by an SIC arms length organisation, Shetland Telecom. The core network is proposed to be deployed in three phases, Phase 1 will connect Lerwick to SHEFA-2 in Sandwick; Phase 2 Lerwick to Scalloway; and Phase 3 Scalloway to SHEFA-2 in Maywick. This network will be accessible at the Wholesale level by any organisation wishing use it. As such the project will:

- replace Shetland’s reliance on the limited available bandwidth and resilience from the current microwave links that connect Shetland to the mainland by providing a resilient connection to the SHEFA-2 cable
- contribute to Shetland’ social-economic growth inline with national, regional and local economic strategies
- make high capacity bandwidth available in Shetland at a comparable cost benchmarked to similar service in other areas of the UK.

3.2 Objectives

The objectives of the NGA project will be to:

- maximise NGA coverage across the Shetland Islands, including rural, remote and other commercially less attractive areas
- ensure the core network is sustainable, thus, the network will need to be as future-proof as possible, and will include a number of zones that are deemed to be completely future-proof
- provide passive and active access to service providers on an equitable basis, maximising competition in an open market
- in line with the Government in Scotland Act 2003 Wellbeing Guidelines⁵, contribute to Shetland in terms of:
 - economic development
 - developing a knowledge-based economy and promoting life-long learning
 - taking active steps to maximise the potential environmental benefits of ICT and mitigate the potential negative environmental impacts of ICT
 - ensuring Shetland is better placed to benefit from intervention that can permit firms in the region to access new markets, better serve existing markets, produce and benefit

⁵ <http://www.scotland.gov.uk/Resource/Doc/47237/0028847.pdf>

from new NGA content and applications, promote innovation and collaboration, and lower carbon emissions

It is not an objective of this project for Shetland Telecom to provide the access network and/or retail services to Shetland. However, the project will be monitored to assess the take-up by the private sector at the wholesale level. Should the take-up be at such a level to indicate a market failure after a period of two to three years, Shetland Council may wish to investigate the option for Shetland Telecom to develop the access network and provide NGA services at the retail level.

Wider objectives

In addition to the specific objectives listed above, there are a number of wider objectives associated to the rollout of an NGA network in Shetland:

- support the delivery of a number of initiatives by working with and through partners, using a range of European and UK Government funds; such initiatives include:
 - the development of the ICT skills of the Shetland workforce
 - tackling digital exclusion and increasing the use of broadband and ICT in the wider society to improve access to education, health care, work and services
 - improving the competitiveness of Shetland businesses community.
- maximise the potential wider environmental benefits of the NGA network, which could include:
 - reduction in car use and travel, by commuters, businesses and people accessing services
 - more efficient use of buildings, such as workplaces and homes
 - reduction in energy consumption, for example with modern fibre networks and new applications such as ‘thin clients’⁶
- ensure that wider equality and diversity issues are addressed in relation to businesses and citizens using NGA applications, which could include:
 - coverage and take-up
 - access to work and services
 - digital inclusion.

⁶ A ‘thin client’ is a system where the client (end user) requires very little processing power locally.

3.3 Project model

3.3.1 Project scope

Geographical Coverage

The areas covered by the proposed project are some of the most remote and sparsely populated areas of Scotland. Shetland is the most northerly point in the British Isles, and traditionally has suffered from 'broadband lag' being at the latter end of commercial operators' deployment plans. On the basis of our consultations it is apparent that the commercial market has no plans to invest to provide rural areas with the required NGA services in the next three years or longer. This is for similar reasons as related to first generation broadband services, which is primarily because the very low population and business densities in the area make this segment of the market commercially unattractive to telecommunications operators.

The Shetland Islands have an approximate total population of 22,000 inhabitants⁷ who are geographically dispersed over 15 islands. Shetland's population density is only 15 people per square kilometre compared with a UK average of 254 people per square kilometre⁸. Given the disparity with the UK average, there is a clear lack of incentive for the private sector to invest in the region.

The remoteness of the Shetland Islands also increases the population's reliability on telecommunications services in order to stay in touch with the Scottish mainland and maintain essential services. The Shetland Islands area includes a number of critical services, such as coast guards, Sumburgh Airport and public safety services, who rely upon the telecommunications infrastructure on the island.

The project will aim to make broadband coverage across Shetland available at a higher quality, and greater reliability in comparison to the current provision by bridging the gap between the existing infrastructure on the Islands and the fibre optic cable (SHEFA-2) which provides a robust resilient link to the rest of the world.

Infrastructure

SIC wishes to retain ownership of the infrastructure and through the establishment of a Council-owned, arms length organisation (referred to throughout this paper as Shetland Telecom), to operate the infrastructure and ensure that the public sector network will be accessible to all services providers in a fair and equitable manner.

Wholesale Services for ISPs

It is proposed that SIC, through the development of an arms length organisation Shetland Telecom, will be responsible for the provision of wholesale services over the infrastructure.

⁷ GROS, 2009. MidYear Population Estimates Scotland; Estimated population by sex, five year age group and administrative area: 30 June 2008

⁸ GROS, 2009. Land area and population density by administrative area: 30 June 2008.

Demand Stimulation

Demand stimulation is considered to be an essential element of the project in order to ensure sustainability by maximising take up and deliver economic benefits to Shetland. Demand stimulation will focus on two key areas:

1. Promoting the core network as an open access network for all Service Providers wishing to provide high speed broadband services to the citizens and businesses of Shetland
2. Promoting and educating the citizens and businesses of Shetland as to how the use of high speed broadband would improve both the social and economic climate of Shetland by promoting the benefits to all parties.

Project Organisation

The project is proposed to be delivered between the SIC's Capital Programme and an ERDF funding grant. SIC has committed £1,102,500 from the 2010/2011 programme to deliver the project. Project costs have been established as £1,470,000. Funding for other projects has already been committed from the 2010/11 budget. It is anticipated that a 25% intervention rate, or £367,500, from ERDF will contribute to the success of a project which will eventually bring benefits to the whole of Shetland.

3.4 Technology options

Following consultation with the industry a fibre optic connection is proposed as this will give the greatest degree of flexibility for service providers. The project will be focussed on network capabilities rather than technologies, and access to the fibre will be '**technology neutral**'. In order to maximise the coverage of NGA through the deployment of the core network, it is likely that a mix of technologies may well be required. The neutrality will allow the private sector to suggest innovative solutions and minimise costs by making best use of existing infrastructure.

As an indication, the core network may be based on the provision of SDH technology allowing 10 /100 / 1000 Mbps Ethernet connections linking the Lerwick PoP to SHEFA-2. To ensure that the development of the core network continues to be '**technology neutral**', discussions with the market are ongoing.

3.5 Alternative approaches

The Council already owns a fibre network in Shetland which is used to service Council premises. The proposed core network described in this report will remain in the ownership of the Council and be an extension of the existing network which will provide enhanced services to schools, care homes and other local authority buildings outside of Lerwick. It will provide an essential, resilient, link to the mainland UK through the Faroese SHEFA-2 cable. This is seen as critical for delivery of services by public sector organisations in Shetland. The Council investment can be justified on

public sector usage alone. The opportunity exists to make this network available to Telcos to deliver NGA access for businesses and the people of Shetland.

SIC's preferred option is to invest in the network infrastructure and form an arms length organisation, Shetland Telecom to manage and operate the network infrastructure at the wholesale level. The network infrastructure will be open access so that any Service Provider can deliver high speed broadband services to the citizens and businesses of Shetland.

This option has been chosen as it will encourage open competition in Shetland and so that the Council can ensure that its investment does not result in a monopoly or duopoly situation that would be to the detriment of the Islands.

A report in December 2009 showed that the likely returns would preclude private sector investment in this infrastructure.

A partnership with an existing Telco or public subsidy would likely result in ongoing revenue costs for the partner that cannot not be justified without additional financial assistance and may in any event favour an incumbent provider and be detrimental to the market as a whole.

After careful consideration it has been concluded that the best use of public finances is to proceed with development of a public owned network. This will result in the lowest level of investment, taking into account the potential for ongoing revenue subsidy, to achieve an open and equitable market in Shetland.

4 Alignment with European and national strategies

4.1 Lisbon agenda

100% of programme activity is judged to compatible with the Lisbon Agenda, with expenditure occurring under the Lisbon Categories of Intervention listed in Figure 4-1.

<i>Code</i>	<i>Description</i>
10	Telephone infrastructure (including broadband networks)
11	Information and communication technologies (access, security, interoperability, risk-prevention, research, innovation, e-content, etc.)
12	Information and communication technologies (TEN-ICT)
15	Other measures for improving access to and efficient use of ICT by SMEs

Figure 4-1: *i2010 – A European Information Society for Growth and Employment*

4.2 European Information Society 2010

*i2010 – A European Information Society for Growth and Employment*⁹ states that the Commission actively supports the widespread availability of broadband services, and encourages Member States to put comprehensive national broadband strategies in place.

This project helps provide access to NGA applications to businesses and citizens in Shetland, which includes rural and remote areas, and is therefore believed to be in the common interest.

i2010 provides the EU strategic framework for ICT and sets out broad policy orientations and objectives. *i2010* recognises that if Europe is to fulfil its economic potential, a proactive policy approach is needed to stimulate favourable market developments and the promotion of the knowledge society.

The Shetland NGA project delivers on the *i2010* objectives by:

- promoting an open and competitive digital economy
- promoting ICT as a driver of economic growth, giving special attention to SMEs which are acknowledged to face specific challenges in adopting and exploiting ICT
- delivering a large-scale ambitious programme based upon private–public partnerships
- promoting ICT as a driver of inclusion and quality of life
- aiming for complete coverage to ensure equality in access.

⁹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0229:FIN:EN:PDF>.

4.3 EU Sustainable Development Strategy

The Renewed EU Sustainable Development Strategy¹⁰, was adopted by the European Council in June 2006. It is an overarching strategy for all EU policies which sets out how we can meet the needs of present generations without compromising the ability of future generations to meet their needs.

The Shetland NGA project delivers on the objectives of the EU Sustainable Development Strategy in the area of climate change and clean energy. The Scottish and UK Government, in line with EC policy, are determined to tackle the negative effects of growth in motor traffic. The detrimental effects of motor traffic growth include pollution and congestion. Pollution from cars is now causing very serious concern among environmental and health experts. There are also high economic, environmental and social costs associated with congestion: as more people use their cars, traffic increases, congestion worsens, journey conditions become less pleasant and take longer, and the environment worsens.

The Shetland NGA project has the potential to improve the environment by reducing travel in the following ways:

- cut home-to-work travel and reduce congestion by enabling travel at smarter times by flexible working (e.g. some home-working)
- cut in-work travel by holding smarter meetings (conference calls and video links)
- cut in-work travel by using systems with data access anytime, anywhere enabling access to information and systems remotely, ensuring peripatetic staff need to return less to an office base
- reduce network maintenance – next-generation fibre networks will require less maintenance, and less travel to maintain
- reduce truck journeys – with efficient supply chains facilitated by ICT.

The Shetland NGA project also has the potential to improve the environment in the following ways:

- use buildings efficiently with smarter use of office space (e.g. more hot-desking) and use of home-working
- reduce energy consumption – future applications like ‘thin clients’ (remotely hosted PCs) and fibre networks will use less energy
- grow the environmental technology sector more efficiently through smarter use of ICTs
- communicate the environmental message – as a communication medium, the Internet will empower environmentalists to raise awareness through the www, social networking, YouTube, etc. and allow citizens to effectively monitor their carbon footprints.

¹⁰ <http://ec.europa.eu/environment/eussd/>

The wider benefits of the project will also have a positive impact on the following elements of the EU Sustainable Development Strategy:

- *sustainable transport* – by reducing the need to travel and presenting virtual meetings as the ultimate form of sustainable transport
- *public health* – for example by facilitating the development and use of telecare systems
- *social inclusion* – by working with partners to address issues of digital inclusion.

4.4 Related Scottish and Shetland strategic programmes

The project is designed contribute at the Scottish national, regional and local strategic level.

National Level – Scottish Government Economic Strategy (GES)¹¹

The project will help deliver on the aim of the GES of increasing sustainable economic growth. The creative industries sector (including digital content and technologies) is highlighted as a key sector for attention to help create the right environment for competitiveness and growth.

The project can deliver on the following Strategic Priorities of the GES:

Supportive Business Environment –The GES highlights that Scotland’s businesses are the primary driver of sustainable economic growth and that national competitiveness depends critically on the competitiveness of individual businesses. Access to good telecommunications networks is key to remote and rural businesses being able to compete in the global marketplace.

Equity – maximising utilisation of electronic connectivity will enable the most remote areas of Scotland to contribute to, and benefit from, economic growth.

Regional Level – Highlands & Islands Enterprise’s (HIE) Operating Plan 2009-2012¹²

The objectives of the 2009 – 2012 Operating Plan is to build sustainable economic growth in all parts of the Highlands and Islands in line with the GES.

One of the three areas HIE aim to focus on to achieve sustainable economic growth is “Creating the infrastructure and conditions to improve regional competitiveness”. The Operating Plan states that regional competitiveness can be achieved with the provision of improved connectivity and technology by providing access to high quality telecommunications services. This project can therefore make a direct contribution to achieving sustainable economic growth within the Highlands and Islands.

Local level – Shetland Single Outcome Agreement for 2009/2010¹³

¹¹ <http://www.scotland.gov.uk/Publications/2007/11/12115041/0>

¹² <http://www.hie.co.uk/operating-plan-2009-2012.htm>

¹³ <http://www.shetland.gov.uk/communityplanning/documents/ShetlandSOA2009.pdf>

The following Improvement Indicators and Local Targets are relevant to this outcome:

Improvement Indicator LI 11: Improve the availability, reliability and uptake of broadband communications.

Local Target: Increase broadband uptake to 80% of Shetland population by 2011.

Improvement Indicator LI 49: Support the extension of broadband availability and quality.

Local Target: Fibre link to mainland Scotland to be active by 2011. 2 Mbps to be available in all areas.

In addition, within the Shetland Single Outcome Agreement for 2009/10, the Shetland Community Planning Partnership has committed to focusing on some specific Priority Areas in order to contribute to the Scottish Government's Strategic Objectives. Under the Strategic Objective of 'Smarter', the agreed Priority Area is:

"Work with all partners to make available high quality broadband and telecommunications throughout Shetland"

In addition SIC policy documents are also relevant to this project:

SIC Corporate Plan 2008-2011¹⁴ – The project will make a contribution to the Sustainable Economy Action Area. The Corporate Plan puts specific focus on improving telecommunications by achieving integration of the fibre optic cable and maximising broadband speed and coverage. The outcome of this will be robust broadband services for businesses, organisations and homes in Shetland and supporting growth of businesses in the Creative Industries sector.

SIC Economic Development Policy Statement 2007-2011¹⁵ – The main aim of SIC's Economic Development service is "to improve the quality of life of Shetland residents by promoting an environment in which traditional industries can thrive and innovate alongside newer emerging industries". The service aims to diversify Shetland's narrow economic base, seek new methods of working and find ways to link more closely to the rest of the world. The availability of high quality telecoms services is recognised as being a key component to this.

The project delivers on Policy No 15 of the Statement:

"Establish robust broadband services to businesses, organisations and homes in Shetland" and pledges the following:

- Achieve full integration of fibre-optic cable
- Full broadband service (at least 4-8Mbps) to 80% of Shetland population by 2011

¹⁴ <http://www.shetland.gov.uk/corporateplan/>

¹⁵ <http://www.shetland.gov.uk/business-jobs/documents/EconomicDevelopmentPolicyStatement2007-2011.pdf>

- Establishment of 20 new businesses dependent on high-speed data links offering direct employment to 60 people

4.5 European Social Fund Operational Programme

The European Social Fund (ESF) Operational Programme, which sets out the priorities for ESF investments, includes the following priorities:

- *Priority 4: Tackling barriers to employment* – will improve the employability and skills of unemployed and inactive people, and tackle barriers to work.
- *Priority 5: Improving the skills of the local workforce* – will improve the qualifications and skills of workers without basic skills and with no or low qualifications.

Much of the ESF investment in this area will focus on programmes that complement the proposed ERDF investment in ICT, ensuring Shetland's citizens have the skills and opportunities to benefit from an information society, and are able to positively contribute to economic growth.

4.6 National strategies

In February 2007, BIS (formally BERR), in partnership with Ofcom, published a best-practice guide to public investment in broadband schemes in the UK.¹⁶

The Broadband Stakeholder Group (BSG), the UK Government's leading advisory group on broadband, has also recently published further strategic reports. The most recent reports examine the models for effective public-sector interventions¹⁷ and the costs of deploying fibre-based next-generation infrastructure.¹⁸

In 2008, BERR (formally DTI) commissioned the Ciao Report¹⁹ to underline the Government's commitment to securing a world-class communications infrastructure for the UK.

4.7 Digital Britain report

In June 2009, the UK Government published the *Digital Britain* report,²⁰ the Government's strategic vision for ensuring that the UK is at the leading edge of the global digital economy.

The contents and recommendations of the *Digital Britain* report are complimentary to, and consistent with, the objectives and timing of the Shetland NGA project, and potentially provide additional opportunities for the people of Shetland beyond those delivered by the NGA project

¹⁶ DTI & Ofcom, *Public Broadband Schemes, A Best Practice Guide*, February 2007.

¹⁷ BSG, *Models for efficient and effective public-sector interventions in next-generation broadband access networks*, 9 June 2008.

¹⁸ BSG, *The costs of deploying fibre-based next-generation broadband infrastructure*, 8 September 2008.

¹⁹ Francesco Ciao, *The next phase of broadband UK: Action now for long term competitiveness*, September 2008.

²⁰ <http://www.culture.gov.uk/images/publications/digitalbritain-finalreport-jun09.pdf>.

alone. The Shetland NGA project, by nature of its timing, also provides opportunities for a digital Britain by helping to validate the methods and processes for using public money to deliver competitive digital communications infrastructure solutions, and providing evidence of consumer and business demand necessary for a successful digital Britain.

Key points from the *Digital Britain* report that relate to the Shetland NGA project include:

- **90% next-generation broadband coverage by 2017** – The report indicates that next-generation broadband will be delivered to between half and two-thirds of the UK population without Government intervention by 2017. It is highly likely that Shetland falls into the remaining one-third of the UK population that would require Government intervention.
- **Universal Service Commitment (USC) at 2Mbit/s** – The report indicates that 11% of lines in the UK are unable to deliver a 2Mbit/s service. Given its rural characteristics, Shetland will have a higher percentage than the UK average. The NGA project will specify services that should be greater than the USC in order to provide an uplift for the whole population, and also to provide an element of future-proofing beyond the USC.

4.8 European guidelines

In September 2009, the European Commission published its guidelines on the application of state aid in the rapid deployment of broadband networks.²¹ The Commission's broadband strategy is an important part of the European Economic Recovery Plan.²² The aim of the plan is to increase the Commission's investment in key sectors such as broadband to promote economic growth and develop the communications infrastructure to sustain long-term economic growth.

As part of the Recovery Plan, it is the aim of the Commission to achieve 100% NGA coverage for all European citizens. As such, the Commission has added EUR1,02 billion into the European Agricultural Fund for Rural Development (EAFRD). This additional funding will be used to deploy NGA infrastructure in rural areas to promote and develop economic growth.

4.9 UK regulation

Ofcom is the independent regulator and competition authority for the UK communications industries. In relation to NGA, Ofcom states that regulation must support investment by the private sector, while at the same time promoting competition wherever there are potential barriers to the competitive delivery of services.

Ofcom has recently cleared the way for companies and organisations to invest in NGA services for UK homes and businesses.²³ Note that although this guidance is aimed at BT's announcement to

²¹ 2009/C 235/04 Community Guidelines for the application of State aid rules in relation to rapid deployment of broadband networks.

²² COM(2008) 800 Final – A European Economic Recovery Plan.

²³ <http://www.ofcom.org.uk/media/features/ngaonex>.

roll out NGA to ten million homes by 2012, Shetland's requirement is to provide a network with open access at the wholesale level, and it is SIC's intention to fit in with this regulatory guidance to achieve this.

Ofcom has a central role to play in enabling both investment and competition in NGA, and to do this it will:

- allow wholesale pricing flexibility to enable returns appropriate to the considerable risks of building new networks, but constrained by the market in the interests of customers
- ensure that any regulatory pricing allows investors the opportunity to earn a rate of return that genuinely reflects the cost of deployment and the associated level of risk
- minimise unnecessary inefficiencies in network design and build as a result of regulatory policies, while continuing to protect the consumer interest
- support the use of new, more flexible wholesale services by BT to offer super-fast services to other service providers and consumers at competitive prices
- safeguard the opportunity for further competition based on physical infrastructure, by facilitating fair opportunities for companies to synchronise their investments with BT's deployments, should reasonable demand arise, and encouraging network design that takes future potential competition into account.

A key element that is fundamental to the proposed project model is Ofcom's assertion²⁴ that ***'In the future, wholesale electronic products – 'active access' – will be key to deliver widespread investment and competition'***.

Ofcom is also consulting on a variation to the Undertakings with BT. The Undertakings require Openreach to provide passive products on today's copper-based access network on the same basis for all communications providers, including BT's own wholesale and retail divisions. Today, in super-fast broadband, there appears to be more significant interest so far in active products. In these circumstances, requiring BT to develop passive products for communications providers, and to then use them itself, risks creating inefficiencies such as duplications in engineering labour or overly complex business processes. Such inefficiencies could have the effect of deterring investment in superfast broadband, contrary to the consumers' interest.

In summary, this means that Ofcom aims to ensure that there is ubiquitous access by Internet service providers (ISPs) to wholesale ('active') NGA products on an equitable basis. Ofcom aims to ensure competition can also develop at the infrastructure level with 'passive' products, should reasonable demand arise.

²⁴ http://www.ofcom.org.uk/consult/condocs/nga_future_broadband/summary/

5 Survey of existing services

5.1 Current UK broadband market

Incumbent (BT) – Openreach

In the UK mainland, the main broadband infrastructure is owned and operated by BT, the incumbent operator. BT is divided into separate functional lines of business, including Openreach, which owns and operates the local access networks – the copper wires between the telephone exchange and the end users. This entity ensures that all rival communications providers have equality of access to BT’s own local network on a non-discriminatory basis.

Other BT lines of business operate above the infrastructure level and include BT Retail (a service provider) and BT Wholesale.

In 1997, in a competition case relating to BT (and at the time its new Internet business), Oftel (now Ofcom) found that a two-stage test needs to be undertaken by BT to ensure that unfair cross-subsidisation is not carried out by the incumbent national operator:

- a financial analysis should be carried out to determine whether each area of BT’s business plan is reasonable on a standalone basis
- a competition analysis should be undertaken to determine whether any anti-competitive cross-subsidisation is occurring on any relevant market.

Cable (Virgin Media)

Virgin Media (formally NTL-Telewest) provides a cable network across the UK. Broadband services, along with telephone and cable TV, are delivered over the cable network based on ‘co-axial’ cable. This network covers about 50% of the UK mainland.

5.1.1 Wholesale

BT Wholesale

BT Wholesale provides wholesale services on an equitable basis to service providers including BT Retail. BT Wholesale supplies 46% of broadband connections across the UK.

Local loop unbundling (LLU)

In the UK, the regulatory framework encourages deeper competition in the telecoms market by allowing rival operators to compete with BT by installing equipment in BT's local exchanges (LLU). The operators can then offer their own wholesale services over BT's telephone lines. Currently, about 34% of the exchanges had been unbundled across the UK²⁵.

5.1.2 Retail

There is healthy competition at the retail level across much of the UK. BT Retail is the largest player, with a market share of 27%, followed by Virgin Media (23%) and Car phone Warehouse (16%).²⁶ Hundreds of other service providers are also active.

Virgin Media's cable network, which covers about 50% of the UK, supplies about 21% of broadband connections. The cable network is not regulated at present, and end users can only access services from Virgin Media.

5.2 Current broadband market in the Shetland Islands**5.2.1 Incumbent**

Unlike the UK mainland, there is limited competition at the telecommunications retail level in Shetland, brought about by the remoteness of the area, and the very low population densities, as discussed earlier in this paper. There are two national operators - BT and Cable & Wireless (formerly the C&W network was developed and operated by Thus PLC) - who have networks in the Shetland Islands, Cable & Wireless use a combination of fibre and point-to-point microwave links while BT use fibre and copper:

- Thus PLC initially won business in Shetland through the University of the Highlands and Islands (UHI) network of which three sites are in Shetland. Thus won the Pathfinder North Contract in 2006 and extended the number of fibre connections from three to 12 by attaching 9 Pathfinder sites that are located on the route of their UHI cable, the remaining 63 Pathfinder sites are connected by 5.8Ghz point to point wireless links. When Cable & Wireless took over Thus PLC in 2008 they inherited Thus's Pathfinder network in Shetland. Cable & Wireless do not offer access network services to SME's and the general public in Shetland.
- BT is the main provider of business and consumer broadband services, using a combination of fibre, ADSL and copper connections. BT has a single route fibre link that connects Lerwick to the South of Shetland where their microwave link to the UK mainland is situated.

²⁵ <http://www.samknows.com/broadband/regions.php>.

²⁶ Q3 2008 figures www.broadbanduk.org/content/view/279/55/.

5.3 Access Network

The primary access network providing voice and data services to citizens and business users in Shetland is the copper network owned by BT. This is used to deliver ADSL broadband services. Availability is constrained by the long distances between some premises and the telephone exchange and in those areas covered by Exchange Activate connection numbers are limited. While in some areas customers can get ADSL speeds up to 6½ Mbps in many others the maximum download speed is 2Mbps or less. Those areas covered by Exchange Activate are limited to a maximum 512kbps download speed. The physical limitations of the current networks mean that they can act as a bottleneck for broadband speeds.

In addition to BT's copper access network, Shetland Broadband operates a Fixed Wireless Access network. Coverage is limited to parts of Lerwick. Shetland Broadband is a very small, privately owned limited liability partnership that provides some ISP services as well as repair and maintenance of network equipment.

There are no unbundled exchanges in the Shetland Islands.²⁷

5.3.1 White, black and grey areas

In order to ensure pan-European compliance with state-aid rules, the European Commission has specified a methodology for assessing areas that may be eligible for public-sector support. This methodology is based upon a geographical analysis that uses white, grey and black designations to indicate the number of operators providing coverage within a time horizon of three years:

*'The Commission has consistently made a distinction between areas where no broadband infrastructure exists or is unlikely to be developed in the near term (white areas), areas where only one broadband network operator is present (grey areas) and areas where at least two or more broadband network providers are present (black areas).'*²⁸

In terms of basic broadband services Shetland has one incumbent operator, BT, and can be deemed a grey area and is expected to remain grey for the near future.²⁹

In terms of NGA connectivity there are no providers, Shetland can be deemed to be white and is expected to remain white for the near future.³⁰

²⁷ <http://www.samknows.com/broadband/county-availability/Shetland-Islands.html>.

²⁸ Source: 'Communication from the Commission: Community Guidelines for the application of State aid rules in relation to rapid deployment of broadband networks', Official Journal of the European Union, 30 September 2009.

²⁹ Near future is defined as three years in accordance with EC guideline on the rapid deployment of high speed broadband networks.

³⁰ Near future is defined as three years in accordance with EC guideline on the rapid deployment of high speed broadband networks.

Shetland basic broadband coverage

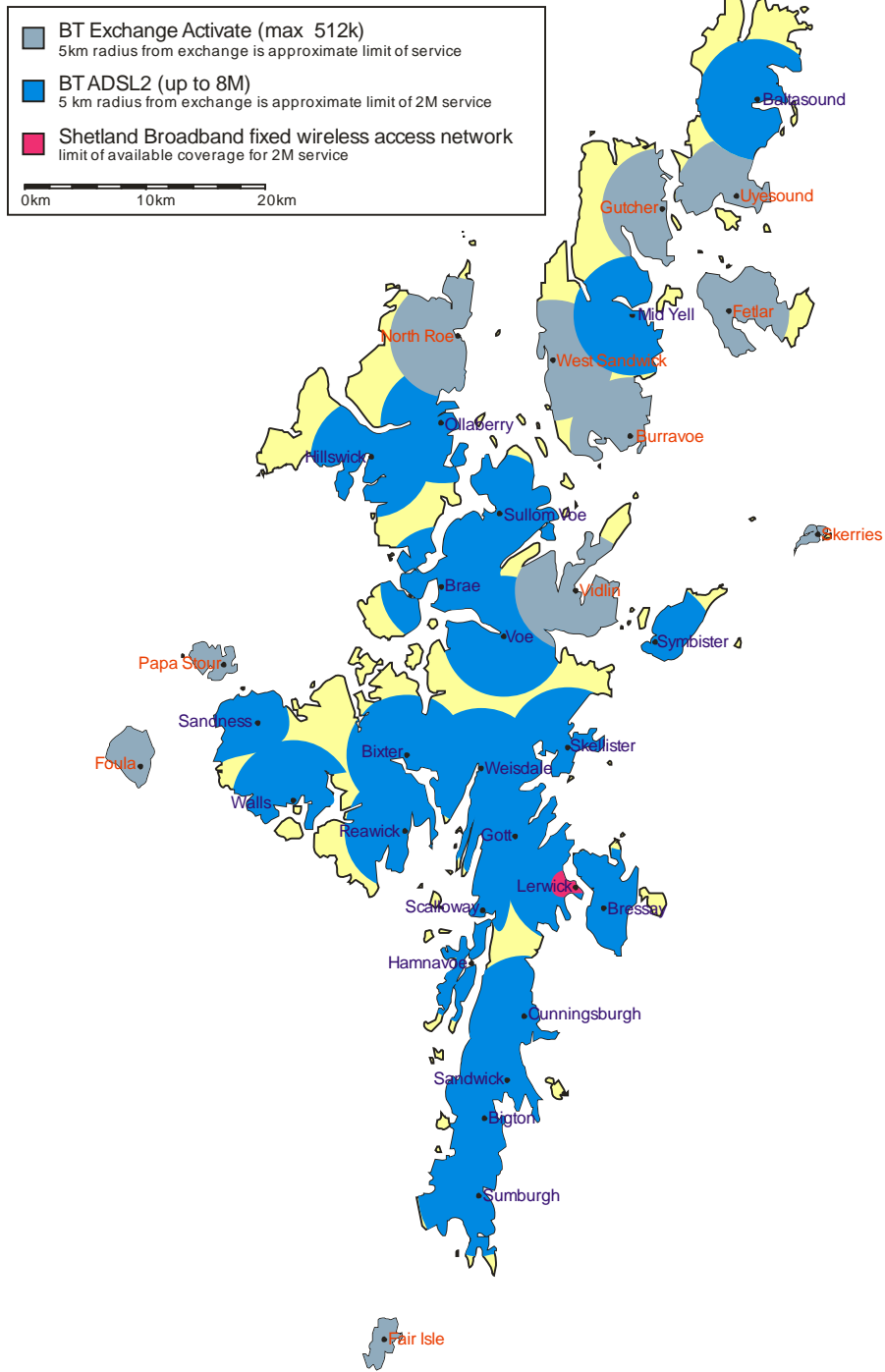


Figure 2: Availability of basic broadband services in Shetland [Source: Shetland Island Council, 2010]

5.4 Market failure

5.4.1 NGA availability in the UK

In terms of NGA availability in the UK, Virgin Media is introducing an NGA service over its cable network. Using DOCSIS technology, speeds of up to 20Mbit/s are currently available, with higher speeds of 50Mbit/s to be rolled out in 2009/10. This is only available to areas covered by the Virgin Media cable network. Virgin does not operate or plan to operate in Shetland.

In July 2008 BT announced its plans to make NGA available to ten million homes by 2012.³¹ In March 2009 BT named the initial 29 exchanges³² that will be upgraded, focussing on densely populated urban areas. This has been followed by successive upgrades, the latest being an announcement in January 2010 of a further 63 exchanges due to be upgraded. None of these exchanges are in Shetland.

In February 2010, BT announced plans for several locations in Scotland to be upgraded, all focussing on densely populated areas.³³ None of these locations are in Shetland.

5.4.2 Rationale for state intervention UK policy

BIS guidance³⁴ on public broadband schemes identifies the following two reasons for public-sector intervention and recommends that any public scheme clearly identifies which of these rationales (or objectives) it is seeking to achieve:

- addressing market failure
- achieving distributional policy objectives and increasing regional competitiveness.

Addressing market failure

We consider that there is a strong case for state financial assistance to the project due to anticipated failure of the market to provide NGA to Shetland. Delivering NGA in urban areas is a cheaper, less risky and more attractive option than delivering NGA in rural areas with a dispersed population, like Shetland.

Market failure (as defined by the BIS) is a technical term describing a situation where the quantity of a product demanded by consumers does not equate to the quantity supplied by suppliers. Market failure occurs when:

³¹ <http://btplc.com/News/Articles/ShowArticle.cfm?ArticleID=efd7b1fa-52ed-45bb-b530-734fac577e94>.

³² <http://www.btplc.com/News/Articles/ShowArticle.cfm?ArticleID=9c80bccc-31c8-4588-b11a-e10c7d47e991>.

³³ <http://www.btplc.com/news/articles/showarticle.cfm?articleid=4DDD46CB-17A0-4452-8F55-1DCC8EBA8E37&Terms=79,278,1367>.

³⁴ DTI & Ofcom, "Public Broadband Schemes, A Best Practice Guide", February 2007

- a market place is distorted by the existence of a dominant player which uses its dominance to exert significant influence over supply, prices or output (a monopoly)
- there is incomplete or asymmetric information
- externalities, or side effects, are not included in decision making with regard to pricing and purchasing
- the supply of public goods (goods which are not restricted to those that are prepared to pay for them) by the state, distorts competition.

The case for state financial assistance to the project is based on:

- an assessment that the market will fail to deliver the benefits of NGA to Shetland – delivery in urban areas is cheaper, less risky and more attractive to private investors than delivery in rural areas with a dispersed population like Shetland
- social and economic benefits to the region, private industry, increased regional competitiveness and reduced regional disparities
- benefits to the public sector and the population as a whole

Achieving distributional policy objectives and increasing regional competitiveness

There is also a case for state financial assistance to the project based on its contributions towards achieving distributional policy objectives, and many of the same arguments could also be made with regard to increasing regional competitiveness.

Structural and Cohesion Funds are the EU's main instruments for supporting social and economic restructuring across the EU. They are used to tackle regional disparities and address structural weaknesses in regional economies. The funds can be used to support actions to develop infrastructure and telecoms, human resources, and to support research and development.

The BIS paper proposes the following tests to assess the case for intervention on the grounds of distributional objectives. These are:

- *comparative service availability* – are the kind of services the scheme will deliver widely available in other areas in the UK?
- *likelihood of commercial services* – are commercial companies unlikely to invest even when there is a proven demand to deliver the kinds of services that the scheme aims to provide?

In the case of comparative service availability, NGA services are soon to be available over about 50% of the UK across the cable network. BT has announced³⁵ its intention to roll out NGA services to ten million households by 2012. In recent meetings between SIC and BT, March 2010, it was found that BT have no plans within the next three years to for an NGA deployment in the Shetland Islands.

³⁵ <http://www.btplc.com/News/Articles/Showarticle.cfm?ArticleID=b09630bd-4529-4d6b-b2ab-0708b3b1f15c>

On an analysis of the likelihood of NGA deployment in Shetland, SIC concludes that there is also minimal prospect of any other private-sector operator unilaterally making the decision to invest in an NGA network in Shetland in the short to medium term.

6 Market Size

Shetland has a population of 22,000 with approximately 10,000 households. The estimated total number of businesses is 1,325³⁶ with an estimated combined turnover of £1.3 Million in 2009. The total number of telephone lines is estimated to be in the region of 12,000.

Broadband take-up in the Shetland Islands is currently 23 connections per 100 inhabitants, lower than the national average of 29.23 connections per 100 inhabitants³⁷.

6.1 Demand in the Shetland Islands

Previous research commissioned by SIC established potential additional demand for high-speed broadband services in the Shetland isles over three markets. These segmented markets are.

- ISPs serving the consumer and business market
- mobile network operators
- public-sector organisations.

³⁶ Scottish Government 2009 Data Statistics

³⁷ Point Topic - Broadband Take-up by Local Authority 2009

7 Appropriate instrument

7.1 Incentive effect on firms

As indicated in Section 5.4, the prospects for the delivery of NGA in Shetland by the private sector are limited. The proposed measure will encourage companies to undertake activities they would not otherwise do through the introduction of core network and the provision of wholesale services in Shetland.

The investment by SIC and the ERDF grant to gap fund the Shetland's investment would provide a significant incentive for private sector telecommunication operators to provide high speed broadband service in Shetland.

By ensuring that service providers have access to wholesale NGA services in an open and non-discriminatory way, it is expected that the network will stimulate competition between service providers in the area.

7.2 Selection of preferred supplier and how Shetland Telecom will be formed

The construction works (civil works, ducts, dark fibre, etc.) will be carried out by private operators selected by the means of an open tender in accordance with Council Standing Orders Relating to Tenders and Contracts and in line with the relevant national and EU Procurement Directives.

The management of the core network and offering of wholesale services to the third party service providers will be carried out by a public non-profit legal entity, called "*Shetland Telecom*".

7.3 Indicative costs

Costing the delivery of a core network will vary significantly depending on the technology deployed. As noted in Section 3.4, a deployment based upon a SDH technology is considered the most likely to deliver the project objectives and therefore forms the basis of the indicative costing provided in this section. The total cost of making a connection to the Faroese cable and providing the core network infrastructure is estimated to be £1,470,000.

7.4 Effect on competition

SIC consider that the proposed investment in the NGA project will not distort or threaten to distort competition in a way that is incompatible with the common interest of the EU. As discussed in Section 3.3.1, the formation of Shetland Telecom to provide services at the wholesale level will

ensure that all services providers will have access to the core network in a fair and equitable manner.

Other Service Providers

Service providers will have access to wholesale products provided by Shetland Telecom comparable to UK wholesale. Service providers will gain access to wholesale NGA products on a non-discriminatory, equal and transparent basis. Shetland telecom will provide open access that complies with the principles of equivalence. This is expected to lead to increased competition at the retail level, positively impacting both services and prices in Shetland.

Affect on the incumbent

As there are no plans by the current incumbents to deliver NGA services to Shetland within the next three years, SIC believe there will be no affect on the incumbents as the incumbents will have access to wholesale NGA products on a non-discriminatory, equal and transparent basis

7.5 Effects on trade

Service providers from across the EU will have non-discriminatory access to wholesale products.

The open competition to select a private-sector investor will be open to potential investors from across the EU.

SMEs using NGA applications will be encouraged to trade beyond the Shetland Islands, nationally, EU-wide and globally.

SIC considers that the principle of subsidiarity found in Article 5 of the EC Treaty may also be relevant here. In certain recent cases relating to the effect on trade between EC Member States in other areas of competition law (e.g. Article 81 and 82 of the EC Treaty), the European institutions have not asserted jurisdiction. This is in line with the principal of subsidiarity, as well as EC Modernisation and the European Commission's willingness to see national competition authorities apply their own competition rules to matters that primarily only have a national (or even more local) impact, as may be the case here.

7.6 Justification for financial assistance

SIC accepts that project will have state aid implications, which will need to be notified to the Commission and assessed under the EU state-aid rules. However, we consider the benefits of the aid to be proportionate and approvable, as the benefits of the measure will outweigh any potential distortions to the market. We consider the proposed measures to be in line with precedents set for the approval of aid to support broadband in rural areas, and would ask that the Commission also to take into account the extent to which the measure will facilitate the development of Shetland in accordance with Article 107(3)(c) of the EC Treaty.

In summary:

- The NGA core network in Shetland will serve the public and substantially benefit the local economy. It is intended that the scheme will support the delivery of initiatives to develop the ICT skills of the Shetland workforce, tackle digital exclusion and increase the use of broadband and ICT in the wider society to improve access to education, healthcare, work and services, improve the competitiveness of Shetland businesses and attract external businesses to Shetland.
- The project will provide substantial social and economic benefits to the public sector, private industry and the general population of Shetland. It will also lead to increased regional competitiveness and reduced regional disparities.
- The NGA project will maximise the potential environmental benefits of advanced ICT and NGA. It will reduce transport journeys that detrimentally affect the environment, thereby reducing pollution and congestion, which are key aims of the European Commission. It will enable more efficient use of buildings, such as workplaces and homes, and it will reduce energy consumption, for example with modern fibre networks and new applications.
- The award criteria will be designed to ensure that the most economically advantageous proposal is chosen by enabling a full analysis of cost versus quality. For any two given proposals, with all other criteria scoring equally, the proposal with the minimum level of aid would be chosen.

8 Correspondence

Comments and requests for further information should be directed to

Marvin Smith

Project Manager - Telecoms

Shetland Islands Council

Economic Development Unit

66 Commercial Road

Lerwick

Shetland

ZE1 0NJ

(p) 01595 745678

(f) 01595 745676

(e) marvin.smith@shetland.gov.uk

