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Additional information:

Strategy for maximising Internet Connectivity across EL. The document also includes back ground information about current provision in EL, the National initiatives currently underway and their expected outcomes. Links to report to Cabinet 11/11/14.

Authorised By	Jim Lamond
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Date	31/10/14

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East Lothian Next Generation Internet Connectivity Strategy

EAST LOTHIAN COUNCIL

Date: August 2014

Revision	Description	Author	Checked	Reviewed	Authorised	Date
1.0	Draft report	JM	AM	AM	JM	18/02/14
2.0	Final report	JM	AM	AM	JM	14/03/14
3.0	Final Updated report	JM			AAC	18/08/14

CONTENTS

1 Executive Summary

This document presents an overarching five year internet connectivity strategy for East Lothian that defines priorities to improve the provision of Internet connectivity across the East Lothian Council area. The strategy brings together input from a range of policies, strategic documents and initiatives both current and in development. The related action plan provides a clear link to the strategy and demonstrates how the proposed actions will move East Lothian towards its stated aspirations. Access to affordable broadband is regarded as a key priority for the Council and is in direct support of the Council Plan 2012-2017, Economic Development Strategy, Single Outcome Agreement and Digital Inclusion objectives.

The Scottish Government Step Change programme aims to achieve 95% coverage of Next Generation Access (NGA) (i.e. availability to all/or part fibre based broadband infrastructure) in East Lothian by 2017, with all premises expected to achieve a minimum 2Mbps. Scottish Government has published maps of the deployment phasing based on the information available at contract signature with the supplier BT, to provide an indicative view of the phasing approach and anticipated NGA coverage. All information published by Scottish Government is subject to approval by BT, with data associated with the deployment plan considered to be in commercial confidence and subject to Non-Disclosure Agreements. This will be a phased deployment, with each phase achieving a contracted outcome in terms of number of premises passed and speed distribution. The postcodes to be served in each Phase has an outcome for East Lothian in terms of coverage and speed. Each deployment phase is subject to a 6-9 month survey stage which may impact the proposed deployment plans. Any proposed changes are discussed and agreed between BT and the Step Change Programme and managed through a Change Control process.

Local Authorities have an important role to play in supporting the Step Change deployment programme in their respective regions through planning, roads and street works, press activity etc. The Council should receive notification from the Step Change programme team on live postcodes available for service as a result of successful deployment of a phase, and notice of cabinets/communities to be served following the survey stage. The Council should take an active interest in the programme at a strategic level, with an aim to ensuring that: (a) local priorities are considered in any decision that impacts the planned premises to be served in East Lothian and; (b) East Lothian achieves the same if not better outcome as to what was initially planned by BT. Close monitoring of the Step Change programme will also inform (as far as possible) the expected outcome for East Lothian. The market needs

clarity from a state aid perspective on areas where subsidy will be used to provide a Basic Broadband service (defined as a minimum 2Mbps) and Superfast Broadband service (defined as greater than 24Mbps). This information is essential in order to allow communities and potential suppliers to assess if the Step Change deployment will meet end user needs in terms of coverage, speed and timescales and to determine the viability of using public funds to serve an area that will not benefit from Step Change or offer an interim solution until Step Change comes along.

Feedback from businesses and residents including community representative's in East Lothian highlights significant problems, with a number of locations having an 'unusable' broadband service which hampers development and threatens sustainability. The Step Change programme has the objective of achieving a minimum 2Mbps to every premise in Scotland by 2017. Based on feedback it is evident that a 2Mbps service will be inadequate in meeting the needs of the majority of residents/businesses in East Lothian. A commonly stated desire is to widen access to a 'usable' broadband speed rather than focus on further raising speeds for those already with a commercially available and 'usable' service. The term 'usable' is a common misconception and is explored further in the strategy document. The challenge is to provide a service that not only meets the needs of users but is also capable of meeting future requirements. It is evident that alternative solutions and technologies will be required to reach out to the hard to reach areas unlikely to achieve an uplift in speed from the Step Change programme. These technologies are explored in this document. The benefits of delivering a standardised broadband product over bespoke solutions are significant in terms of user acceptance and service sustainability and this has been considered when devising the strategy.

A number of funding opportunities are available for extending coverage of NGA in Scotland. The Council should take the initiative to capture the make-up, requirements and firm demand of the hard to reach areas across East Lothian to allow the Council to be prepared and ready to co-ordinate and harness any national funding opportunities. Community Broadband Scotland (CBS) funding is available now and is already being utilised by active communities such as Humbie (led by Humbie Community Council). We encourage the Council to identify organised community projects in rural areas unlikely to be covered through Step Change, and to submit expressions of interest to CBS for these projects. This would help raise the profile early on of rural East Lothian and of specific communities within the Council area. It would also help engage communities in the delivery of their own broadband capability and incentivise communities to form a concrete project.

In June 2013, the Chief Secretary to the Treasury announced a further £250m that builds on the £1.2 billion programme of public investment already underway to transform broadband in the UK. The £250 million investment is to help reach a target of 95% of homes and businesses in the UK having access to Superfast Broadband by 2017. The Scottish Government has been awarded £20.99m from this fund on a match-funding basis and will decide on the effective use of the fund within Scotland. East Lothian is targeted to reach 95% NGA by 2017 through the Step Change programme, however it is likely that not all premises having access to NGA will benefit from Superfast Broadband speeds (greater than 24Mbps). There is therefore scope for the Council to raise the profile within Scottish Government of key areas in East Lothian that should benefit from this funding in support of not only the Local Plan but also the National Plan. This will require a clear understanding by the Council of Scottish Government objectives for the funding in line with the World Class 2020 vision and how investment in East Lothian can contribute towards this. A clear understanding by the Council on state aid related matters for the use of such funding and a view on options for expanding coverage in East Lothian will also provide a good basis on which the Council can base discussions with Scottish Government.

A Working Group is required to deliver and report on the actions set out in this Strategy, and to develop measures for monitoring and reporting on delivery and benefits arising from the Strategy. Another key responsibility of the Group will be to ensure that the Council is effectively applying its local power and harnessing the local opportunity/capability for encouraging and supporting community networks and suppliers to improve Internet connectivity in the area. It is also considered vital for East Lothian's economic and social prosperity, that significant effort is put in to supporting individuals, businesses and communities exploit the benefits of Internet connectivity.

2 Background

2.1 Introduction

This document presents a strategy for Next Generation Internet Connectivity in East Lothian.

The purpose of this strategy is two-fold:

- Produce a coherent and deliverable five year internet connectivity strategy for East Lothian that defines priorities for advanced Internet connectivity; and
- Provide a related action plan to deliver the key outcomes of the strategy.

The strategy is built up as follows:

- The area is described in terms of population, key facts and figures, and business sectors;
- The applicable East Lothian policies, strategic documents and initiatives both current and in development are described;
- The benefits to business and residents through the use of Internet connectivity is explored;
- Internet connectivity provision is base-lined, highlighting the current situation in terms of fixed and wireless telecoms provision in East Lothian;
- The existing Scottish Government and UK Government digital initiatives are described;
- The technologies that can be used in the delivery of broadband are described;
- The Step Change deployment programme is analysed to ascertain the anticipated outcome for East Lothian in terms of broadband availability and capability;
- The Internet connectivity needs of residents and businesses in the region are highlighted through community consultations and representations;
- Four key areas of focus to improve the position with regard to provision of Internet connectivity are described; and
- An Action Plan is presented based on the above four key areas for investigation.

Developing the strategy has involved the following:

- Data Review of the relevant policies, strategic documents and initiatives which set the background to the current position and the future plans for the area in terms of Internet connectivity. This has included the Council Plan, Scottish Government's Infrastructure Plan, and local initiatives relevant to the provision of Internet connectivity such as Economic Development actions for the area, business surveys and related projects such as the proposed East Lothian public access WiFi project.
- Capture the Aims and Objectives within the Council on how it wishes to see broadband develop in the area and how it wishes to influence this development.
- Holding one-to-one discussions with key organisations, stakeholders and local businesses to capture the key issues associated with the current availability, capability and affordability of Internet connectivity in the region.
- Investigate the anticipated benefits that will be received from the Scottish Government Step Change plans.
- Review the likely technologies that could be deployed to further enhance broadband delivery in the region. This covers fibre technologies, passive infrastructure such as duct, wireless technologies, regenerated copper and developments such as wireless to the cabinet, further copper rearrangement and complementary technologies such as 4G, white spaces and satellite. All of which may play a part in the overall delivery across the region.

2.2 East Lothian - The Area

Stretching eastwards from Edinburgh in east central Scotland, East Lothian covers 666 sq. km / 257 sq. miles with key towns of Musselburgh, Haddington, Tranent, Dunbar, North Berwick, Prestonpans and the resort of Gullane. It borders the City of Edinburgh, Midlothian and the Scottish Borders. The East Lothian Council area is shown in Figure 1.

Figure 1: East Lothian area (source FarrPoint)

2.3 East Lothian - Major Towns

The population of the key towns in Table 1 equates to approximately 65% of the total population of East Lothian.

Town/Village	*Population (approx.)*
Cockenzie and Port Seton	5,499
Dunbar	6,354
Haddington	8,851
Musselburgh	22,112
North Berwick	6,223
Prestonpans	7,014
Tranent	8,892

Table 1: Settlement Populations

2.4 East Lothian - Rural Areas

East Lothian has several coastal and inland villages. A number of villages are off the A199 running between Musselburgh through Haddington to Dunbar, including Macmerry, Glasdmuir and East Linton. A number of villages are located off the A6093 such as Ormiston and Pencaitland. Other villages such as East Saltoun, Gifford, Garvald, Stenton, Humbie are accessed via B roads.

2.5 East Lothian - Facts and Figures

A detailed account of the situation in East Lothian is set out in the East Lothian Profile[1] 2013 and the six complementary Ward Profiles. Together these highlight the relative inequalities that exist within and across East Lothian communities as well as the key strengths that can be built on.

Some key facts and figures on East Lothian from the above sources are provided below:

- The 2012 population for East Lothian is 100,850; an increase of 0.9 per cent from 99,920 in 2011.
- The population of East Lothian accounts for 1.9% per cent of the total population of Scotland.
- In East Lothian, 15.5% of the population are aged 16 to 29 years. This is smaller than Scotland where 18.4% are aged 16 to 29 years.
- Persons aged 60 and over make up 24.5% of East Lothian. This is larger than Scotland where 23.5% are aged 60 and over.
- By 2035 the population of East Lothian is projected to be 129,729, an increase of 33.1% compared to the population in 2010. The population of Scotland is projected to increase by 10.2% between 2010 and 2035.
- Over the 25 year period, the age group that is projected to increase the most in size in East Lothian is the 75+ age group. This is the same as for Scotland as a whole.
- The population aged under 16 in East Lothian is projected to increase by 41.4% over the 25 year period.
- The 2012 estimate of the number of households in East Lothian is 43,442. This is a 1.0% increase in the 2011 figure of 43,009, compared to a 0.4% increase in Scotland as a whole.
- The total number of households in East Lothian is projected to change from 42,800 in 2010 to 59,380 in 2035, which is an increase of 39%. In Scotland as a whole, the projected number of households is set to increase by 23% over the same 25 year period.

[1] http://www.gro-scotland.gov.uk/files2/stats/council-area-data-sheets/east-lothian-factsheet.pdf

- Jobs – East Lothian had 3,160 jobs per 10,000 adults in 2010, which is significantly below the Scotland figure of 5,362 jobs per 10,000 adults and places East Lothian 30th of Scotland's 32 local authority areas.
- Businesses – East Lothian had 332 businesses per 10,000 adults in 2010, which is below the Scotland figure of 351 businesses per 10,000 adults and places East Lothian 17th of Scotland's 32 local authority areas.
- Employment Rate – East Lothian's employment rate has fallen from 77% in 2006 to 73% in 2011. While still above Scotland's 71%, the gap has closed.
- East Lothian is not an area of high deprivation but deprivation levels in Musselburgh, Wallyford and Prestonpans are moving in the wrong direction relative to Scotland's other datazones.
- East Lothian's main employment sectors are health, education, retail, manufacturing and tourism. It is under-represented in business and financial services. Further details can be found in Table 2.

	East Lothian (employee jobs)	*East Lothian (%)*	*Scotland (%)*	*Great Britain (%)*
Total employee jobs	*28,300*	*-*	*-*	*-*
Full-time	*18,400*	*65.0*	*67.8*	*68.8*
Part-time	*9,900*	*35.0*	*32.2*	*31.2*
Employee jobs by industry				
Manufacturing	*2,000*	*7.1*	*8.7*	*10.2*
Construction	*2,200*	*7.9*	*5.9*	*4.8*
Services	*22,200*	*78.5*	*81.9*	*83.5*
Distribution, hotels & restaurants	*6,000*	*21.2*	*22.2*	*23.4*
Transport & communications	*900*	*3.2*	*5.1*	*5.8*
Finance, IT, other business activities	*4,000*	*14.2*	*19.1*	*22.0*
Public admin, education & health	*8,300*	*29.5*	*30.0*	*27.0*
Other services	*3,000*	*10.6*	*5.4*	*5.3*
*Tourism-related**	*3,200*	*11.5*	*8.9*	*8.2*

Table 2: Employee analysis (Source ONS annual business inquiry employee analysis)

- Data unavailable

** Tourism consists of industries that are also part of the services industry*

Notes: % is a proportion of total employee jobs. Employee jobs excludes self-employed, government-supported trainees and the HM Forces

2.6 Key Documents

The following sections highlight the policies, strategic documents and initiatives that have informed and are of direct relevance to this Internet connectivity strategy.

2.6.1 East Lothian Outcome Agreement 2013-23

The East Lothian Plan Single Outcome Agreement 2013-23[2] is a ten year partnership plan to achieve East Lothian Partnership's Statement of Intent which is:

"We will work in partnership to build an East Lothian where everyone has the opportunity to lead a fulfilling life and which contributes to a fair and sustainable future."

East Lothian Partnership (East Lothian's community planning partnership) brings together organisations from all sectors to work together to make a real difference in East Lothian and, above all, to improve the lives and opportunities of the people of East Lothian.

The East Lothian Partnership has established three strategic objectives through which it aims to meet its long-term goal. These objectives are to create, support and maintain:

- Sustainable Economy;
- Resilient People;
- Safe and Vibrant Communities.

The Partnership has recently established three supporting partnerships to focus on each of the above, with each supporting Partnership having responsibility for delivering three to four high level outcomes, each with contributory outcomes, which provide a clear vision for East Lothian.

2.6.2 East Lothian Council Plan 2012-2017

The East Lothian Council Plan 2012-2017[3] is an ambitious and aspirational statement setting out what the Council wants to achieve over the next five years.

[2] http://www.eastlothian.gov.uk/info/200135/east_lothian_partnership_priorities/1586/community_planning_in_east_lothian/3

The Plan has been influenced by the 2020 Vision for East Lothian, the Single Outcome Agreement (East Lothian Community Planning Partnership's plan for the future of East Lothian), and the Council Administration's manifestos, adopted as Council policy in May 2012. It puts these aspirations and commitments into one strategic document that sets the framework and priorities through which the Council will work towards achieving its ambition for East Lothian.

The Council's aim is to create a prosperous, safe and sustainable East Lothian that will allow our people and communities to flourish. To achieve this, the Council Plan has four objectives:

- Growing our Economy – to increase sustainable economic growth as the basis for a more prosperous East Lothian;
- Growing our Communities – to give people a real say in the decisions that matter most and provide communities with the housing, transport links, community facilities and environment that will allow them to flourish;
- Growing our People – to give our children the best start in life and protect vulnerable and older people;
- Growing the capacity of our Council – to deliver excellent services as effectively and efficiently as possible within our limited resources.

The Council Plan has an action which is of direct relevance to this Internet connectivity strategy which is to work with partners and providers to explore how connectivity can be improved, including the roll out of faster broadband and mobile communications across the county to support and encourage local businesses and home working.

2.6.3 Economic Development Strategy 2012 to 2022

The East Lothian Economic Development Strategy 2012 to 2022[4] is a key delivery mechanism for achieving outcome 1 of the East Lothian Outcome Agreement 2013-23 'East Lothian has a growing sustainable economy' and meeting the first objective of the East Lothian Council Plan 2012-2017 'Growing our Economy'.

[3]http://www.eastlothian.gov.uk/info/695/council_information_performance_and_statistics/1461/the_east_lothian_council_plan_2012-17
[4]http://www.eastlothian.gov.uk/downloads/download/1831/east_lothian_economic_development_strategy_2012_-2022

The strategy has two strategic goals:

- To increase the number of businesses in East Lothian with growth potential;
- To increase the proportion of East Lothian residents working in and contributing to East Lothian's economy.

These are supported by five strategic objectives:

- To be the best place in Scotland to set up and grow a business;
- To be Scotland's leading coastal, leisure and food and drink destination;
- To build on our proximity to Edinburgh to encourage study, work and spend in East Lothian;
- To provide high quality employment pathways for East Lothian's workforce;
- To become Scotland's most sustainable local economy.

The Economic Development Strategy identifies eight 'strategic projects', including developing East Lothian's key sectors; improving East Lothian's connectivity; energising East Lothian's town centres and developing more sustainable employment pathways.

Internet connectivity is one of the key enablers for delivering against the two major strategic goals. Of direct relevance to this Internet Connectivity strategy is the Improving East Lothian's connectivity project which is looking to explore options to enhance broadband infrastructure – and identify investment opportunities.

2.6.4 Digital Inclusion Strategy

The Digital Inclusion Strategy sets out the steps that East Lothian Council can take to increase access to digital skills and technology, to support those at risk of digital exclusion and to engage with those most likely to need support to access online services.

An action plan has been devised to address each of the main barriers to digital inclusion identified in the strategy document. The East Lothian Digital Inclusion Working Group will monitor progress on achieving the outcomes identified in the action plan. Progress will be reported to other relevant groups including the Welfare Reform Task Group and the Resilient People Partnership.

The Digital Inclusion strategy focusses on the broader aspects of lack of internet use (i.e. not just lack of infrastructure/service) and is concerned with ensuring residential communities have access to the opportunities and benefits that the internet and digital technology offer e.g. looking for employment, accessing public services, learning opportunities and applying for benefits.

This Internet connectivity strategy/Action Plan supports the Digital Inclusion strategy/Action Plan in a number of areas as highlighted below.

a) The outcome of this Internet Connectivity strategy/Action Plan can inform the development of an Internet access map/guide for East Lothian in response to the outcome listed in the Digital Inclusion Action Plan. However, it is important to note that any data connected with the Step Change programme is in commercial confidence and cannot be published without the authorisation of Scottish Government and BT.

b) The Internet connectivity strategy is focussed on the gap in provision which will allow these areas to be compared with the areas least likely to access the Internet (as captured by the Digital Inclusion strategy).

c) To inform the Internet connectivity strategy, a number of meetings have taken place with Community Councils, Local Council departments and Businesses to capture the business need for Internet connectivity in the region. The outcome of the discussions can be developed into case studies in response to the Digital Inclusion Action Plan outcome for encouraging small businesses to use the Internet for increased competitiveness.

d) The Digital Inclusion Action Plan has an outcome for improving access to digital infrastructure in rural areas through the provision of free WiFi pilot projects (1 year trial) to community centres (e.g. Wallyford and Whitecraig). The feasibility of these pilot projects is dependent on the availability of affordable backhaul connectivity.

e) The Digital Inclusion Action Plan has an outcome for increasing access to the Internet by giving consideration for including broadband infrastructure within all new build homes. This Internet connectivity strategy recommends that the planning system should promote provision for

broadband infrastructure (such as ducting and fibre) in new developments so it is designed and installed as an integral part of development.

2.7 Benefits of Broadband

The most recent comprehensive review of research, published by DCMS[5], identifies a wide range of literature, demonstrating the range of impacts attributable to broadband and the evidence supporting this. There are some discernible trends emerging:

Discernible business impact trends derived from research reported in the literature are:

- ICT adoption and use generates additional output (GDP/ GVA) – 4,5,6% or more GDP uplift;
- Some of this translates into jobs although not on a 1:1 basis;
- Some of this is attributable to broadband, and some to faster broadband – somewhere between 1-3% GDP uplift.

Discernible residential/household impact trends are:

Access to the Internet indisputably provides a range of benefits, for example:

- Increased educational attainment resulting in higher lifetime earnings, better access to jobs resulting in higher lifetime earnings, savings from shopping on line;
- Access to entertainment and access to health information resulting in improved health and wellbeing;
- Access to the internet for public sector workers and internet access to clients is resulting in a combination of benefits which can be categorised into two broad groups
- Cost savings resulting from improved internal public sector systems linked to increased transactions with the public on line; flexible and home working resulting in increased productivity;
- Public sector service improvements, for example, improved education, improved health, improved social care.

The benefits that derive from broadband, and particularly from faster broadband, can be categorised into two broad groups as follows:

- **Benefits derived from local businesses accessing faster broadband:** through increased productivity, innovation and enterprise, resulting in increased sales and turnover, resulting in additional GVA and equivalent jobs;

[5] https://www.gov.uk/government/publications/uk-broadband-impact-study published by DCMS, (Department of Culture, Media and Sport)

- **Benefits derived from residents accessing faster broadband:** increased educational attainment, increased access to jobs, savings from shopping on line, savings to public sector from more transactions undertaken online, savings to the NHS through reduced visits to the GP. This is by no means an exhaustive list of residential benefits, but instead is meant as an illustration of the types and associated scale of benefits that can derive.

A report by Regeneris[6], commissioned by BT, has stated that over a rural area of reasonable size superfast broadband could lead to:

- An annual increase in GVA of 0.3% per annum over 15 years. For every £1 a business invests in superfast broadband, this will create nearly £15 in additional GVA for the UK economy.
- 1,470 business start-ups as a result of Cloud Computing and support for 7,780 home workers.
- Around 1,810 jobs created through business creation and improved business performance.

2.8 Summary

The Council recognises the importance of Internet connectivity for sustaining business and communities. Although the marketplace may largely meet urban area requirements, and hence Council support may be in more indirect ways, the rural areas will require additional support to ensure that broadband services at usable levels become more widely available. It is also considered vital, for Scotland's economic and social prosperity that significant effort is put in to supporting individuals, businesses and communities to exploit the benefits of Internet connectivity.

[6] https://www.btplc.com/Thegroup/BTUKandWorldwide/BTRegions/England/Factsandfigures/SocialStudy2013-scot.pdf published by Regeneris

3 Current Telecoms Provision

3.1 British Telecom

BT has 20 local exchanges in the region, which have varying levels of broadband capability. The exchanges and approximate capture area is shown in Figure 2.

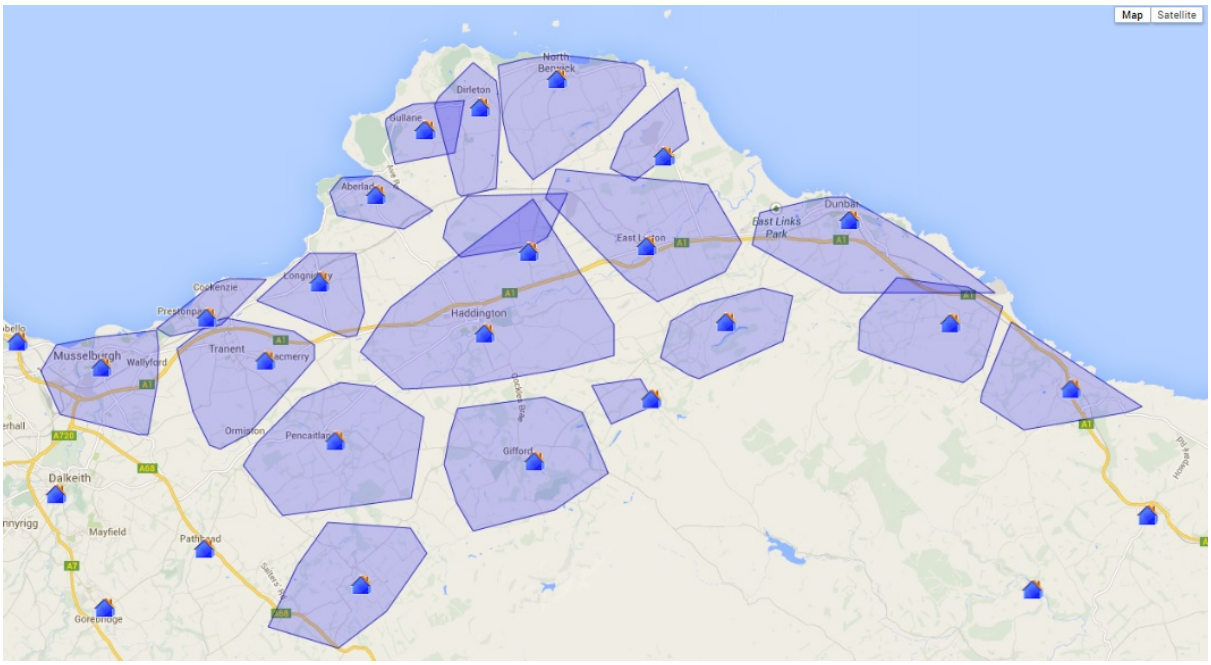

Figure 2: BT Exchanges (Source FarrPoint/SamKnows)

Table 3 shows the BT WBC ADSL2+, ADSL Max, and Superfast Broadband (SFBB) status for each exchange. It is important to note that even though an exchange is denoted as Available Now or has a date assigned for SFBB, this does not mean that the service will be available to all postcodes/premises served by the exchange.

Exchanges denoted as Under Evaluation for SFBB are those areas that are in scope for possible deployment via the Step Change Programme.

Exchange	*Postcode*	*WBC ADSL 2+*	*ADSL Max (up to 8Mbps)*	*SFBB status*
Musselburgh	EH217DS	Available Now	Available Now	Available Now (FTTC)
Humbie	EH365PJ	Not Available	Available Now	Under Evaluation
Pencaitland	EH345DW	Not Available	Available Now	Some cabinets from April 2015
Gifford	EH414QW	Not Available	Available Now	Some cabinets from April 2015
Prestonpans-Port Seton	EH329AP	Available Now	Available Now	Available Now (FTTC)
Tranent	EH331DY	Available Now	Available Now	Available Now (FTTC)
Longniddry	EH32 0NH	Mar 2014	Available Now	Some cabinets from April 2015
Haddington	EH413DT	Available Now	Available Now	October 2014 (FTTC)
Athelstaneford	EH395BG	Not Available	Available Now	Under Evaluation
Aberlady	EH320NF	Not Available	Available Now	Under Evaluation
Gullane	EH312HQ	Oct 2013	Available Now	April 2015
Garvald	EH414LN	Not Available	Available Now	Under Evaluation
Dirleton	EH395ET	Not Available	Available Now	Early 2017
North Berwick	EH394PD	Available Now	Available Now	Early 2017
Whitekirk	EH421XS	Not Available	Available Now	Not Currently in Rollout Plans
East Linton	EH403AR	Dec 2013	Available Now	Early 2017
Innerwick	EH421SD	Not Available	Available Now	Under Evaluation
Cockburnspath	TD135YF	Not Available	Available Now	Under Evaluation
Dunbar	EH421DX	Available Now	Available Now	Available Now (FTTC)
Stenton	EH421TE	Not Available	Available Now	Under Evaluation

Table 3: Exchange status (Source Samknows and Openreach where and when[7])

East Lothian is expected to achieve Superfast Broadband to 67% of premises following commercial investment. The highest speed ADSL broadband service is ADSL2+ provided from equipment within the exchange with speeds dependent on distance from exchange. This has a maximum download speed of 24Mbps and is set to be available from 9 exchanges listed above. All other exchanges are served by standard ADSL service which offers speeds up to 8Mbps download.

[7] http://www.superfast-openreach.co.uk/where-and-when/

Ethernet services at 10Mbps, 100Mbps and 1Gbps are available from BT within 45km radial distance from Dunbar, Musselburgh and Tranent exchanges.

3.2 Lothian Broadband

Lothian Broadband currently provide a service to some 75 premises out of around 300 or so in the area that extends from Sunnyside, just south of East Linton, due south to Nunraw Abbey, south west to Snawdon, north west to Renton Hall, north to West Bearsford, then back slightly north eastwards to Cairndinnis and back round south of Traprain Law to Sunnyside. Lothian Broadband has future plans for expansion that encompasses moving forward with planning permission granted to build a main mast on Barney Hill, Haddington to allow the service to be made available across East Lothian. The business case is focussed on serving premises in the hard to reach areas likely to miss out from the Step Change programme. Typical speeds are stated to be 30Mbps down and 15Mbps up. Minimum package is 10Mbps download and 2Mbps upload. Case studies are available on the Community Broadband Scotland website. Lothian Broadband has plans for expanding coverage to encompass the hard to reach areas of East Lothian.

3.3 Mobile Coverage

The four mobile operators in the UK, namely Vodafone, O2, EE and Three have 2G/3G presence in East Lothian. Some coverage of 4G services is available on the west approaching the Edinburgh City bypass from operator 4G network deployments covering the City of Edinburgh. Most networks offer pretty poor coverage throughout the rural area below the Lammermuirs, with 2G and most certainly 3G not-spots evident in the region. The coverage maps shown on each operator’s website should be treated with caution as they are intended as a guide and not a guarantee of service availability in a particular location.

3.4 Haddington O2 WiFi

East Lothian Council has been working with O2 to provide the free O2 WiFi service that is currently available across thousands of locations nationwide (e.g. McDonalds, Debenhams, Costa Coffee, House of Fraser, Cafe Rouge amongst others) to key locations in Haddington town centre. The objective is to replicate residents 'at home' WiFi experience while out and about and to provide Council staff with the capability for mobile working.

Pilot projects (currently unrelated to the Haddington O2 WiFi initiative) are planned to extend free WiFi to Wallyford and Whitecraig Community Centres in support of the Digital Inclusion Action Plan to improve access to digital infrastructure particularly in rural and bottom 20% SIMD areas.

4 Broadband Initiatives

4.1 Infrastructure Action Plan

The Scottish Government's Infrastructure Action Plan[8] sets out the Scottish Government's commitment and the steps to be taken to deliver world-class, future proofed digital infrastructure across all of Scotland by 2020, with an interim milestone of delivering a step change by 2015.

The Infrastructure Action Plan sets out four programmes, that combined, aims to ensure that the ambition to deliver a world-class digital infrastructure for Scotland is met.

- Programme 1: Achieving a step change by 2015 will address the current digital divide and put in place infrastructure in those areas that the market will currently not go, to ensure a step change in speeds by 2015. The outcome the Scottish Government is seeking is a significant uplift in speeds for everyone by 2015, with speeds of 40 to 80Mbps for 85% to 90% of premises. The procurement will seek to extend the reach further and deliver the best possible speeds for those where delivery of 40 to 80Mbps is not possible at this stage.
- Programme 2: Achieving world-class by 2020 will deliver a longer-term plan, developed in parallel, to ensure the right mechanisms, partnerships and commercial models are in place to deliver world-class infrastructure in a sustainable way and in partnership with industry.
- Programme 3: Demonstrating and delivering innovative and local solutions will be targeted at promoting locally based projects and programmes and also trialling new technologies.
- Programme 4: Increasing take-up and stimulating demand will be targeted at raising digital participation rates (for businesses and individuals) and raising demand for services – helping to improve the commercial case for investment.

The Step Change 2015 procurement (Programme 1 of the Plan) is the most immediate and significant element of the Plan to date.

In July 2013, BT was awarded a contract by the Scottish Government to deliver the Digital Scotland (also known as the Rest of Scotland) project. The project is valued at £264 million with:

- £157 million from public sources (Scottish Government, ERDF, Department for Culture, Media and Sport, and all 27 local authorities that form part of the Rest of Scotland Project area. The European funding will be used to

[8] http://www.scotland.gov.uk/Resource/0038/00386525.pdf

specifically benefit Small to Medium size Enterprises (SMEs) in certain geographic areas).

- £106.7 million from BT.

Fourteen authorities encompassing the overall geographic boundary of the Rest of Scotland project have chosen to further fund the project totalling £50.65 million. The local authorities that have made additional contributions are:

Aberdeenshire, Angus, Clackmannanshire, Dumfries and Galloway, East Ayrshire, Fife, Midlothian, North Ayrshire, North Lanarkshire, Perth and Kinross, Scottish Borders, South Ayrshire, Stirling and West Lothian.

Through the use of central funds, Scottish Government has committed to ensuring that 75% of premises within each local authority area are provided with NGA from BT.

4.2 Community Broadband Scotland

Community Broadband Scotland is a programme from Scottish Government, delivered through Highlands & Islands Enterprise, to support communities wishing to develop their own local broadband networks in the absence of commercially available services. A seed fund of £5m was committed with six pioneer projects initially identified to progress, with a call for further interest in early 2013. The objective behind the scheme is to provide a hub for communities to receive and share information and also for provision of funding support for certain capital items involved in planning and setting up local networks.

The initiative has created interest within communities across Scotland who have broadband issues and do not see upgrade activities planned in their area. As part of the Community Broadband Scotland process, Communities can request funding to secure technical assistance to carry out a site survey, report and outline technical options appraisal outlining the options for establishing a sustainable community broadband network which will bring fast broadband provision to the area. The CBS Start-Up Fund stages highlight the activity required for any area looking to utilise public funds to improve broadband connectivity. The process can be summarised as follows:

- Ascertain whether the area is likely to benefit from the national Step Change infrastructure programmes and establish the geographic area that the project will serve;
- Identify current provision, understand the need, aggregate demand and be able to demonstrate sufficient support within the area for an improved broadband service;

- Identify a champion to raise the profile of the area, capture user demand and stimulate momentum and enthusiasm of local residents and businesses;
- Investigate potential project partners and funders;
- Prepare a business plan as the basis of an application for Capital Assistance.

Achieving confirmation of the Step Change outcome can take time due to the phased nature of the Step Change network rollout, with each phase being subject to a period of survey and coverage confirmation by BT prior to commencing rollout. However, it is clear that many remote communities will not be covered by Step Change and so options for these areas may be developed earlier given community resource and commitment.

Community Councils in East Lothian have expressed strong interest in improving Internet connectivity particularly in their respective areas. The communities bring evidence of the day-day usability of broadband provision and the issues they face in running their businesses. Humbie Community Council is one such group that is working with CBS to improve broadband coverage in the area. Their plan is to build a new network to supply broadband to all interested households by June 2014. The tender document proposes a two stage development: Stage 1 encompassing the Humbie phone exchange area which currently has no plans for deployment by the Step Change programme; and a Stage 2 expanding into areas including West and East Saltoun (and others). The Stage 2 areas towards Haddington are in part served by the Pencaitland exchange and appear to be earmarked for upgrade as part of the Step Change programme. For this reason, the Community Council deemed it necessary to focus on the Phase 1 area. Funding has yet to be secured with a number of households "likely to subscribe" still to be established. The hope is that CBS can fund up to £500 per household to 89% of total capital costs and the local wind farm trust can be used to finance the remaining 11%.

4.3 Mobile Infrastructure Project

On 3rd October 2011, the UK Chancellor announced that the Government will invest up to £150 million to improve the coverage and quality of mobile network services for consumers and businesses that live and work in areas of the UK where existing outdoor mobile network coverage is poor or non-existent, by:

- Addressing the majority of the premises situated in “complete” not-spot areas (60,000 premises);
- Addressing the worst affected road routes which currently traverse “complete” voice not-spot areas (10 sections of A-road where there is no currently signal).

A complete not spot is defined as a 200m^2 grid square where the projected mobile signal for all operators is below a set threshold (RSSI threshold for all operators is less than -86dBm).

Ofcom have identified the not spots, using projected coverage data provided by each of the operators as shown in Figure 3.

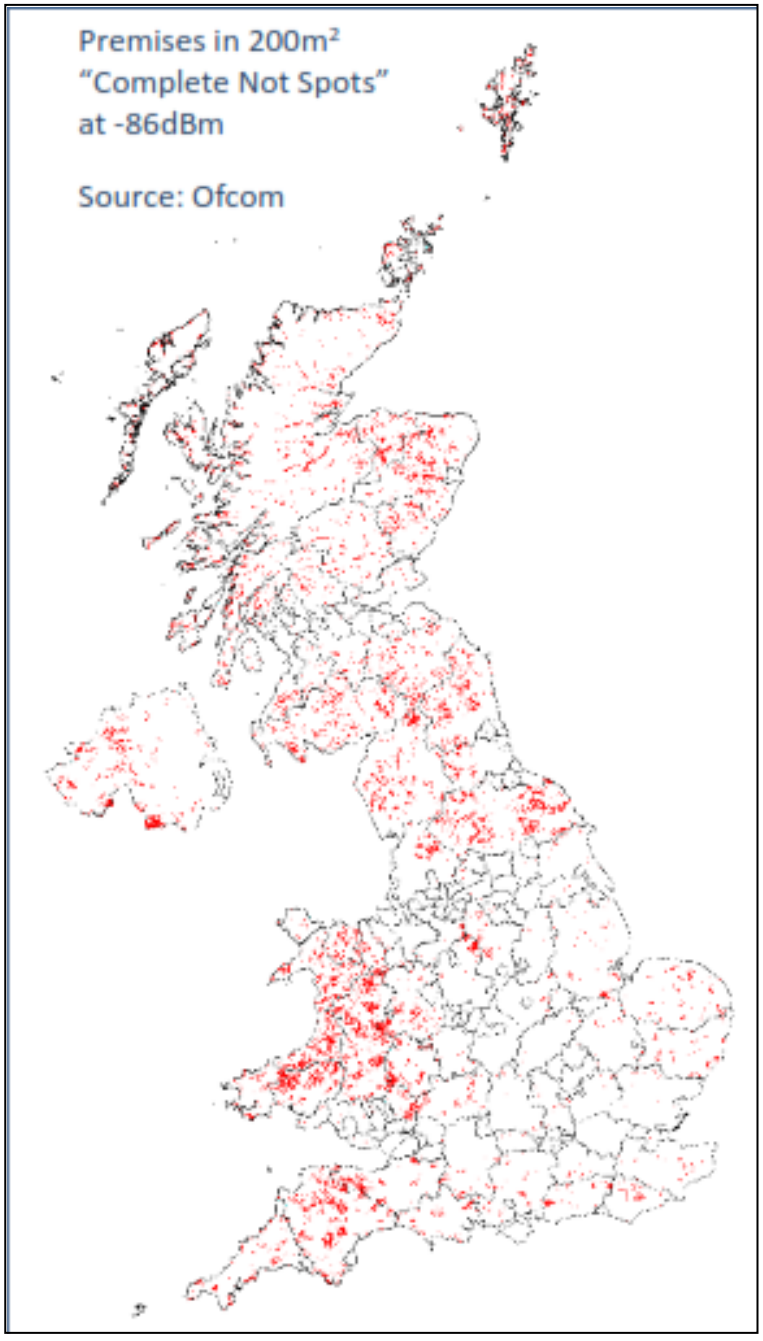

Figure 3: Ofcom Mobile not-spots

In May 2013, Arqiva was appointed to provide a full-scale mobile network roll out including network planning, site acquisition and the deployment of site infrastructure and installation of equipment. The equipment will then be offered for use by network operators, Vodafone, EE, O2 and Three. Harlequin Group has been contracted to carry out planning, survey and design for the Project.

The phasing of the project is shown in Figure 4.

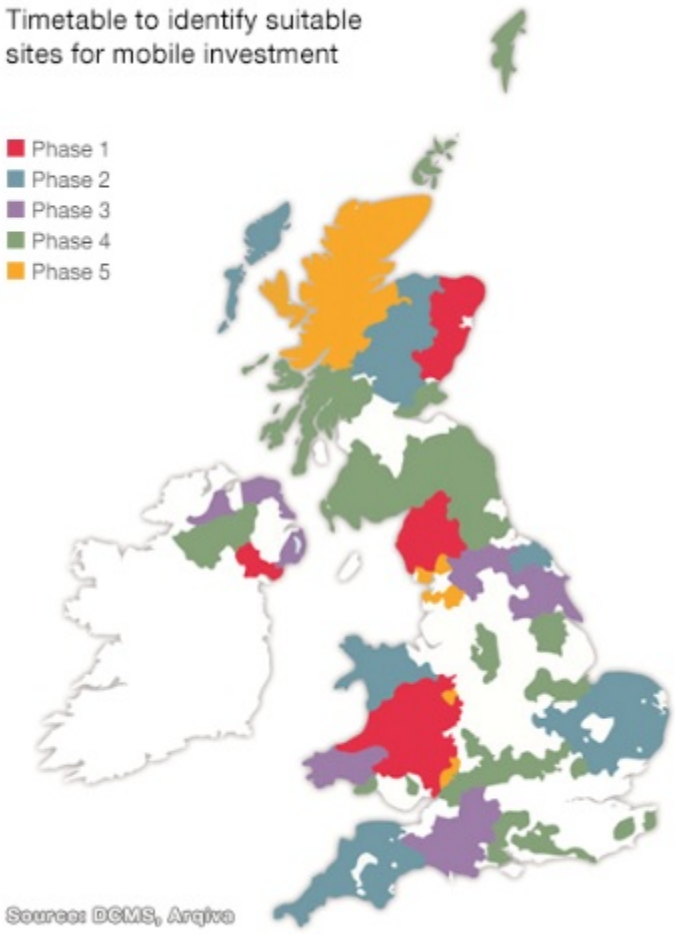

Figure 4: MIP Project Phases

The scheme has been divided into five phases, the first two of which are already under way. Areas including the Highlands, Dumfries and Galloway, Argyll and Bute, Hampshire, Gloucestershire, Fermanagh and parts of Tyrone are set to be among the last areas dealt with. The phasing map shows that East Lothian will not benefit from the project.

5 Step Change Programme likely outcomes

5.1 Introduction

The Scottish Government Step Change programme aims to achieve 95% coverage of Next Generation Access (NGA) (i.e. availability to all/or part fibre based broadband infrastructure) in East Lothian by 2017, with all premises expected to achieve a minimum 2Mbps. Note that not all premises connected to FTTC will receive Superfast Broadband (access line speed greater than 24Mbps): speed is dependent on copper line distance from the cabinet and some premises located a long distance from the cabinet may only receive speeds similar to standard broadband.

5.2 Step Change roll out

The Step Change deployment plan is set to be completed by 2017 and will have three stages for each phase of the roll out:

- Stage 1 - Survey, design and detailed planning;
- Stage 2 - Infrastructure build;
- Stage 3 - Services becoming available.

Scottish Government has published a NGA phasing map as shown in Figure 5 to provide an indicative view of how services will be rolled out across the country. All information published by Scottish Government is subject to approval by BT, with data associated with the deployment plan considered to be in commercial confidence and subject to Non-Disclosure Agreements.

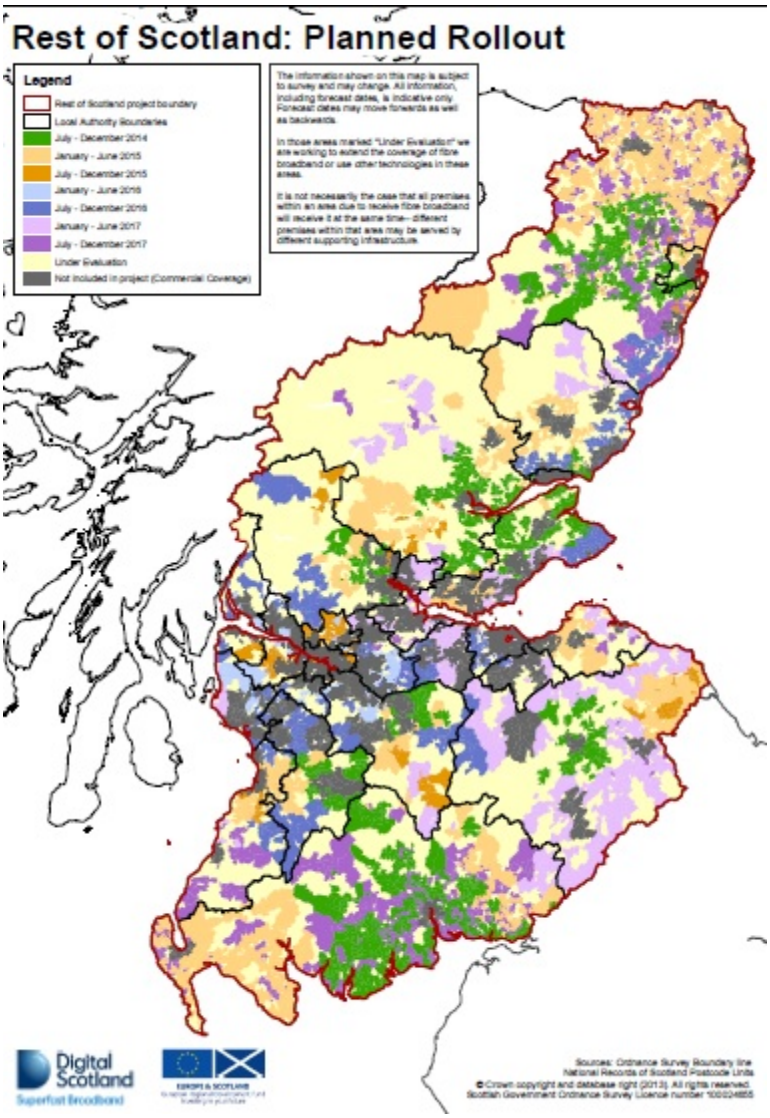

Figure 5: Rest of Scotland Planned Rollout

Further work is being carried out to create a more efficient roll-out, maximise coverage and speed up the roll-out plans as much as possible. The maps are therefore subject to change as BT carries out this further planning work and surveys take place. Scottish Government intend to update the maps on a regular basis as further updates come through from BT.

The map also shows the areas where fibre broadband is already available commercially (denoted in grey) and so these areas are not part of this project.

The map comes with the following caveats from Scottish Government:

- The information shown on these maps is subject to survey and may change.
- All information, including forecast dates, is indicative only. Forecast dates may move forwards as well as backwards.
- The areas shown as being already covered commercially by fibre broadband are not included in this project.
- In those areas marked “Under Evaluation” we are working to extend the coverage of fibre broadband or use other technologies in these areas.
- It is not necessarily the case that all premises within an area due to receive fibre broadband will receive it at the same time– different premises within that area may be served by different supporting infrastructure.

Taking the above into consideration, we are unable to perform an analysis of the Step Change deployment plan to the level of certainty and detail required to inform this strategy at this current point in time.

5.3 Basic Broadband Provision

The Step Change programme has an objective of providing a Basic Broadband service (defined as a minimum 2 Mbps) to all premises across Scotland. It is not possible to identify what will be provided to more rural areas to fulfil any Basic Broadband objectives, however current ‘in-fill’ solutions from BT include:

- BET;
- Satellite provision.

The Step Change programme has an innovation fund in place to look at alternative technologies that become available for deployment by BT to achieve a better outcome for those premises earmarked for an ‘in-fill’ solution. Potential solutions include Fibre to the Remote Node (FTTRN), wireless fed cabinets, Broadband Regenerators, Broadband Amplifiers. Indications from BT suggest that these solutions will not be able to be modelled or deployed as working solutions until later in the year. It should be noted that those areas that are targeted for an in-fill solution to achieve 2Mbps are likely to be served at the end of the programme scheduled for 2017.

6 The Need for improved Internet Connectivity in East Lothian

6.1 Outcome of stakeholder meetings

A number of organisations in East Lothian were consulted to achieve an understanding of the degree to which the current availability/affordability of Internet connectivity meets the needs of businesses and residents in East Lothian. A number of examples were given of organisations and communities struggling with very slow and sometimes unreliable telecom services. An overview of the key findings from these meetings is provided below.

6.1.1 Business

A number of businesses have a copper ADSL connection which, given the length/quality of the line from the serving exchange, results in typical speeds varying from sub 2Mbps up to 8Mbps. For example, businesses off the A1 by Gladsmuir were typically experiencing around 2 Mbps.

A common complaint by businesses was the experience of faults on the copper line resulting in major downtime/degradation of service with the level of response provided by BT deemed to be generally unsatisfactory. There is a common perception that the copper line plant in rural areas of East Lothian is in need of upgrade, with many recurring faults being experienced as a result.

A reliable connection and good/prompt customer service is more important than broadband speed to many of the businesses consulted. For example, one business is reliant on the broadband connection to connect to 3rd party systems to download orders. Should the connection be unavailable then a manual process must be invoked which inherently results in delays to order processing and risk of human input error.

Many businesses consulted had other branches/offices in the UK and/or further afield. Poor Internet connectivity for some businesses results in these business locations in East Lothian having no choice but to be self-sufficient. Typically the connection was capable of e-mail and viewing of web pages but not much more. Traditional telephony was seen as the main form of communication between sites. Hosting services off-site and taking advantage of collaboration tools such as Video Conferencing was considered unachievable. The lack of broadband connectivity was also seen as an inhibitor to opening up new markets. One key example is an organisation

having to wait for an opportunity where a number of potential clients were available in the same area to make a physical trip worthwhile. A customer multimedia presentation delivered remotely could be effective in making timely contact with these potential clients.

A common perception by businesses consulted is that BT is the only option, with most stating that they would consider an alternative supplier if one was available offering better speeds/service. A common response by BT when an alternative solution is requested by a business is that the existing service is a standard product offering and the local exchange is limited on what it can provide. In some instances a leased line connection was offered with businesses considering the connection fee and ongoing rental to be far too expensive. However a few businesses consulted have decided to buy a leased line due to the current situation being unworkable. A reliable, higher speed connection to the Internet is considered to be essential to operation and growth of the business. A frustration for some businesses is knowledge that fibre connectivity runs nearby the site to connect other locations but due to this being a private fibre route it is unavailable for use.

Many organisations have previously, or are currently, considering options for re-locating to areas with improved Internet connectivity. A few business park owners consulted stated that high speed broadband was an essential requirement for a business deciding to locate in the park. Some have experienced tenants moving out to other locations with space and Internet connectivity being the key reasons. One park consulted has a leased line, with the availability of a leased line featuring on its marketing campaign to attract businesses to locate. This same park, located on the edge of Musselburgh town centre expressed surprise that BT had no plans for providing superfast broadband to the location. A successful software development company located in East Linton considered a change of location having experienced many frustrating hours of data upload to America with a slow broadband connection. The organisation now takes a wireless connection from Lothian Broadband offering 30Mbps download and 15Mbps upload.

For some organisations consulted, multiple people working from home and accessing on-site services is extremely frustrating given the speed of the broadband connection to the office. Home working is becoming a growing trend and is essential when staff have difficulty travelling to the office in winter

due to bad weather. Some businesses in East Lothian have employees travelling from areas with good broadband availability and have the expectation that Internet connectivity should be the same if not better than at home. One business consulted finds that any tasks involving Internet connectivity is best performed at home in preparation for the following day in the office. This same business is customer facing and find that customers seeing the business operate on a low speed Internet connection gives a poor impression.

Some businesses have considered alternative options (e.g. MiFi and Satellite) to substitute for the lack of fixed connectivity. However a lack of confidence existed on the suitability of such technology in terms of performance and security for business purposes.

Mobile coverage is lacking in many areas of East Lothian. A few organisations consulted had to install a mobile booster in the office. Some businesses in the farming industry were more dependent on mobile service than a fixed line. The technology is developing fast, with farmers relying on mobile coverage for all manner of purposes. Examples include, precision agriculture that makes intensive use of measurement and control equipment requiring mobile connectivity to communicate and exchange data. One organisation consulted has invested in a system that provides increased accuracy of GPS positioning to gather detailed data for assisting with maximising yield, greater efficiency in cultivation and operations. The organisation is now experiencing issues with the system, believed to be due to the mast consolidation programme by T-Mobile and Orange which has de-commissioned radio base station sites in the Gifford area. The unreliable mobile phone service is also an issue for lone working, with a connection to base essential for Health and Safety purposes. Many businesses are dependent on delivery of items by courier who rely at least to some degree on mobile phone connectivity to locate specific delivery points in the region. Alternative solutions offered by the mobile operator in response to an enquiry have been unhelpful including early termination of contract (with no alternative operator available offering a better service) and Unlicensed Mobile Access (UMA) type functionality which allows transition between the mobile network and wireless LAN within the vicinity of a wireless hub in the office.

East Lothian Council shared the results of a business survey which is summarised in Section 6.2.

6.1.2 Residents

Many residents feel that their Internet connectivity speed supports daily activities such as e-mail/ browsing etc but makes the Internet unworkable for services such as iplayer etc. A number of residents also experience degradation of service at peak hours (e.g. in the evening).

A common view held is that the raising of average speeds to a usable level was more important than striving for higher bandwidths for those already experiencing good speeds. The focus should be on the rural areas to provide a broadband service commensurate with the towns.

Areas of poor mobile coverage/not spots are well known by residents with the general perception that mobile coverage is poor, particularly 3G.

Pencaitland Community Council and Humbie Community Council shared the results of broadband surveys, which are captured in Section 6.2.

6.1.3 Other key stakeholders

The following organisations were also consulted to inform this strategy:

- East Lothian Works;
- East Lothian Council Economic Development;
- East Lothian Council IT;
- Cllr's Michael Veitch and John McMillan;
- Sustaining Dunbar community Trust;
- East Lothian Council Digital Inclusion;
- Community Councils;
- Lothian Broadband.

6.2 Surveys

6.2.1 Business Survey

The Council captured a sample response from 160 businesses regarding achievable speeds and the impact of broadband speed on the business. The results showed that 28% of the respondents believed that poor broadband

speeds had an impact on their business and 33 out of the 110 respondents were receiving download speeds of less than 2Mbps.

6.2.2 Pencaitland Community Council Survey

Pencaitland Community Council has maintained an ongoing broadband survey. From a community of approx. 1100, 91 responses have been received (approx. 10%). The survey results highlight the following:

- Majority of respondents have a broadband connection (91%);
- High dissatisfaction with existing broadband connection (approximately 74% of respondents are either dissatisfied or very dissatisfied);
- 83% of respondents are experiencing broadband speeds less than 5Mbps, with 61% less than 2Mbps;
- 94% of respondents use the internet connection for business or working from home;
- 46% of respondents would be prepared to pay extra for a better service to allow downloading of film, music, video or working from home;
- Increase in number of users per home with 56% of respondents having two users; 13% three users and 9% four users.

6.2.3 Humbie Community Council Survey

A broadband survey has been shared of 90 residents of which 67 responded. The survey results highlight the following:

- Majority of respondents have a broadband connection (99%);
- High dissatisfaction with existing broadband connection (approximately 63% of respondents are not happy);
- 36% of respondents are both domestic and business users; 48% use their Internet connection for remote working;
- 81% of respondents would subscribe to a community backed Internet service offering greater than 20Mbps if it was available.

6.3 What is a usable speed?

The government has been working towards a 2Mbps minimum connectivity speed for citizens under its Broadband Delivery UK framework. However, with web services increasing in sophistication all the time, the need for ever-faster speeds means the 2Mbps threshold is out of date. Ofcom has said 8Mbps is the new minimum download

speed required for a web user in the UK as part of a push by the nation to ensure everyone can use the Internet at a functional level. The chief executive of Ofcom has stated the following:

"In our Infrastructure Report[9], what you see very clearly is a big gap between those people with 8Mbps or more and those with less. It seems to be the case if you have less than 8Mbps you just use networks less, so there is a really interesting question about what, in the longer term, we mean by universal connectivity."

Currently the average connection speed achieved by UK web users is 14.7Mbps, according to recent Ofcom data, although millions of homes and businesses experience far lower speeds than this number.

One business park owner who was consulted to inform this strategy document stated that the basic needs for tenants is around 8Mbps download and 1Mbps upload.

[9] http://stakeholders.ofcom.org.uk/market-data-research/other/telecoms-research/broadband-speeds/infrastructure-report-2013/?utm_source=updates&utm_medium=email&utm_campaign=infrastructure-2013

7 Strategy for improving Internet connectivity in East Lothian

7.1 Overview

This strategy identifies four key areas of focus that will require co-ordination and leadership by the Council to ensure an overarching and coherent approach is adopted.

7.2 Key areas of focus

7.2.1 Maximise the outcomes of the Step Change Programme in East Lothian

The Council should review the coverage and speed outcome in East Lothian following each phase of the Step Change programme and influence, where possible, the final coverage area.

A community solution may seem an attractive option where no commercial suppliers offer a solution. However, it is worth highlighting that there are key advantages to a community in being included in a wider regional/national rollout from a main supplier:

- From a technical point of view, the quality of the infrastructure will be in line with wider established standards and practices, and technologies offered will be tried and tested and hence reliable;
- From an operational point of view the maintenance, support, order processing and billing functions will also be integrated with wider network operations;
- From a services perspective, end-users will have access to a wider choice of Retail/Internet Service Providers (RSPs/ISPs) already established on the wholesale platform of the supplier;
- And financially it will provide assurance that the project will be sustainable.

The above being said, a commercial supplier with standard solutions brings some disadvantages to rural communities due to inflexibility of technology choice and lack of readiness of specific solutions that may be better suited to the local environment. It also means that the local community is fully reliant on the supplier and has little to no input to the coverage and other practical aspects of the local deployment.

A preferred approach is to influence the Step Change Programme as much as possible to include local priorities while making the required contribution to

meeting the wider national targets. The appointed supplier (BT) will undergo a phased network deployment, with each phase achieving a contracted outcome in terms of number of premises served and speed distribution. The postcodes to be served in each Phase has an outcome for East Lothian in terms of coverage and speed. Each deployment phase is subject to a 6-9 month survey stage, which may impact the proposed deployment plans. Any proposed changes are discussed and agreed between BT and the Step Change Programme and managed through a Change Control process. The programme also has an innovation fund in place to look at alternative technologies that become available for deployment by BT to achieve a better outcome for those premises earmarked for an 'in-fill' solution.

Departments within East Lothian Council have an important role to play in supporting and overseeing the Step Change deployment programme through planning, road and street works, press activity etc. The Council should receive notification from the Step Change programme team on live postcodes as a result of successful deployment of a phase, and notice of cabinets/communities to be served following the survey stage. The Council should establish a close working relationship with the Scottish Government Step Change Programme and take an active interest in the programme at a strategic level, with an aim of ensuring that: (a) local priorities are considered in any decision that impacts the planned premises to be served in East Lothian and; (b) East Lothian achieves the same if not better outcome as to what was initially planned by BT.

Close monitoring of the Step Change programme will also inform (as far as possible) the expected outcome for East Lothian. The market needs clarity from a state aid perspective on areas where subsidy will be used to provide a Basic Broadband service (defined as a minimum 2Mbps) and Superfast Broadband service (defined as greater than 24Mbps). This information is essential in order to allow communities and potential suppliers to assess if the Step Change deployment will meet end user needs in terms of coverage, speed and timescales and to determine the viability of using public funds to serve an area that will not benefit from Step Change or offer an interim solution until Step Change comes along.

The Council should provide local assistance to Programme 4 of the Infrastructure Action Plan covering Digital Participation to ensure highest take-

up of broadband within the Council area and to highlight the demand in the area.

7.2.2 Enhance the funding opportunities for improving Internet connectivity to rural Communities in East Lothian

The Council should seek to maximise investment in East Lothian of any funding sources allocated to extending the deployment of fixed and mobile coverage/capability in the UK.

A key challenge is securing timely and affordable broadband access to premises that will not benefit from the Step Change Programme. This will require a new approach and innovative business models to enable cost effective, scalable and future proofed solutions to the hardest to reach rural areas.

In June 2013, the Chief Secretary to the Treasury announced a further £250m that builds on the £1.2 billion programme of public investment already underway to transform broadband in the UK. The £250 million investment is to help reach a target of 95% of homes and businesses in the UK having access to Superfast Broadband by 2017. The Scottish Government has been awarded £20.99m from this fund on a match funding basis and will decide on the effective use of the fund within Scotland. East Lothian is targeted to reach 95% NGA by 2017 through the Step Change programme, however it is likely that not all premises having access to NGA will benefit from Superfast Broadband speeds (greater than 24Mbps). There is therefore scope for the Council to raise the profile within Scottish Government of key areas in East Lothian that should benefit from this funding in support of not only the Local Plan but also the National Plan. This will require a clear understanding by the Council of Scottish Government objectives for the funding in line with the World Class 2020 vision and how investment in East Lothian can contribute towards this. A clear understanding by the Council on state aid related matters for the use of such funding and a view on options for expanding coverage in East Lothian will also provide a good basis on which the Council can base discussions with Scottish Government.

The Council should take the initiative to capture the make-up, requirements and firm demand of the hard to reach areas across East Lothian to ensure that the region is in prime position to take advantage of any national funding opportunities. The Council should look to support Humbie Community Council

towards a successful outcome of its CBS project to Design & Build a broadband network, and use the achieved benefits to promote to other communities the value that can be gained from taking action to improve broadband in their respective areas. We encourage the Council to identify community target areas for aggregation that are unlikely to be covered through Step Change and to submit Expressions of Interest to CBS. This will help raise the profile early on of rural East Lothian and of communities within the Council area.

In January 2014, a £10m fund was announced to be made available to alternative technology providers who come forward with innovative ideas to help superfast broadband reach Britain's most remote communities. The fund is available from 17 March 2014 with the focus on the hardest and most remote five per cent of premises in the UK. Potential technologies that could be piloted under the new fund for remote areas include:

- Using 4G mobile signal to deliver 'fixed wireless' superfast broadband';
- Using fibre direct to premises;
- Taking fibre from broadband cabinets to a distribution point further down the network, increasing speeds by reducing the reliance on copper;
- Satellite technology.

A number of suppliers have expressed an interest in the £10m Pilot Fund. Engaging with suppliers at an early stage to highlight key areas primed and ready for a trial in East Lothian will help put these areas on the radar of suppliers. Again this needs a Council lead to identify suitable areas and liaise with Scottish Government on how funding could be secured from the UK government to perform such trials. A trial will have the key advantage of raising the profile of East Lothian nationally, allow suppliers to demonstrate what is feasible in rural areas and may result in the trial being expanded within the region.

East Lothian suffers from poor mobile coverage throughout the rural area. This inhibits how many rural businesses work and disadvantages them from being able to effectively take advantage of technology to enhance their business. The lack of mobile broadband is further exacerbated by the tendency for rural areas to suffer from long copper lines/low quality lines with poor broadband signals. The Council should look to gain a thorough understanding of areas where mobile coverage is insufficient to meet the

needs of businesses and residents in the region (which takes into consideration the uses of both mobile voice and data) to ensure that the Council is fully informed to help steer any further public sector investment that may be forthcoming to increase mobile coverage.

7.2.3 Investigate methods for attracting suppliers to deliver services in East Lothian

The Council should look to identify/promote methods for encouraging community networks and suppliers to deploy in the region.

Organisations and communities looking to apply for available public funds find that the lack of clarity around areas to be served via the BT Step Change programme provides too much uncertainty and risk to the use of public funds for delivering a broadband service in an area. An added challenge to the use of public funds is finding eligible community areas that can be aggregated into a larger community broadband project with sufficient number of premises to attract the interest of commercial Service Providers. This can result in disparate, isolated areas being eligible for public funds resulting in multiple projects, procurements and a patch work of networks.

There are measures that the Council can investigate for encouraging community networks and suppliers to deploy in an area, such as:

- Communicate with organisations in the area that have telecoms infrastructure to understand the extent of infrastructure and mechanisms of use for providing connectivity for community projects e.g. Network Rail, JANET, SWAN, Renewables etc;
- Provide a framework for the aggregation of demand for content to be delivered and create critical mass for content providers and ISPs;
- Develop an Open Data Bank to demonstrate demand and opportunity in East Lothian to suppliers;
- Potential Access to Finance schemes to provide low interest rate loans to suppliers;
- Offer support within Council powers to improve the business case for suppliers to deploy into rural areas, such as:
    - Joined up thinking on how the network could be used to provide further benefits than just fixed broadband connectivity to premises e.g. meeting connectivity requirements for temporary events such as golfing tournaments, assist with field work such as SSI sites etc;

- Reduction in business rates for infrastructure that is of a community interest;
- Free advice on matters relating to the deployment of telecoms infrastructure in East Lothian such as planning guidelines etc.

- Promote provision for broadband infrastructure (such as ducting and fibre) in new developments so it is designed and installed as an integral part of development.

7.2.4 Develop a Strategy Working Group

Create a Working group for ensuring a co-ordinated approach to delivery of improved Internet connectivity in East Lothian.

A Working Group is required to further develop, deliver and report on the actions set out in this strategy. Key areas of responsibility include:

- Appointment of an influential figure to lead the Strategy Group;
- Preparation of detailed case studies, lessons learned and contacts of other communities in the UK who have taken action and delivered improved internet connectivity;
- Creation of a knowledge base on working commercial models;
- Representing the broadband needs of businesses and residents in the region;
- Provision of advice on State Aid, Delivery, Funding and Procurement Mechanisms;
- Promotion of the benefits and effective use of Internet connectivity to businesses (e.g. marketing, new sales channels, cloud computing etc). For example, set-up fee and annual rental of a leased line Internet connection may be justifiable depending on realised cost/business benefits from the effective use of the connection.

APPENDIX A

ACTION PLAN

Action Ref	Outcome A: Maximise/Optimise the outcome of the Step Change Programme in East Lothian	Action	Indicator of success	Timescale	Lead
A1	**Develop relationship and ongoing engagement with SG, BT and other providers**	Exert influence at key decision points in the management of the BT contract to ensure that local priorities are considered in any decision that impacts the planned premises to be served in East Lothian and that East Lothian achieves the same if not better outcome as to what was initially planned by BT. Identify priority areas in East Lothian where the need for broadband is greatest (in support of East Lothian aims and objectives) and assess the likelihood of Step Change not delivering in these areas.	Close and trusted relationship formed with Scottish Government Digital Scotland team and BT.	Lifespan of Digital Scotland Project	Economic Development Manager & Service Manager – IT Infrastructure
A2	**Contribute to the debate on effective use of the innovation/investment fund**	Provide an informed and practical view on technologies that can achieve a better outcome for those premises earmarked for an 'in-fill' solution in the context of East Lothian (potential to use outcomes from Humbie broadband project/trials and external advisors to inform the debate).	Successfully guide the Step Change team on effective use of the innovation/investment fund based on transfer of knowledge from East Lothian.	Lifespan of Digital Scotland Project	Economic Development Manager & Service Manager – IT Infrastructure

A3	**Digital Participation**	Provide local assistance to Programme 4 of the Infrastructure Action Plan covering Digital Participation to ensure highest take-up of broadband within the Council area.	East Lothian recognised by the Digital Scotland team/BT for high take-up relative to other Local Council areas. Effective correlation with the Digital Inclusion Action Plan.	Lifespan of Digital Scotland Project	Economic Development Manager & Equalities Policy Officer
	Outcome B: **Enhance funding opportunities for improving Internet connectivity in East Lothian**	**Action**	**Indicator of success**	**Timescale**	**Lead**
B1	**Assist communities to help themselves**	Identify active community projects in rural areas unlikely to be covered through Step Change, and with them submit expressions of interest to CBS for these projects bringing together communities where appropriate	Number of active communities created and projects submitted	2014/15	Economic Development Manager
B2	**Support an overarching joined up approach for delivery in hard to reach areas**	Take the initiative to capture the make-up, requirements and firm demand of the hard to reach areas across East Lothian to raise the profile of East Lothian to Scottish Government and allow the Council to be prepared and ready to take advantage of any funding opportunities.	Targeted investment at East Lothian from the funding available.	2014-16	Economic Development Manager & Service Manager – IT Infrastructure
B3	**Raise the profile of East**	Identify areas suitable for a	Operation of a	2014/15	Economic

	Lothian as an innovation hub	broadband trial with the £10m trial fund in mind. Engage with Suppliers early highlighting key areas primed and ready for a trial in East Lothian.	successful trial that raises the profile of East Lothian nationally, allows suppliers to demonstrate what is feasible in rural areas and promotes the advantages of Internet connectivity in support of the Digital Inclusion Strategy.		Development Manager
B4	**Capture mobile requirements**	Gain a thorough understanding of areas where mobile voice and data coverage is insufficient to meet the needs of businesses and residents in the region.	Reduction in 2G and 3G not spots. Penetration of 4G coverage.	2014/15	Service Manager – IT Infrastructure
	Outcome C: Attract suppliers to improve Internet connectivity in East Lothian	**Action**	**Indicator of success**	**Timescale**	**Lead**
C1	**Understand the extent of Digital Infrastructure in East Lothian**	Communicate with organisations in the area that have telecoms infrastructure to understand the extent of infrastructure and mechanisms of use for providing connectivity for community projects e.g. NR, JANET, SWAN, Renewables etc.	Successful capture of the extent of digital infrastructure in East Lothian and mechanisms for use.	On going	Service Manager – IT Infrastructure
C2	**Support suppliers**	Work with suppliers to assist in reducing any inhibitors/improving	Increased installation of telecoms	On going	Economic Development

		the business case for investment in East Lothian.	infrastructure in East Lothian. Increased presence of Suppliers in East Lothian.		Manager & Service Manager – IT Infrastructure
	Outcome D: Develop a Strategy Working Group	**Action**	**Indicator of success**	**Timescale**	**Lead**
D1	**Working Group**	Appoint a short-life Working Group to further develop, deliver and report on the actions set out in the East Lothian Next Generation Internet Connectivity Strategy. Develop measures for monitoring and reporting on delivery and benefits arising from the Strategy	Working Group established with an influential leader. Evidence of benefits arising from strategy	Establish group by March 2015	Head of Corporate Resources
D2	**Digital Stimulation**	Promote the benefits and effective use of internet connectivity to businesses (e.g. marketing, new sales channels, cloud computing etc).	Increased awareness of the benefits and need of Internet connectivity resulting in increased demand from business. Close working with the Digital Inclusion working group. Business broadband event during East Lothian Business Week	Ongoing	Economic Development Manager
D4	**Champion the Internet Connectivity needs of**	Represent the Internet connectivity needs of businesses and residents	One point of contact for capturing and	Ongoing	Economic Development

	businesses and residents in the region	in the region. Provide a forum for Community Councils and other interested organisations to contribute to the debate for improving Internet connectivity in East Lothian.	promoting the Internet connectivity needs of businesses and residents in East Lothian.		Manager

APPENDIX B

TECHNOLOGIES

1 Overview

This section presents a summary of the most common Fixed and Wireless broadband solutions, and their suitability for providing Next Generation and/or Basic broadband services to rural premises. A comparison of some of the key distinguishing factors is provided in Appendix A.

Access to broadband is typically determined by location, in that premises in urban areas receive investment from the marketplace over those in rural areas, due to the lower cost per premise of deployment and improved business case from a higher number of potential subscribers.

In 2010 the UK Government published its ambition to have “the best superfast (NGB) broadband network in Europe by 2015”, to ensure that next generation (Superfast) broadband is available across the UK, encouraging the creation of ‘Super Connected Cities’ and ensuring a minimum service to all households and businesses in remote and rural locations.

The main difficulty with providing NGB to rural premises is in the high civil cost associated with the deployment of new fibre and duct infrastructure to provide suitable Next Generation Infrastructure, such as Fibre to the Cabinet (FTTC) and Fibre to the Premises (FTTP).

Additionally, many premises currently struggle to receive a broadband service at all, or are currently receiving less than 2Mbps, which is quickly becoming insufficient given the requirements of most modern Internet users. Solutions to provide basic broadband services (>2Mbps) are proposed when next generation solutions are too expensive, and typically involve a wireless element, which reduces the civil cost to connect premises. Wireless solutions usually offer lower achievable speeds to fixed broadband services, but can be significantly cheaper to deploy and certainly capable of providing high download speeds, depending upon the specific solution.

2 Basic Broadband

2.1 ADSL

ADSL and ADSL2+ are currently the most widely deployed methods of receiving broadband in the UK. They are based on Digital Subscriber Line (DSL) technology and are provided to end-users over the legacy copper telephone network. DSL equipment is installed in the local exchange to enable this service.

ADSL provides maximum download and upload speeds of up to 8Mbps and 0.8Mbps respectively and ADSL2+ provides maximum download and upload speeds of up to 24Mbps and 2.5Mbps respectively. The copper line length between the local exchange and customer premise and the quality of the copper line determines the actual speeds experienced by the customer.

ADSL/ADSL2+ services are delivered over the legacy PSTN telephone network which is owned and maintained by Openreach. Internet Service Providers (ISPs) deliver retail services to customers by purchasing appropriate products from Openreach and/or BT Wholesale to connect their customers.

Copper lines can be 'unbundled' at the local exchange, which is when Service Providers install their own ADSL/ADSL2+ equipment in the local exchange to terminate the customer's copper line, and connect them to their own network to provide access to the Internet. This allows competing service providers to offer different services and service levels to BT Retail and other ISPs.

2.2 BET (Broadband Enabling Technology)

BET is a solution developed by Openreach, which aims to extend the reach of ADSL services to customers on long line lengths from their serving exchange. Additional equipment is installed in the exchange, and at the customer's premises.

BET utilises two copper pairs per premise to deliver broadband speeds of up to 2Mbps, or a single copper pair to deliver 1Mbps, and on line lengths of up to 12km from the serving exchange.

The cost of the BET equipment per premise is significant being in the region of £1,100 per customer installation.

2.3 Future developments

ADSL and ADSL2+ are limited in terms of the maximum speeds achievable, and cannot deliver NGB. However, ADSL Regenerators/Amplifiers are available that may provide increased speeds for premises on long line lengths from the exchange and enable a minimum service to premises that would otherwise be beyond the reach of ADSL/ADSL2+. Examples of the potential increase in ADSL range for a number of download speeds are shown below.

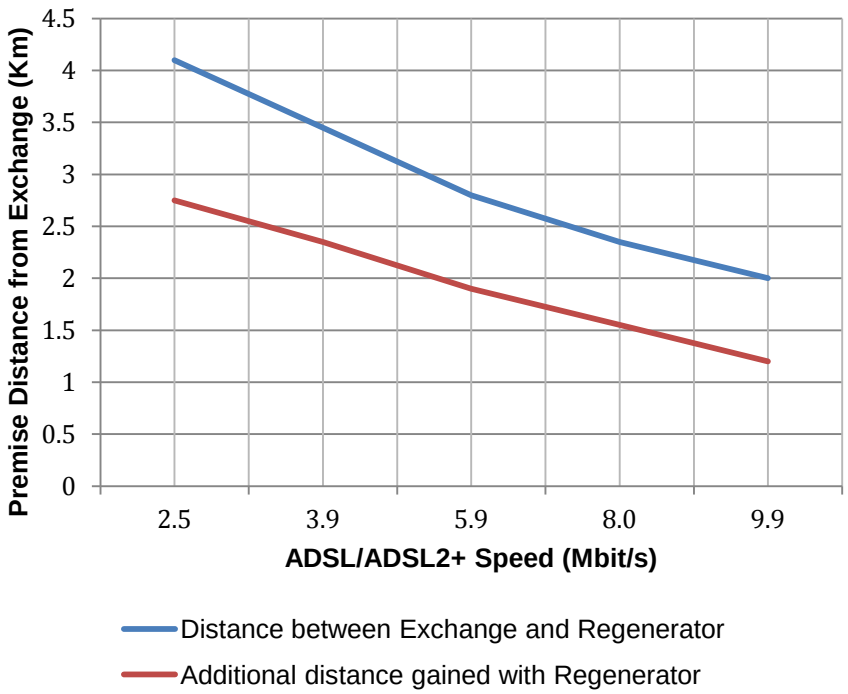

Figure B1: Increased range with ADSL repeaters

The likelihood of future technical developments around BET is low, and the development of ADSL/ADSL2+ regenerators would be preferred due to the faster speeds offered and avoiding the need for additional copper lines.

3 Next Generation Broadband (fixed)

3.1 Fibre to the Cabinet (FTTC)

FTTC requires the provision of fibre optic cables between the serving exchange and a street cabinet. Electronic equipment known as VDSL2 is installed in a new street cabinet, adjacent to the existing cabinet, to deliver broadband services to end premises over the existing copper lines. By doing this, the length of copper between the DSL equipment and the end user premise is shortened, allowing for faster broadband services to be offered. The FTTC architecture is shown in Figure B2.

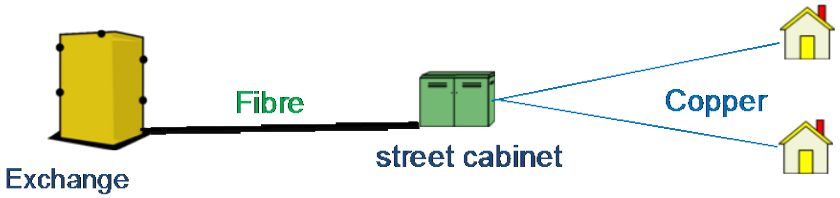

Figure B2: Fibre to the Cabinet (source FarrPoint/Atkins)

Currently, FTTC is not available to premises that are served directly from the exchange (so called Exchange Only 'EO' lines), as opposed to those that are served through a street cabinet. However, Openreach has a product available that consists of a typical street cabinet installed either outside the exchange or pushed further out towards the end users to connect the EO lines.

In the UK download speeds of up to 80Mbps and upload speeds of 20Mbps are currently offered. Like ADSL/ADSL2+ the access line speed experienced will vary dependent upon a number of factors such as the distance from the cabinet, the quality of the existing copper phone line, and noise on the line.

Figure B3 shows how speed drops off with distance for VDSL, ADSL2+ and ADSL technologies. It is evident that whilst FTTC offers good performance over short distance, there is no benefit over ADSL2+ at longer line lengths. For example the graph shows that at a distance of 1km from the cabinet, speeds from FTTC are equivalent to ADSL2+ and are actually less with increasing distance.

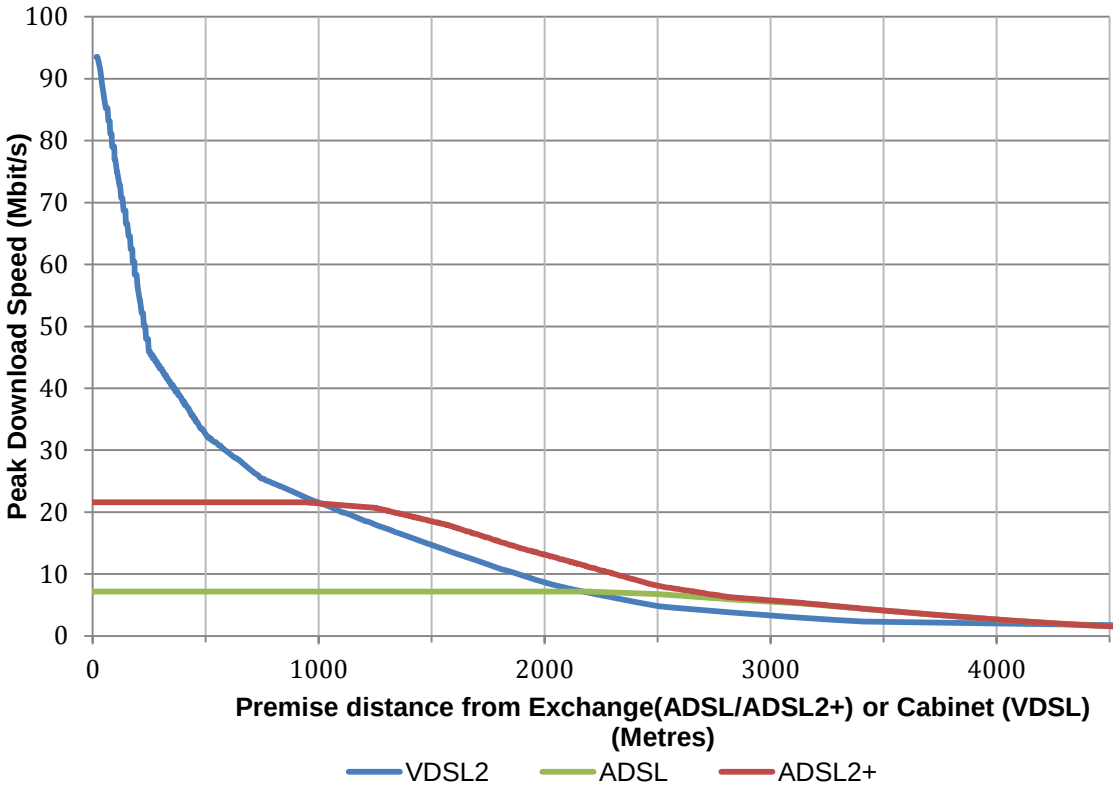

Figure B3: ADSL, ADSL2+ and VDSL2 Theoretical Performance

Alternative suppliers can unbundle the street cabinets (sub-loop unbundling) by installing their own FTTC cabinet adjacent to the BT street cabinet to offer FTTC services directly to customers connected to that cabinet. The uptake of this product is currently very limited.

The cost of deploying FTTC is predominantly determined by the route distance of fibre required between the local exchange and the street cabinet, and the availability of existing duct infrastructure. The major cost is in excavating and in repairing or laying new duct infrastructure in which to install fibre optic cable, but this can be offset by the relatively large number of premises passed by enabling a cabinet.

FTTC is an attractive option for premises that are close to their serving cabinet with customers benefitting from significant speed uplifts.

3.1.1 Future Developments

The maximum speeds available over FTTC have already been increased from 40Mbps to 80Mbps by improving the VDSL2 frequency range. Future increases in speeds may be achieved by similar changes to

the VDSL2 profile with the benefit that no additional equipment would be required.

Vectoring is a technology currently under trial where noise-cancellation techniques are applied to reduce interference and cross-talk between cables, improving the performance and in theory enabling more customers to receive faster broadband speeds. It is expected that this would provide significant uplift to many premises on short to medium line lengths, but will provide limited benefit to those on long lines. Vectoring will also come at an additional cost, as it most likely will require new electronics to be installed in the street cabinet, and new end-user premise equipment.

Fibre to the Remote Node (FTTRN) addresses customers whose distance from their FTTC-enabled cabinet results in sub-24Mbps downstream line speeds, customers whose cabinets are not FTTC-enabled, and customers whose lines do not pass through a cabinet (EO lines). The solution consists of a self-enclosed mini VDSL cabinet (typically less than 20 ports) that can be located in a footway box or on a telephone pole close to the customer premises. Customer lines are terminated on the device's VDSL ports providing standard GEA service at VDSL speeds up to 80Mbps. Connectivity between the FTTRN device and the Openreach handover point (layer 2 switch) is via a fibre backhaul link that is fully compatible with NGA. Electrical power could be provided to the device either via a hybrid fibre-power cable from an upstream power supply or via local mains power. FTTRN is therefore intended to be a cost-effective alternative to FTTP, providing an intermediate solution between Openreach standard FTTC solution and FTTP that pushes the fibre deeper into the network but still capitalises on the ability of the copper local loop to deliver effective SFBB services over relatively long distances. It is expected to be particularly effective where target premises are grouped in small clusters where FTTRN can avoid the need for costly fibre deployments into each premise or where the provision of a cabinet is problematic e.g. in city centre locations or for EO lines. The solution would be fully GEA compatible, and internet service providers would consume standard GEA services on lines where FTTRN devices have been deployed.

3.2 Fibre on Demand

BT have announced a 'FTTP on Demand (FTTPoD)' product, which will enable end users who are connected to an FTTC enabled cabinet to request and pay for the installation of a fibre to their premises (FTTP) from their cabinet, thus providing access to faster FTTP services. To date, this product is only available from premises served from an enabled cabinet in the Edinburgh Waverley exchange.

3.3 Fibre to the Premise (FTTP)

Fibre to the premise is the provision of fibre optic cable all the way from the serving exchange/PoP to the customer premise. By utilising fibre optic cables, as opposed to copper, very high bandwidths can be provided to premises, and independent of the line length and interference.

Since a new fibre optic cable must be provided to each end customer premise, the civil costs of installing new duct and fibre are significant. As such, the distance to each premise is a major factor in the cost of deployment, making this solution less viable to serve rural premises given the long distances of new duct/fibre build.

There are two main types of fibre networks: Point-to-Point and Passive Optical Networks (PON). In a Point-to-Point network, a single fibre is allocated to each premise between the exchange/PoP and the end user. This allows un-contended bandwidth, but is more expensive as a very large number of fibre cables must be installed to give the required coverage.

A PON network utilises a single fibre from the exchange to serve multiple premises by installing passive (non-powered) splitters to connect multiple customers to shared fibres. Typically a single PON might serve 32 or 64 users, and since less fibre is required the cost of deployment is lower. In this case, the bandwidth for that PON is shared between the users, but still provides very high speeds to each user. The most common type of PON is a Gigabit Passive optical network (GPON) where a download bandwidth of 2.44Gbps (2440Mbps) is shared between the 32 or 64 GPON users. This is the technology used by most service providers including BT, who offer products with download and upload speeds of 330Mbps and 30Mbps respectively.

A number of communications providers have deployed FTTP networks in the UK, although typically on a relatively small scale due to the high deployment costs. Most

FTTP installations are to new premises, as the cost of deployment is much lower if the civil work and fibre installation is undertaken during construction.

3.3.1 Future Developments

Fibre to the premise broadband technology is the focus of much research and development. Successors to the current GPON standard include 10GPON which provides 10Gbps download speed shared between the PON users and Wave Division Multiplexing (WDM) PON. Continual advancements and improvements and increases in performance and bandwidth are to be expected.

3.4 Hybrid Fibre-Coaxial Network (HFC)

A hybrid Fibre-Coaxial Network is similar in architecture to an FTTC network, but the final drop to the customer premise is delivered over a Coaxial Copper Cable. The use of coaxial copper cable, as opposed to a twisted copper phone line, allows for higher bandwidth services to be offered to customers and less deterioration in performance than ADSL/VDSL2.

This is the technology used by cable networks, which in the UK are owned by Virgin Media. This offers download speeds of 120Mbps and corresponding upload speeds of 12Mbps and future technical developments and new standards are expected to significantly increase the potential download speeds over HFC networks.

Virgin Media are not undertaking any significant expansion of their fixed network presence in the UK and it is unlikely they would deploy to any new locations such as the East Lothian area at present.

3.5 Wireless Network Technologies

3.5.1 Wireless to the Cabinet (WTTC/FTTC)

Wireless to the Cabinet is a technology that is being researched to provide FTTC type services to premises whose cabinet is located in a rural location. A point-to-point wireless microwave connection is installed between the local exchange and the cabinet to provide high-capacity backhaul, instead of providing a fibre connection. Standard FTTC services are then offered from

the cabinet, after the installation of local power and electrical equipment. The Wireless to the Cabinet architecture is shown below in Figure B4.

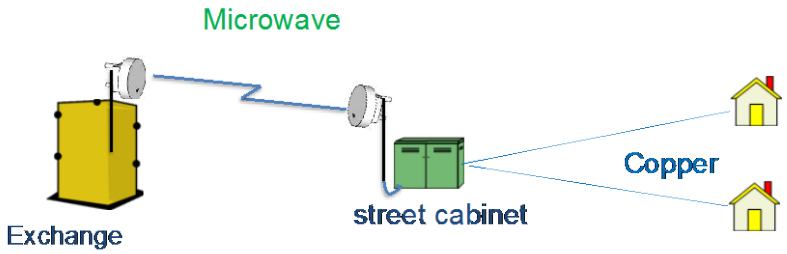

Figure B4: Wireless to the Cabinet (source FarrPoint/Atkins)

This technology is currently being researched with pilot trials planned for 2013. It is likely that the only operator to provide this will be Openreach.

WTTC represents a cost saving over a normal FTTC deployment for rural cabinets, as duct and fibre does not need to be installed between the exchange and cabinet. The cabinet will still require power and in some rural areas this can remain prohibitively expensive. In addition a point-to-point microwave link is required with 'line-of-sight' between the cabinet and the local exchange or intermediary point, which may be difficult in some geographical areas.

However, overall this is an attractive proposition as it allows the possibility of FTTC cabinets to be provisioned in what would otherwise be uneconomic locations.

3.5.2 Fixed Wireless Broadband (Wireless to the Premise)

Fixed Wireless Broadband connects a premise to a wireless service, provided from a fixed location such as local hilltop mast site or the local exchange. This technology encompasses a large range of potential delivery methods such as Wi-Max, WiFi, Whitespaces and 3G/4G technologies such as LTE.

The customer requires an antenna to be installed on their premise (whether on the roof, window or located internally) to receive and transmit a signal to a base station, which is connected to the supplier's network.

The speeds achieved depend upon a number of factors including the technology used and the received wireless signal strength, which is affected

by terrain, visual obstacles and distance from the base station.

Some of the available technologies are outlined below.

3.5.3 Unlicensed Point to Multipoint Fixed Wireless Access

Most fixed wireless access networks in the UK operate in the licence-exempt 5GHz band (which has largely superseded the more crowded 2.4GHz band) and are used to provide broadband in areas where deploying wired infrastructure is too expensive.

Being unlicensed[10] there is no recurring license fee to pay and in theory anyone can set up such a network and start providing services. Customers can be connected over considerable distances depending on the geography, system specification and other parameters.

The benefit of deploying a fixed wireless access network is the ability to serve remote customers without the need to deploy new wired infrastructure which significantly reduces the cost of deployment. This type of network is commonly deployed as a community solution, due to its affordability and relatively straightforward implementation.

There are a number of different complimentary technologies that are being researched or deployed, which can improve the potential speeds and coverage achievable with Wireless Access networks, such as TV Whitespaces and 4G.

3.5.4 Whitespaces

TV Whitespaces is a method of providing wireless connectivity by utilising frequency ‘gaps’ in the TV broadcast spectrum. These frequency gaps vary in size and availability across the country, and are a result of the way the TV broadcast network is delivered. The specific frequencies used by TV broadcasts are attractive for wireless communications due to their relatively low frequency which results in long distances being achieved. Because this technology is effectively interlaced with the TV Broadcast spectrum, the guaranteed availability and bandwidth is determined by a number of factors,

[10] The 2.4Ghz band is completely unlicensed whilst the 5.8GHz band is lightly licensed meaning Ofcom should be notified of installation locations and a nominal fee is paid per end-user connected.

including geographic location, and is not guaranteed. White Space delivery mechanism is shown in Figure B5.

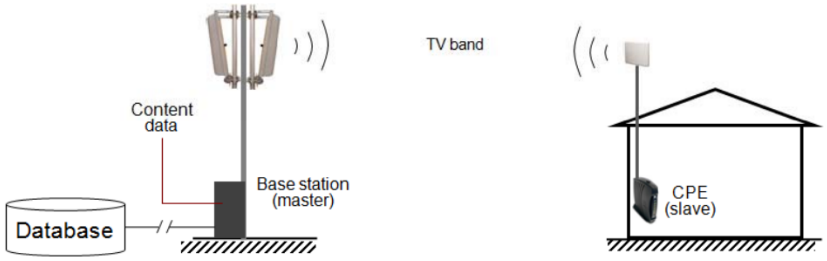

Figure B5: Whitespace Connectivity

The potential speeds are dependent upon a number of factors, including the available Whitespace spectrum in any given location, the allowable power levels (both of which are dictated by the TV broadcast network in a given location), the technology utilised, and importantly the distance from the broadcasting base station.

As an indication, download speeds in the range of 2 - 20Mbps have been achieved in trials, over distances of up to 6km.

A number of companies are researching Whitespace, and this could potentially be offered by a number of operators in the future. The technology could be particularly useful in rural areas given its propagation characteristics. However, any wireless technology requires that sufficient backhaul bandwidth can be provided from the base station, which must be located within a suitable distance from the customer premises to provide a service. This often requires a mast to be installed in a rural location, and providing this backhaul connection (typically by microwave or fibre) can be geographically difficult, or prohibitively expensive.

3.5.5 3G / 4G LTE

Mobile phone communication based technologies, specifically 3G (third generation) and 4G (fourth generation) can be used to deliver broadband to premises where other fixed options are not available.

In such a scenario, the customer equipment typically consists of a mobile ‘dongle’, or Wi-Fi enabled 3G/4G modem, which allows multiple devices to

share an Internet connection.

3G and 4G based technologies provide a range of achievable speeds, based upon a number of factors such as the available network coverage, including whether the user is located indoors or outdoors, network loading (the number of simultaneous users) and whether the user is static or mobile.

3G technologies are theoretically capable of download speeds in excess of 8Mbps, however this can vary substantially and real-life experienced speeds are typically around 1 - 4Mbps. 4G technologies, also known as LTE, or Long Term Evolution, provides higher speeds upwards to 20Mbps.

However there are disadvantages around cost and data download allowances and availability in more rural areas due to commercial rollout considerations.

3.5.6 Satellite Broadband

Satellite broadband is capable of providing a service to almost all premises in the UK, as it only requires a clear view of the southern sky in order to receive a two-way service.

The achievable broadband speeds with satellite broadband have quite recently seen an increase, as a new generation of satellites that operate at higher frequencies (Ka band) have been deployed which are able to provide greater capacity than before. Peak download and upload speeds of up to 18Mbps and 6Mbps respectively are currently available.

However, satellite broadband works by sharing an expensive but limited resource across a large number of end users. Because of this, the service is subject to very high contention and the median broadband speeds experienced are likely to be lower than the peak speeds advertised and low data usage caps are typically applied to most packages, unless an additional premium is paid. The service is also affected by latency that causes issues with certain types of delay sensitive traffic.

Given the ubiquitous availability of satellite broadband, it can be an attractive solution for the hardest to reach premises. However, satellite broadband is subject to disadvantages due to the nature of delivery, which include low data usage caps, variable achievable speeds and much higher latency. As such, it

is considered a last resort solution where reasonable line access speeds are not achievable by any other method.

APPENDIX C

TECHNOLOGY COMPARISONS

Technology	Theoretical Peak Download Speeds	Availability	Operators / Deployment	Potential Community Involvement	Costs	Likelihood of deployment to Rural Premises	Future Upgrade Path
Fixed							
ADSL	8Mbps	Currently Available	Openreach, RSPs	N/A	Low	Low	ADSL2+
ADSL2+	24Mbps	Currently Available	Openreach, RSPs	N/A	Low	Low	N/A
ADSL/ADSL2+ Regenerator	8-24Mbps	Future	Openreach, RSPs	N/A	Low	High	N/A
BET	2Mbps	Currently Available	Openreach, RSPs	N/A	Medium	High	N/A
FTTC	80Mbps	Currently Available	Openreach, RSPs	Potential to contribute to capital cost	Medium	Medium	FTTP
FTTP	330Mbps	Currently Available	Openreach, RSPs	Potential to contribute to capital cost	High	Low	Potential improvement in performance
HFC	120Mbps	Currently Available	Virgin Media, WightFibre	N/A	High	Low	N/A / FTTP
Wireless							
WTTC	70Mbps	Future	Openreach, RSPs	Currently N/A, future potential to contribute to capital cost	Medium	Medium	Full FTTC / FTTP
5/5.8GHz FWA		Currently Available	Many Operators	Potential to Operate / Contribute	Low/ Medium	High	Potential improvement in performance
Whitespaces		Future	None Currently	Currently N/A	Low	Medium	Potential improvement in performance
3G/4G	2-20Mbps	Currently Available	O2, Three, Vodafone, EE,	N/A	Medium/ High	Medium	Potential improvement in performance
Satellite	18Mbps	Currently Available	Tooway, Avanti, others	N/A	Medium	High	Potential improvement in performance