CAIRNGORMS NATIONAL PARK DIGITAL CONNECTIVITY AUDIT

Prepared by Broadband Strategies Limited for the Cairngorms National Park Authority

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This report was prepared to assess current digital connectivity across the Cairngorms National Park in order to inform future project work to improve broadband and mobile communications. The online survey provides a strong and convincing evidence base for action. This will be used to influence discussions with the Scottish Government and key strategic partners including local authorities, enterprise networks and industry to ensure that the many rural communities across the Park do not remain disadvantaged with poor communications services.

A NATIONAL AND REGIONAL CONTEXT

AI National Context

AI.I BDUK

Broadband Delivery UK (BDUK) – a team within DCMS – was set up to deliver the UK Government's broadband strategy, bringing superfast broadband to all parts of the UK.

BDUK's main role is to allocate and distribute £530m of funding¹, to bring superfast broadband to the third of UK homes and businesses which won't be provided for by the broadband market and would otherwise miss out. County councils, unitary authorities and Local Enterprise Partnerships can apply for a share of the money by developing a local broadband plan setting out how everyone in the area will be provided with superfast broadband access. Once the local plan is sufficiently developed, BDUK will allocate the funding and the work will be put out to tender to bidding suppliers².

There are currently 5 pilots in progress³:

- **Connecting Cumbria** "To deliver optimum geographic coverage, aiming for 100 % coverage across the Cumbria sub-region, including rural, remote and sparsely populated areas to a minimum speed of 2Mbit/s".
- Highlands and Islands Next Generation Broadband Project "To provide affordable Next Generation Broadband (NGB) services to all parts of the Highlands and Islands based on building out from 50 population centres. In addition to NGB provision in these key towns, Wholesale Access Points of Presence (PoPs) will also be required. Once provision is made available to the 50 key towns, this will be widened to at least a 20km radius from each town with NGB ultimately available to all". See Regional Context for more details and latest update.
- Connecting North Yorkshire "Providing next generation access (NGA) to market towns in North Yorkshire, accounting for around 45% of the addressable residential/business market Also providing, high-speed digital hubs (if possible with access layer) to around 250 communities that will act as points of interconnection to backhaul infrastructure for Community (or any other) Service Providers".
- **Borders Broadband** "To bring universal minimum standard broadband to rural parts of the counties and high level of access of superfast broadband. This will in turn support the economic development ambitions of the counties and address the disadvantages of digital exclusion. The improved network will enable the delivery of latest generation public sector applications to support access to services in deeply rural parts of the counties".

² Source: BDUK information page on DCMS website: http://www.culture.gov.uk/what we do/telecommunications and online/7781.aspx

¹ This is UK wide, but a part of this is now apportioned to the Scottish Government. It is not yet known how bit this funding pot will be or how it will be distributed in Scotland.

³ Source: Broadband Delivery Programme: Superfast Pilots - Lessons Learnt Report, November 2011.

• **Digital Rutland** "To offer Next Generation Access (NGA) to 99% of the County (businesses and households) by 2013. Further aspirations for the period are a universal minimum standard broadband solution by 2015 including exploitation of wireless, satellite or community based solutions to the most remote settlements, working with neighbouring LAs and Local Enterprise Partnership (LEPs) as appropriate".

A further four local broadband plans have been approved for Wiltshire, Norfolk, Devon & Somerset and Suffolk.

In Scotland the apportioning of funding from BDUK will be administered by the Scottish Government. Up until now funding has, with the exception of the Highlands and Islands project, been awarded to councils who have successfully applied for it by producing a local broadband plan. The Cairngorms National Park Authority (CNPA) is exploring the possibility of creating a collaborative broadband plan for the Park area, in conjunction with all the local councils and, where appropriate with HIE and other strategic partners. Acceptance of such a plan will depend on a number factors, including the final decision by the Scottish Government on the method by which it will use their allocation of BDUK funding.

More information on the developments at the Scottish Government in section A1.2 below.

A number of lessons learned from the early pilots have been published by BDUK in a report entitled Broadband Delivery Programme: Superfast Pilots - Lessons Learnt Report, November 2011, and available on the BDUK information page:

http://www.culture.gov.uk/what_we_do/telecommunications_and_online/7781.aspx

Key findings from this report that support a potential application from the Cairngorms National Park area (the Park) include:

- 1. **Local delivery**. In rolling out the broadband delivery programme the UK Government has established a locally led delivery approach. This approach has been successful in enabling local bodies to develop a local vision and priorities which are tailored to meet local requirements and are incorporated into local economic growth and service transformation plans.
- 2. Local bodies working in partnership. The experience of the Pilots shows that local bodies which are willing and able to work together to increase the scale of intervention can achieve a more efficient approach, without resulting in slower development and procurement times. When scoping future projects local bodies should endeavour to form cross border partnerships wherever possible to better aggregate demand and secure economies of scale.

Other recommendations from this report should provide the CNPA with information it needs to produce a plan that is in line with current best practice. Summarised these recommendations cover the following topics and details are available from the report in section 1.2.

- Project resourcing and governance
- Project planning
 - Developing the business case, vision and project priorities supported by a funding strategy
 - Undertaking demand stimulation activity and awareness raising communications

- o Developing a 'data room'
- Ensuring a co-ordinated approach to planning issues
- o Developing a communications strategy
- Market capacity
- Commercial models

AI.2 Scottish Government

The Scottish Government produced Scotland's Digital Future: A Strategy for Scotland in 2011. An Infrastructure Action Plan was published on 31 January 2012:

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

A detailed delivery plan is being developed by March 2012.

The Action Plan highlights four key programmes of activity;

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 we are seeking is a significant uplift in speeds for everyone by 2015, with speeds of 40 – 80 Mbit/s for between 85% to 90% of premises. Our procurement strategy will seek to extend the reach further and deliver the best possible speeds for those where delivery of 40 - 80 Mbit/s is not possible at this stage.

Programme 2: Achieving world-class by 2020 will deliver a longer term plan, developed in parallel, to ensure we have the right mechanisms, partnerships and commercial models in place to deliver world-class infrastructure in a sustainable way and in partnership with industry.

Underpinning these core infrastructure programmes are two additional programmes:

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 and delivering better outcomes for Scotland.

Improving mobile coverage across Scotland is also an important element of the plan to ensure people have good access, wherever they are, to telephone and data services from hand held devices.

There is still some way to go to realise the targets outlined in the action plan. It remains to be seen how a single procurement contract for the rest of Scotland (outside the Highlands & Islands) will impact on any regional collaboration around the Cairngorms National Park. Equally, more work will be required to deliver the step change in service that is needed in many isolated rural communities.

The above programmes do indicate a unspecified commitment to the 10% - 15% of the population that will not at this stage be able to get 40 - 80 Mbit/s, but does not specifically detail plans to comply with the BDUK's desire for a universal service commitment of a minimum of 2 Mbit/s for all (100%) of the population.

A2 Regional Context

A2.1 HIE Pilot

Highlands and Islands Enterprise (HIE) were the one of the first three regions in the UK to have benefitted from funding from BDUK by receiving grant funding for a large pilot. The pilot aims to realise high speed broadband in around 50 strategically located towns and villages throughout the Highlands and Islands. This will create a new network of high capacity backhaul throughout the area, which in turn allows improvement of broadband in smaller and more remote communities. The pilot, which is endorsed by the various councils as well as other public sector organisations such as NHS Highlands and UHI, is the start of a much larger project that aims to bring high speed broadband to all people and businesses in the area by 2020.

Currently the procurement stage of the pilot has been completed and BT shortlisted as the preferred supplier. They are now entering the negotiation and planning phase which is expected to last the rest of this year with the first implementation of new services expected early in 2013.

The HIE area covers part of the Park, i.e. those areas covered by Highland Council and Moray Council (see map in Appendix A). Two towns in the Park area (Aviemore and Kingussie) are noted on the initial indicative map issued by HIE. However, the timing of any upgrade and the wider rollout beyond specific settlements is dependent on contract negotiations.

HIE are in dialogue with councils across the Highlands and Islands and with the CNPA and the issue of future upgrades to more remote rural communities is a key part of these discussions.

A2.2 Local Authorities

The Park falls within a number of Local Authority areas (see appendix A). These are:

- I. Highland Council
- 2. Moray Council
- 3. Aberdeenshire Council
- 4. Angus Council
- 5. Perth and Kinross Council

The Highland Council and Moray Council are currently working together with HIE on their high speed project pilot (see section A2.1).

Aberdeen Council is working in collaboration with Aberdeen City Council and Aberdeen City and Shire Economic Future (ACSEF) on a number of digital initiatives for the North East of Scotland. Aberdeenshire Council has provisionally agreed an $\pounds 18$ million funding package from their capital programme to deliver high speed broadband services within their area. The Council is keen to work with the CNPA to find ways to implement this in their part of the Park. A detailed analysis for Aberdeenshire and Aberdeen City was conducted by Mott Macdonald in 2011.

Angus Council have commissioned an audit of their council area by FarrPoint. This is due to report in early 2012.

Perth & Kinross Council have also conducted a detailed broadband audit and outline plan. This has been done by FarrPoint.

A2.3 Pathfinder North⁴

Opportunities exist to utilise some, or part of, existing public service networks. This is being considered in the governments action plan work. The most significant network that operates within the Park is Pathfinder North.

The £70 million Pathfinder North is to procure, implement and manage the delivery of broadband services in five local authority areas across the Highlands and Islands (Highland, Moray, Argyll and Bute, Orkney and Shetland). The five local authorities formed a consortium to undertake the procurement. The Highland Council was appointed the Lead Authority for the procurement and implementation of the Pathfinder North programme

The Highland Council has a dual role in the project, acting as the Lead Authority on behalf of other Partner authorities and as an individual Partner authority. The services delivered by the Pathfinder North Project, will offer direct benefits to local authorities by enabling high bandwidth connections for schools, libraries and other Council offices throughout the Highlands and Islands. The Implementation phase has now finished with the last site connected on 20.12.2009, and therefore the Pathfinder North contract will now move into an ongoing service delivery phase and be managed within the ICT Services team. An update by the by the Highland Council's Resource Committee in April 2010 includes information about Pathfinder North's position on the potential use of the Pathfinder North network as a means of providing backhaul for potential non-public sector purposes. Potentially relevant to the CNPA's local broadband plan are the following statements:

- Pathfinder delivers services to 800 sites across the Highlands and Islands, with bandwidths varying from 2Mbit/s to 300Mbit/s. Most schools range from 8Mbit/s to 100Mbit/s. This is delivered using a range of technologies, including radio, fibre and BT connections.
- The Council buys these services from Cable and Wireless under a 7 year managed services contract. The current contract ends in March 2014, and a full EU reprocurement will need to commence in early 2011 to ensure that a replacement contract is in place by 2014.
- The original purpose of the EU procurement was to purchase broadband network services for local authority sites and as such community, commercial or individual broadband usages were not included in the original procurement scope. Under the procurement regulations this means that the Council is limited in being able to open up the existing contract or 'sell on' services to any 3rd parties. In order to clarify what the Council can and cannot do under the terms of the EU procurement specialist legal advice is being sought as to the limitations of both the current contract and also the EU 'state aid' approval restrictions which were in place at the time of the contract award.
- If a viable and sustainable business model can be devised, then it is conceivable that the Council could allow access to the connection points of the Pathfinder North network (i.e. in schools and libraries). However, significant further work is needed to define this model and to understand the roles, responsibilities and funding requirements as any community requirement would need to be managed and resourced by the community and a suitable business interface with Cable and Wireless defined. Initial indications suggest that EU Leader funding may be available to community groups in terms of funding resource requirements and this is being investigated. The position regarding any national or centralised funding from the Scottish Government is unclear at the current time.

⁴ Source: Pathfinder North & Broadband Update. THE HIGHLAND COUNCIL RESOURCES COMMITTEE – 14th April 2010.

• Within the Highlands and Islands there are a number of independent pilot projects which have been exploring how broadband access can be improved to communities and businesses. The vast majority of these projects are dependent on a high level of community engagement and drive, plus access to project funding and equipment.

It is clear that for the part of the Park that is covered by Pathfinder North that there are potential opportunities depending on the how the 2014 renewal of the contract is going to pan out. The procurement process for Pathfinder North 2 needs to commence in early 2012. An Outline Business Case has been submitted to the Scottish Government for consideration.

B CAIRNGORMS NATIONAL PARK

BI Background

The Cairngorms National Park covers an area of over 4500km2. Whilst much of this area is of significant international and national importance for biodiversity and landscape it is also home to over 17,000 people and is visited by over 1.4 million visitors each year. There are around 1000 businesses, many small and operating in remote rural areas. The Park encompasses many, and in some case all, of the most isolated communities and businesses in the 5 local authority areas that make up the Park (Highland, Aberdeenshire, Moray, Angus and Perth & Kinross)⁵.

B2 National Park Plan

The National Park owned and managed by a variety of landowners, communities, businesses, charities and public bodies. The CNPA exists to ensure the coordinated delivery of the National Park Plan, a strategic document that sets out a clear vision and priority for the benefit of the Park and the people who live and work in and visit the Park. A new Park Plan for 2012-17 is under development and the wide public consultation highlighted the need for enhanced broadband and mobile connectivity for residents, businesses and visitors⁶. This has been investigated further by the recent Cairngorms Broadband and Mobile Connectivity Survey.

A key element of the next Park Plan will be a clear economic strategy for the area, based on the inherently strong characteristics that the area offers as a tourism destination, but also recognising the pressing need for wider diversification of the economic base to ensure long term economic and social sustainability. Providing the infrastructure to attract new investment and business, as well as improve and sustain vibrant communities, is crucial. Improved broadband and mobile connectivity is the key area where progress can be made. There is very strong support from many stakeholders to work in collaboration to improve the current situation.

B3 Cairngorms Business Partnership

The Cairngorms Business Partnership⁷ (CBP) is an innovative and dynamic business group that combines destination management and marketing with chamber of commerce support for business across the Park. It has over 250 members, has a strong private sector revenue stream and is supported by the CNPA, HIE, Scottish Enterprise, local authorities and Visit Scotland. It provides an established and efficient network and means of engaging with businesses in the Park.

⁵ See <u>www.cairngorms.co.uk</u> for more information.

 $^{^{6}}$ A full report on consultation responses and a draft plan will be available in early March 2012.

⁷ See <u>www.visitcairngorms.com</u> for more information.

C EVIDENCE BASE

CI Services currently available in the Park

CI.I ADSL

There currently are 30 telephone exchanges that cover the Cairngorms National Park area, servicing 15065 telephone connections (not all in the Park area) of which 13869 are classed as residential and 1196 as non-residential⁸. All 30 exchanges are enabled to provide some form of ADSL broadband.

24 of these exchanges (representing 85% of all connections) are ADSL Max enabled. This means that households and businesses connected to these exchanges should in theory be able to receive a service of up to 8 Mbit/s download. This however is in practice never achieved, because the achievable speed depends on the length of the cable from the exchange to the user and only those nearest the exchange will get anything near this speed. The average speed is around 3.5 Mbit/s⁹. The highest upload speed achievable is about 3 Mpbs, but that is rarely available, the average is around 380 Kbps.

5 exchanges are enabled with Exchange Activate (EA) technology, which was installed in exchanges where full ADSL was not deemed a viable option. EA only offers a service of up to 512 Kbps download speed and about half of that up. There are 359 telephone connections to these exchanges, representing only 2% of all connections in the Park. EA has other limitations, such as the choice of Service Provider. The EA exchanges in the Park area are only serviced by BT and Scotnet. Also only a limited number of connections are available per exchange. If more connection are needed additional equipment must be installed.

The Pitlochry exchange (ESPIT) is currently planned for an upgrade to 21CN technology (21st Century Network). This means that people within the Park boundaries that are linked to this exchange should then be able to receive considerably higher download speeds (but only at a relatively short distance from the exchange). The expected installation date for this is 31 January 2012.Pitlochry istself is outside the Park and it isn't clear how many households and businesses are within the boundary that would be serviced by this exchange. Because the exchange is in Pitlochry itself, it is likely that the improvements will not extend far into the park area. However the nearby availability of better bandwidth is good news as it can potentially provide backhaul for future projects in areas in the Park nearby.

The Aboyne exchange (NSABO) is in the process of being upgraded with Broadband Enabling Technology (BET), which increases the length of the line at which a service is still possible from approximately 6 Km to 12 Km. This BET system is installed to service a number of users in Glen

⁸ Source: "Sam Knows" (<u>www.samknows.com</u>). Although non-residential may imply business use, this also includes public sector. It is also likely that there are businesses with a residential service. A list of exchanges with detailed information is available in appendix D. A map with the locations of exchanges and major businesses is found in appendix B.

⁹ A survey CNPA recently undertook shows that the highest speed recorded is 7.7 Mbit/s. The average for the whole area is 3.46 Mbit/s.

Tanar, who are outside the usable range of ADSL Max. BET offers speeds of up to 2 Mbit/s. This project was partly funded by Cairngorms LEADER.

BT has recently announced the upgrade of the Grantown-On-Spey exchange (NSGOS) to 21CN technology. The ready for service date has been confirmed as 31 May 2012. As in Pitlochry, this will increase available bandwidth for subscribers that are near enough the exchange from up to 8 Mpbs to up to 20 Mbit/s. According our records, the exchange is in the centre of town, so it is likely that most people in Grantown will be able to receive considerably better speeds. Grantown has currently got 1642 telephone subscribers.

CI.2 2 Way Satellite

A small number of clusters of households and businesses within the Park that are too far from the exchange to get any ADSL type broadband service received grand funding to install under the Governments Broadband Reach project. They were provided with 2 way satellite broadband. However there have been many problems with this system and users are in general not happy with the service at all. Slow speed (especially upload), lack of reliability (especially in bad weather conditions), latency (delay), lack of support and service, and high cost have all been cited as problems. Known areas where 2 way satellite systems were installed include Corgarff and Glen Tanar.

CI.3 Mobile/3G

A number of people in the Park area are able to receive and use 3G mobile broadband services using a USB dongle. Despite it being called "broadband", speeds that can be achieved using this service normally fall well short of 512 Kbps.

CI.4 Leased Lines

There are a number of businesses in the Park area that have been provided with a leased line solution. Such services are in theory available everywhere, but because of cost (usually in the tens of thousands of pounds to install and many thousands of pounds to run) it is an unrealistic solution for most businesses, unless a reliable, uncontended, low latency, symmetric (up and download speeds are the same) service is essential and justifiable. There is evidence that availability of more affordable high capacity leased line solutions is needed to provide the growth potential of a number of key businesses in the area.

There are a number of different types of leased line products on the market from various providers. They range from copper based basic (IP VPN) services to privately owned fibre optic solutions.

C2 Known problems

Between November 2011 and January 2012 CNPA undertook a large scale broadband survey. There were a total of 634 responses to this survey. A complete list of questions and responses of this survey can be found in Appendix E. Where information below is based on the findings in this survey this has been highlighted in shaded boxes.

C2.1 What kind of problems have been identified?

Problems identified can be put into 8 categories as follows:

- 1. Households or businesses are too far (typically 6 Km or more) from their exchange to get any broadband service at all.
- 2. Households or businesses are using a 2 way satellite broadband solution which doesn't provide an adequate service for their needs (typically much less than 512kbps, high latency and low reliability).
- 3. Households or businesses are connected to a multiplexer, which does not support broadband.
- 4. Households or businesses are too far from the exchange to get a reliable broadband service, or where the service is reliable but too slow to be of any practical use (typically less than 512 Kbps).
- 5. Households or businesses are serviced by Exchange Activate and therefore only offering, albeit a reliable, up to 512 Kbps service but to a limited number of subscribers.
- 6. Households or businesses have access to broadband, but the current provision isn't reliable or varies.
- 7. Households or businesses have access to broadband, but speeds offered by the current technology not adequate for their purpose.
- 8. Households or businesses appear to have a slow or unreliable (or both) broadband connection despite being in range of the exchange. Reasons for this include badly configured or installed equipment at the user's premises, interference from electric or electronic equipment or computer problems.

C2.2 Who do these problems impact on?

C2.2.1 Residents

The CNPA Broadband survey shows that 64% of respondents use a residential type of broadband

This doesn't necessarily mean that these people don't use their broadband connection for home use only. It is very likely that various small businesses and sole traders use residential types of broadband. It is also quite likely that some people work from home (part time) and are therefore also dependent on a residential broadband connection.

The above figure seems at odds with data from the exchanges, where the proportion of the residential connections is far greater. This is most likely because respondents may use their broadband service through a telephone line that is classed as domestic.

C2.2.2 Education and Students

47% of respondents say that they use their broadband connection for education, such as undertaking research for assignments, participating in online learning or tutorials or a distance learning course.

This is a substantial figure and shows that availability of broadband is crucial to education and developing knowledge and skills.

C2.2.3 Business

36% of respondents to the survey say that they use a business type broadband service

Although this is quite a substantial figure, it is quite likely that this may be higher taking into account those people who may work from home, or use their broadband connection for dual purpose but elected to indicate primary use as domestic.

A number of business users will either travel into or outside the Park to a place of work, or conduct some of their business inside or outside the park. Availability of mobile connectivity or places where travelling business people could get a wifi connection is key to ensure that the Park doesn't become a communication blackspot and potentially put people of from doing business there.

See appendix B for distribution of major businesses in the Park.

C2.2.4 Visitors

It is estimated that the Park is visited annually by 1.4 million people who use the Park for recreational purposes. More and more of these visitors will have access to mobile devices and wish to use this. It is estimated that by 2013 more than half of all online "traffic" will be via a mobile phone or device and the Cairngorms Business Partnership are lobbying hard to seek improvements to mobile coverage.

20% of all respondents said they have no mobile coverage at all in their home or business

39% of all respondents said they have a signal of only 1 or 2 bars (out of 5) in their premises (37% generally in the area).

36% of respondents said they do not have 3G coverage in their home or business, with another 20% claiming the reception is poor. (27% and 28% respectively for generally in the area)

C2.2.5 Public Sector

Most public sector organisations such as NHS, the council and schools use Public Service Networks such as Pathfinder North as their (internal) means of connectivity, but this this doesn't mean that a lack of broadband services has no impact on these organisations. For example lack of suitable broadband means that public sector staff would not be able to work from home, and efficiencies with online transactions and correspondence with the public are limited by wider connectivity in the community.

C2.3 Which specific problem areas have been identified?

In 2010 the Cairngorms LEADER Local Action Group (LAG) undertook a study to identify areas where lack of broadband was still an issue in order to prepare an application for funding from the Government. During the study the following areas were identified.

Community	Exchange	Problem	Affected number of households or businesses
Glenlivet and Inveravon	Glenlivet	Too far from the exchange	25
Corgarff	Strathdon ¹⁰	Multiplexer	50, includes the Lech ski centre
Glenbuchat	Strathdon	Too far from the exchange	20
Glen Girnoc, Glen Gairn and Glen Muick	Ballater	Too far from the exchange	34
Marr Lodge, Linn of	Braemar	Too far from the exchange and	24
Dee and Glenshee	Glenshee	Exchange Activate (Glenshee)	
Glen Tanar	Aboyne	Too far from the exchange, unreliable service	24

Other areas that have since been identified with problems are:

Community	Exchange	Problem	
Laggan	Laggan	Exchange Activate combined	
		with too far from the exchange	
Angus Glens	Cortachy	Too far from the exchange	
Clova	Clova	Exchange Activate, speeds	
		generally slower than 512 Kbps	
Advie	Advie	Exchange Activate, speeds	
		generally slower than 512 Kbps	
CairnGorm	CairnGorm	Exchange Activate, speeds	
		generally slower than 512 Kbps	

An overview of all exchange in and near the Park boundaries is included in appendix D. A map showing the location of the exchanges and current problem areas can be found in appendix C.

C2.4 More general problems

Of all respondents, 6.1% do not have broadband (because they don't need it or find it too expensive), or still use dialup. 15.3% use 3G mobile technology to access the internet

¹⁰ According local resources, Corgarff has a multiplexer which is connected to Strathdon. This is substantiated by the fact that no ADSL services are available to any of the residents and businesses. BT Have not confirmed this, however, and claim that people in Corgarff are connected directly to the Strathdon exchange and are merely too far.

¹¹ Not certain if any people within the Park area are affected by this.

C2.4.1 Reliability

Only 7% of the respondents find that their service is very reliable. 56% find that the speed varies, but the connection never drops. 32% claim that their service does not only vary in speed, but that it also regularly drops out altogether. 4.5% report very unreliable services.

Although direct comparison cannot be made, these figures don't seem to be much at odds with the level of satisfaction from user of broadband in general in the UK.

C2.4.2 Speed

A number of questions were asked about speed including subjective measures as well as actual speed information and questions on how this impacts on the usability of the service. Here the figures are very much at odds with UK and worldwide statistics.

The average download speed given by 307 respondents is 3.46 Mbit/s, which is only 29% of the UK average (11.81 Mbit/s¹² for the UK, 9.79 Mbit/s worldwide).

The average upload speed given by 300 respondents was 0.38 Mbit/s, which is only 20% of the UK average (1.95 Mbit/s for the UK and 3.60 Mbit/s worldwide).

39% of all respondents currently receive a service that does not meet BDUKs planned 2015 universal service commitment of 2 Mbit/s. This is substantially more than the average figures for each of the local authorities in the Park (17.2% in Highland) and higher than in any local authority in the UK (highest is 33% in Fermanagh. In Scotland the highest is 28% in Clackmannanshire)¹³

About half of all respondents have a service of about 3 Mbit/s.

The above findings seem to correlate with the subjective appreciation of the speeds received and how they impact on the ability for individuals to use the internet and for businesses how it restricts them from achieving what they believe they can when they had a better service.

The acceptable range for a majority of people appears to be 4 Mbit/s or better, which currently only 44% of respondents in the Park can get.

¹² Source: Net Index by Ookla (<u>www.netindex.com</u>). This information was correct at the time of compilation of this report, and increases on a daily basis. Ofcom have also conducted research and published their own report: Communications Infrastructure Report 2011 (<u>http://maps.ofcom.org.uk/broadband/index.html</u>). They quote an average synch speed of 7.6 Mbit/s for Scotland. However, this does not include superfast broadband and sync speed is different from actual download speed and therefore not 100% comparable with data from the survey.

¹³ Source: Ofcom Communications Infrastructure Report 2011

^{(&}lt;u>http://maps.ofcom.org.uk/broadband/index.html</u>). The Ofcom data for this measure has been corrected to reflect actual download speeds (2.2 Mbit/s sync speed), so can be used as a comparison. Naturally this excludes superfast broadband connections.

C2.4.3 Mobile 3G connectivity

For those people that are on the road, or have not got access to broadband via ADSL, 3G mobile phone technology could be used to provide essential connectivity. This requires a reliable mobile and 3G coverage. Within the Park such coverage is extremely variable as the CNPA survey has indicated.

More than three quarters of respondents in the survey claimed that 3G coverage is either poor or non-existent. Half of all respondents claim they have no service at home or in their office. Only about 7.8% find that their service at home or in the office is good or very good and this drops to 6.7% for people who are using it generally within the Park.

The above figures are particularly a concern for visitors that expect to be able to keep in touch with their business or family.

C2.5 Why is improved connectivity required?

One of the most challenging characteristic of the Park is that a large proportion of communities are remote and some very remote. This is due to the topography, which means that physical access to services, supplies, employment and social facilities is restricted, journey times long and cost of transport expensive. Especially in the winter, the roads are often impassable, isolating communities and individuals even more.

Although this remoteness has its attractions, the availability of reliable broadband of acceptable standard is now almost essential for people to be able to make a living and working in the area a viable proposition.

C2.5.I Work

For people needing to make a living in the Park the options are very limited. The major employment providers are the public sector, tourism, farming and food and drink (whisky). Travel to and from work is time consuming and costly due to distances. There is an opportunity for people to work from home or to set up small internet based businesses, but this requires reliable and reasonably fast broadband connections.

Tourism is the dominant sector in the Park and visitors expect and rely on good mobile connections to seek advice, book accommodation, purchase goods and provide feedback; failing to meet their expectations lowers the overall visitor experience and can directly influence business sustainability.

57% of business respondents (201 respondents) claimed that their current broadband facilities restricts their business in one way or another, whereas 55% of all respondents find that it generally restricts the way they use the internet.

C2.5.2 Education

Schools in the CNP are small by comparison and there is limited opportunity for children to get access to clubs and other extra-curricular activity which is important for their educational and social

development. As a result, their ability to access the internet as a means to interact with other children or to learn about life outside the park and outside the school's curriculum is vital in order to give them a chance to develop the skills they need later in life. Again, this can only be achieved in any reasonable way with a good broadband connection.

47% of people use the internet for education, but only 51% of respondents find that their current broadband provision provides them with their requirements for education (247 respondents).

C2.5.3 Social

Remoteness is especially a problem where it concerns older or disabled people. Access to good quality broadband would give these people an opportunity to communicate with family, friends and other people elsewhere, and get involved in activities they would otherwise not be able to participate in. It would also provide a means for these people, especially those that are less mobile, to access goods and services online, which means they can get what they need without needing to travel

HD TV via broadband is currently not available anywhere in the Park. Even normal quality TV streaming is difficult or impossible in some areas¹⁴. With the continuous improvement of broadband services in urban areas, more HDTV content is becoming available online, but will remain inaccessible to the Park area if bandwidth isn't improving.

C2.5.4 Community

Viability of communities depends on its size, demographic mix of its residents and locally available services. There is a strong interdependency between those factors. In small communities it is much more difficult to provide viable services such as a local shop, which is often vital for those people who don't have the means to travel (often). For those services to be viable there needs to be a core of people within the community with the ability to economically sustain these services. Such economically active people tend to young professional people with families, or reasonably wealthy people who are looking to retire.

It is especially the young families that are vital, because they can also ensure that the schools become more sustainable and therefore ensure that the community stays attractive to people to move to that community in the future.

But studies¹⁵ have shown that young professional people take the availability of good broadband into serious consideration when moving to a new place. Without it they may not be able to conduct their work or business, or find they can fulfil social or recreational needs, or indeed feel that their children will be deprived from educational content. Availability of quality broadband in the community makes it more attractive for these people to move to that community.

C2.5.5 Winter conditions

¹⁴ Source: Point Topic June 2010 survey

¹⁵ For example: "Digital Britain: Case study of a broadband backwater"

The Park has some of the most challenging winter conditions anywhere in the UK. Because of its inland position and high altitude, snow and sustained low temperatures are common in the winter and can last from as early as October to well into April. As a result roads become more difficult or impossible to pass so people are even more isolated. On top of all that, the cost of keeping warm can become a real burden. Winter is especially a difficult time for older and disabled people, as they could become completely cut off.

Availability of good broadband can become a vital lifeline in such circumstances and provide essential social contact and entertainment too.

C2.5.6 Public Services

There is currently a revolution taking place in the way in which public sector organisations are interacting with their customers. eGovernment initiatives and presures on budgets is leading to more and more services from public sectors bodies being available (only) online. Most tax returns are now done online. Small businesses that register for VAT are now automatically expected to do their returns online and many government services, such as Single Farm Payments can only be applied for online. Getting access to regulatory and other advice is now often only possible online too, so the availability of a reliable good quality internet is crucial in order to be able to access these services.

In addition, NHS have for a number of years been exploring opportunities of using the internet to improve health services at a distance. It is expected that over the next 6 years there will be an over 25% increase in the number of people who require care¹⁶ and the obvious way in which to largely solve this imminent crisis is to use technology to deal with those cases that don't require face to face consultation. Reliable and good quality (high speed) broadband is required in order to make it possible for telehealth technology to be used effectively.

C2.6 International Comparisons

The problems in the Park are particularly stark when compared with areas elsewhere in the world, which have potentially similar issues. The table below shows the top 10 of countries with the highest average broadband speed¹⁷

It is evident from this table that countries such as Sweden, Romania, Bulgaria and Switzerland are able to provide services of much higher bandwidth, despite having topography similar to the Cairngorms National Park¹⁸.

Rank	Country	Average speed (down)
I	Estonia	37.83
2	Lithuania	31.76
3	South Korea	31.26
4	Latvia	25.51
5	Sweden	24.74
6	Romania	24.51

¹⁶ Source: presentation "Telehealthcare in Scotland" by Mike Martin, chair of the National Telecare Programme Board (2010).

¹⁷ Source: Net Index by Ookla (<u>www.netindex.com</u>).

¹⁸ This information does not include details on the geographical availability of broadband in general, which may not be nearly as good as in the UK.

7	Netherlands	24.31
8	Singapore	23.00
9	Bulgaria	21.21
10	Switzerland	19.28
95	Cayman Island	3.47
96	Cairngorms National Park	3.46
97	Bahamas	3.43

In a more local context, the Park ranks bottom when a comparison is made between average download speeds and synch speed averages in UK local authority areas¹⁹. The nearest other areas with similar slow sync speeds are:

١.	Dungannon	4.7
2.	Scilly Isles	4.5
3.	Cookstown	4.4
4.	Fermanagh	4.3
5.	Cairngorms National Park	3.8

C2.7 Required performance to meet the needs of the Park

C2.7.1 Speed

It is extremely difficult to define a generally acceptable speed for a broadband service. Also, just speed alone doesn't make a good broadband connection. There are a number of issues to take into consideration.

- Download speed. This is the primary means by which a broadband service is normally advertised, but subscribers rarely achieve those speeds. The average download speed in the UK is 11.82 Mbit/s. There is currently nowhere in the Park where such speeds are available. The highest speeds attainable are in the order of 7.7 Mbit/s, and only within a several hundred yards from the exchange. The current average speed in the Park is 3.46 Mbit/s.
- Upload speed. They are rarely mentioned, but quite important. Slow upload speeds not only
 reduce the overall performance, but also make emailing larger files or using applications such
 as Skype a lot more difficult. Most ADSL based broadband services provide upload speeds
 on ADSL Max exchanges are in the range of 380 Kbps, although not many people know that
 you can, albeit at an extra cost, do more than that even on ADSL Max. 2 way satellite
 broadband is the worst performer when it comes to upload speeds. Normally you should
 not expect upload speeds of anything better than 128 Kbps, which is the equivalent of 2
 channel ISDN (which is more reliable). The average UK upload speed is 1.95 Mbit/s.
- Contention. Download speed is not the whole picture. Contention, or the number of people who share a single broadband connection, also strongly influences the quality of the broadband connection. Highly contended (usually cheap) ADSL connections tend to perform better at certain times of the day than during other times. Some broadband connections are known to almost grind to a halt at certain times during the day, i.e. when schools are out or during the weekend and in generally in the evenings (when there are live sports programmes available online etc.). At first contention was not a a big problem in smaller communities, but

¹⁹ The Ofcom data was compared for this purpose with an estimated synch speed of 3.8 Mbit/s average for the Park area to take into account the difference between sync speed and actual download speed.

contention now generally gets spread over the total available backhaul. 2 way satellite broadband tends to be highly contended (to reduce cost). More expensive business ADSL products tend to have a low contention ratio. Contention problems are further compounded when people share their internet connection between various PCs and laptops within the premises.

- Latency. This is the delay (usually in milliseconds ms) between your browser or application sending a request and getting an answer from the server. For most applications latency under 100ms is acceptable, any longer and things may start to get problematic, especially when using applications such as Skype, some games or other real time applications. Speeds under 50ms are desirable but anything above 350ms is starting get unusable for quite a number applications. Most ADSL broadband connections are capable of latencies of around 50ms or 60ms when connecting to a server in the UK or Europe. Latencies increase when connecting with more distant servers such as the US, and even more when connecting to servers in the Far East or Australia and New Zealand. Satellite broadband has latency in the region of 750ms, which severely restricts the kind of applications that can be used. This is due to the distance of the satellite which is in geostationary orbit.
- *R-Factor*. This is aimed only at those people who are using the internet for making phone or video calls. It is made up from a variety of objective factors. The average UK R-Factor is about 85, which is well in the acceptable range.

In practice it is very difficult to establish what an acceptable speed is as this is a very subjective issue as is also evident form the survey. Some people showed in the survey that they were quite happy with their 400 Kbps service, whereas there are people who find 5.9 Mbit/s very slow.

Given the fact that the average broadband speed in the UK coupled with responses from the survey and taking into account that applications will become more demanding for bandwidth over time the following performance should be a good starting point.

Target Speeds for the Cairngorms National Park

A minimum download speed of 2 Mbit/s and 350 Kbps upload with better than 150 ms latency (measured to a server within 300 miles) and a contention ratio of 100:1 or better for residents and 50:1 or better for business anywhere within the CNP area by 2014.

- 1. An average download speed of 10 Mbit/s down and 4 Mbit/s up, for all residents within the Park boundary by 2015.
- 2. Access to high speed broadband for all residents and businesses in the CNP area by 2020.

C2.7.2 Reliability

Speed is only one aspect of acceptable broadband provision. Reliability is the second most important issue. Reliability of a connection depends on a number of factors:

• Type of broadband service. Landline based connections tend to be the most reliable. Connections using radio are less reliable.

- Distance from the exchange. The further from the exchange the more likely a landline based internet connection drops out, especially if the quality if the line is poor or there are specific defects such as leaks, or bad connections.
- Service provider. The reliability of a connection can also depend on the quality of the equipment that has been provided by the service provider, or the quality of the backhaul connection that is used for the connection to the internet. There doesn't seem to be a correlation between how big or well known a service provider is and the quality of their connections.

Reliability can be measured in a number of ways, either by expressing the number of times the connection drops within a certain period (from virtually never to several times an hour) and/or by the total amount of time the connection isn't available during a certain interval, for instance in number of hours per year or minutes per month (going from virtually always to virtually never available).

Realistically, reliability of an acceptable broadband service should be high. Any broadband provision within the CNP area should ideally have a reliability that meets or exceeds the UK standard, but the CNPA expects for business broadband services that this not be worse than:

- I. Up to I day per year maximum absence of service.
- 2. No more than I outage per month on average measured over the year.
- 3. Outages should not last longer than 2 hours maximum.

C2.7.3 Services

An acceptable broadband service will potentially include a number of additional services such as:

- Inclusive landline telephone minutes
- Inclusive mobile phone minutes
- Inclusive email and web hosting
- Inclusive television channels

In general the most important point is that a broadband connection provides access to the internet. Other features can always be sourced elsewhere, although cost is also a factor (see below). So the CNPA expects that a broadband service would in principle only need to provide users with a connection to the internet.

C2.7.4 Support

Availability of support is crucial when subscribers are encountering problems. Any broadband provision should provide adequate telephone support at a reasonable cost. Subscribers should as a minimum be able to reach the service provider by telephone during normal office hours and should not need to wait longer than 10 minutes to get their call answered at standard national call rates (much quicker if premium rates are charged).

C2.7.5 Applications

Another way of measuring an acceptable service is by considering the applications that people may want to use their internet connection for. Currently the majority of applications people use fall under the following categories:

- I. Email
- 2. Email with large attachments
- 3. general browsing
- 4. buying online
- 5. maintaining a website
- 6. selling online
- 7. downloading files and software
- 8. uploading files and software
- 9. downloading music
- 10. listening to music
- 11. downloading videos
- 12. watching videos
- 13. downloading TV programmes
- 14. watching TV programmes
- 15. gaming
- 16. voice communication
- 17. video communication
- 18. twitter
- 19. facebook
- 20. maintaining a blog
- 21. other social media
- 22. other applications

Currently, most of the above applications are usable through a 2 Mbit/s connection (with at least 350 Kbps up and better than 350ms latency). Only the live video and TV streaming would work probably better with 3 Mbit/s.

C2.7.6 Cost

The average cost of a broadband connection in the UK is £24.63 per month, or 1.0% of GDP per capita. There is some evidence²⁰ that people are willing to pay more if they currently don't have broadband and are really desperate for it.

The average price residents currently pay in the Park appears to be slightly lower than the UK average. This could be because certain more expensive services are not available. The survey indicates an even spread of fees that people pay, although a majority of people pay prices within the $\pounds 15$ to $\pounds 35$ bracket, the higher part of this bracket ($\pounds 25$ to $\pounds 35$) often includes telephone calls.

²⁰ Application for the LEADER LAG "Broadband Challenge Fund" in 2011.

D CURRENT IMPROVEMENTS IN CONNECTIVITY

DI Recent work in the park

DI.I Laggan

Laggan is one of the areas identified as a problem area. The exchange at Laggan uses Exchange Activate so broadband in the area serviced by this exchange is limited to 512Kbps maximum. However, the problem is compounded by the fact that a number of residents and businesses in the western most parts of the community are even too far for this service to reach and are therefore without a (reliable) broadband service. A project was started earlier this year to investigate the possibility of creating a community wireless network using a property connected to the Newtonmore exchange as a backhaul location, and provide initially speeds of up to 2Mbit/s to subscribers, with the hope that if the Newtonmore exchange is getting upgraded to faster speeds, so will the wireless network. The £80k project is 50% funded by the LEADER LAG. The rest will be private investment and in kind contributions. The community are considering improving and expanding this network further.

DI.2 Glen Tanar

After an unsuccessful bid by the Cairngorms LEADER LAG for funding from the Scottish Governments Broadband Challenge Fund, the LAG decided to fund the Glen Tanar proposal out of their own budget. As a result Glen Tanar has now been upgraded to BET, so residents and businesses in the area can get up to 2Mbit/s download speeds. This BET project has been deemed a great success, as it has now provided broadband to people who were not able to get it, or where broadband was unreliable, for a very modest per subscriber cost. The £50k project was 90% funded by the LEADER LAG, the rest was put in by the residents and businesses.

D3 BT General Roll-out of Improvements

BT have a rolling programme of improvements to services. This roll-out is largely governed by market forces and opportunity. Any new technology or service is typically first implemented where there is demand and economies of scale. Another factor in this process is the availabity of infrastructure that supports such improvements. It would, for instance, be impossible for BT to install their Infinity product where there is not enough backhaul capacity. The cost of upgrading backhaul to exchanges can be extreme and is often (combined with lack of real demand) the reason why upgrades are deemed unviable.

Some product are however more viable than others. Currently the only product that BT are in the progress of rolling out in the Park area is their 21st Century Network (21CN)

upgrade. 21CN offers up to 20 Mbit/s instead of 8. Pitlochry²¹ and Grantown on Spey are currently the only places in or near the Park that have an upgrade planned.

It is unlikely that BT's Infinity product (which requires fibre optic connections to street cabinets) is going to be available within the Park in the foreseeable future. BT are only expecting to roll this technology out in all but the largest concentrations of population.

There has been rumour that BT are also (soon) planning an upgrade of the Exchange Activate (EA) exchanges, but this could not be confirmed. The EA exchanges only offer up to 512 Kbps which does not comply with the BDUK's 2015 planned 2 Mbit/s Universal Service Commitment. There are currently five exchanges in or near the Park area that us this technology.

BT have a programme of rolling out BET technology to a number of exchanges. However, the installation requires a minimum of 15 people to commit and a substantial financial input from the community (£1195 plus VAT for installation). There is currently only one internet service provider that offers services using BET, which is Scotnet. BET is currently being rolled out in Glen Tanar (Aboyne exchange).

D4 Previous LEADER Scoping Work

Some information in this audit has been based on knowledge gathered from previous projects, one of which took place late 2010. A Broadband Challenge fund was made available by the Government to LEADER Local Action Groups, who needed to bid for an apportion of this. Although the Cairngorms LEADER LAG was not successful, the information gathered in the process had led to a renewed focus on connectivity in the Park and LEADER did provide funding for some of the community applications from their own resources.

A total of six applications were received from communities within the Park (see C2.3).

The applications were for a mix of solutions. Two communities opted for BET, which is currently being rolled out and funded by the LEADER LAG's own funds. One community, Corgarff, wanted to have their exchange upgraded from the current line concentrator to a full exchange capable of ADSL Max plus BET for the most remote connection. The situation in Corgarff has close similarities to the successful request for the upgrade of the Dinnet exchange²² to a full ADSL Max capable exchange about 4 years ago.

The rest of the communities opted for a solution involving wireless, or a combination of BET and wireless.

²¹ Although Pitlochry itself is not within the Park boundary, it is likely that a number of people or businesses that are in the Park are connected to this exchange.

²² There is no information available about this project. BT are reluctant to provide this and claim, contrary to local sources, that Corgarff doesn't have a line concentrator, but that all lines are connected directly with the Strathdon exchange. This, however, isn't supported by the information residents receive when trying to sign up for broadband. They are told that their phone numbers do not support ADSL.

E LOOKING FORWARDS

EI Potential Approaches

Because of the great diversity of local factors it is very likely that high speed broadband can only be delivered practically and cost effectively using a mix of technical solutions. Key to any approach is access to affordable backhaul. Determining where exactly this backhaul is available and where new or additional backhaul would possibly be needed is paramount. Information about the exact location of available fibre based or other backhaul capacity is regarded as commercially sensitive information and telecom providers are therefore not willing to share this information. Generally, suitable backhaul is more likely available in larger population centres. The HIE high speed broadband pilot project aims specifically to get backhaul to more remote population centres so that it can then also be used to deliver broadband to even more remote and smaller communities in their vicinity.

By and large delivery of broadband from backhaul to individual subscribers using telephone wires is the most reliable and cost effective, but has distance limitations. Currently conventional ADSL broadband has a range of about 6 Km and less if a minimum of 2 Mbit/s is to be guaranteed. This can be improved with BET technology (see below), or using wireless links, which require line of sight. For the most remote locations where even a phone line isn't available or where there isn't line of sight to any other part of a wireless network, 2 way satellites is a solution. But due to its limitations (reliability, latency, contention ratio, upload speed and relatively high cost) it should always be considered as a last resort.

Whatever the technical solution may be, the main factor that will govern this is geographical location and topography of the landscape.

EI.I Rural and remote

These are the most challenging areas to provide high speed broadband to As distances from the exchange tend to be relatively large and therefore using phone lines for delivery may not always work. Availability of backhaul is another issue. It is the rural and remote locations where currently most of the broadband problems have been identified, although it is not uncommon for people in or near towns to suffer a bad connection. The recent survey provides strong evidence that efforts must be focussed on the more isolated rural communities as a matter of priority, in addition to the upgrading of wider area exchanges with improved backhaul.

EI.2 Towns

More than half of the 15,065 connections to exchanges in the CNP area are in only 5 towns. These are Aboyne, Aviemore, Ballater, Grantown-on-Spey and Pitlochry. Although Aboyne and Pitlochry lie outside the Park boundary, they serve households and businesses in the Park Most towns in the area are fairly small in comparison with nearby towns such as those along the A90 and A96. With only a few exceptions, most of the larger towns cover a fairly small area and are as such ideal for copper based solutions as the distance to the exchange are limited. Also, a number of towns would be an ideal focal point for backhaul for more rural locations. Putting quality backhaul in these towns would be more viable than in less densely populated areas, but can then be used as a "point-of-presence" for more rural communities.

EI.3 Business hubs

There are currently around 8 industrial estates or small scale business unit hubs23 in the Park. They would be another ideal focal point for backhaul as the presence of bandwidth could potentially attract inward investment and the businesses could share the cost of such a connection, making it a viable proposition. This is especially the case if nearby communities or public sector facilities could benefit from this too by providing reliable income stream to cover part of the cost.

E2 Backhaul

It is currently not possible to find out or confirm the existence of high speed internet connection suitable for backhaul anywhere in the area. Service providers are extremely reluctant to provide this information on "commercial grounds". Where anecdotal evidence exists of the availability of fibre, there is usually the misapprehension that you can simply tap into this. However, in practice this is very rarely possible. Even if a fibre optic cable was available, i.e. not in use (often referred to as black fibre), even then a service provider may not wish to tap into this because it means that from the point where the connection is made to the fibre, the rest of it becomes unusable.

The only backhaul of which its existence is verifiable is that used for providing the ADSL services on the exchanges. These connections, however, are not expected to be sufficient once higher speed broadband is made available to the subscribers of these exchanges. It is therefore expected that for next generation high speed broadband to be possible, a substantial number of the exchange will need to get upgraded with higher capacity backhaul, which would be a benefit to the entire area. This is also the basis on which the HIE Pilot project is based. They are looking at a number of strategically placed towns in the area for upgrade to high speed broadband. The new backhaul connections needed for these services will then provide the bandwidth needed for solutions to smaller nearby communities.

E3 Potential Solutions

E3.1 Fibre to the community

This is the solution that the RSE's Digital Scotland paper advocates as the most cost effective solution. A single fibre optic connection to each community would provide more than enough capacity to provide each individual subscriber with up to 40Mbit/s (or more) delivered locally either via telephone cable solutions (using conventional ADLS, or local loop unbundling), or via community wireless solutions (providing there is line of sight).

E3.2 Fibre to the cabinet

This is a step up from Fibre to the Community and therefore considerably more expensive. It is the kind of solutions you see in continental Europe and basically means getting a single fibre cable to a group of houses using the same telephone street cabinet. This could then deliver up to 100Mbit/s to most premises via the standard telephone cables (providing the premises are within a certain distance from the street cabinet).

E3.3 Fibre to the premises

²³ Ballater, Tomintoul, Grantown-on-Spey (x2), Aviemore, Kingussie, Newtonmore, Blair Atholl.

This would be technically the most desirable solution, but also the most expensive and probably impractical. New technologies for laying fibre cables are developed all the time, so it is possible that in the future it may well become a viable option. The Angus Glens have investigated a proposition to have fibre installed as a community project, where volunteers would be used to dig in the cables locally. Even then the cost was still high, but not insurmountable. If such an approach was used for Fibre to the cabinet (or community), then this may well have some mileage, although it would depend on the availability of capable volunteers, which is not always guaranteed.

E3.4 NGB via copper

The problem with using copper telephone wires to deliver high speed broadband is that it will only go a very short distance. Although new protocols etc., have pushed the capability up, people who live 3 or more Km from the exchange will never be able to get anything much in excess of what they currently get unless new technologies, such as a high speed version of BET²⁴, become available. This means that NGB via copper is only really a viable option within a short range of the exchanges in the towns and villages, but that using copper elsewhere would then require there to be fibre to the cabinet (see above).

E3.5 Wireless networks

Wireless is already successfully used for about a decade to delivery high speed connectivity to some remote communities. Actually a considerable amount of the BT backhaul network is point to point wireless technology. Wireless doesn't have the same problems as copper telephone wires, i.e. much greater distances can be achieved without loss of bandwidth. The problem though is that the technology requires line of sight, which makes it difficult or sometimes impossible to use in areas where there is forestry or trees, or where premises are in deep valleys where there is no line of sight to any neighbouring premises. Some of these problems can be solved by using repeater stations on higher ground, or by delivering the bandwidth locally via copper (bringing in the bandwidth via wireless, but using local loop unbundling to get access to the telephone cables to a number of premises locally), providing it is available.

Because the terrain in the Park is extremely mountainous and there is a lot of forestry and in many of the most rural of the communities in the Park makes the potential use of line of sight wireless technologies problematic. Locating hilltop repeater stations may be difficult or costly. Ongoing rental charges for use of space on existing masts were shown during the Broadband Challenge Fund project to be unviable. A solution to this problem may be the aggregation of procurement of a number of small masts that could provide these vital links.

Repeater stations require power. If a remote repeater station is built (i.e. not using costly existing masts) and power is available within a mile, it has been shown during the Tegola project in the Small Isles that using an armoured power cable is the most cost effective and reliable solution to provide this.

²⁴ In Canada, BET technology is currently providing 4 Mbit/s connections in some places, twice as much as here in the UK. Source; Scotnet.

Although relatively reliable, wireless solutions require sensitive electronics to be installed in the environment, which inherently means that it is less reliable than buried copper lines or other solid state technologies such as fibre²⁵.

Cost of installation of a wireless solution is varies (depending on availability of backhaul, etc.) and is in the range of \pounds 700 to \pounds 4000 per subscriber (per community).

E3.6 BET

BET or Broadband Enabling Technology is a relatively new technology that increases the distance a normal ADSL signal can travel through telephone lines. It extends the range from about 6km to 12Km, although greater distances have been achieved (depends on quality of the line). In the UK BET is available since the beginning of this year, but little interest has been shown by service providers. They feel the technology doesn't deliver enough bandwidth (currently up to 2Mbit/s) and would only be a solution to communities that are currently too far from the exchange. In the greater scheme of things the number of people in this category is extremely small (although statistically considerably higher in the CNP area) and it is therefore not worth the service providers while. Currently only Scotnet provides the service.

In Canada much higher speeds have been achieved with BET (at least 4Mbit/s) and there is even talk of much higher speeds (36Mbit/s).

BET is a very simple technology to install and very reliable. It requires the installation of equipment in the exchange and then also in roadside cabinets halfway between the exchange and the subscribers and also at premises. BET currently has a fixed price of $\pounds 1195$ (plus VAT) per subscriber.

Although 2Mbit/s may not sound much, for those people that have now been without broadband for nearly a decade since it first appeared, 2Mbit/s would be a very significant improvement and could mean the difference of being in business or not. BET has been installed in Glen Tanar and people are very positive about its performance. BET should be considered as an excellent candidate technology for delivering broadband to those people who currently do not get any broadband, or nothing near 2Mbit/s.

E3.7 Two Way Satellite Broadband

This is very much a last resort solution. A combination of technical factors and a less than acceptable track record for reliability and customer support make this technology one that should probably be avoided unless there is absolutely no other way of delivering broadband to a certain location. This could for instance be where there are premises that are many miles away from any other premises, i.e. where there may not be any telephone line, line of sight or even mains power.

²⁵ A further consideration that may require careful management is the potential public perception of risk associated with wireless technology and the potential location of masts close to homes and schools.

The technical problems stem from the fact that the system relies on a 2 radio connection between the subscriber and a geostationary satellite (at least 22,000 miles distant). This causes a long delay (latency), and communication outages due to bad reception (weather and atmospheric conditions). Also, satellite technology is very expensive, the delivery of satellites runs in the millions of pounds. Therefore for a service provider to make it viable bandwidth has to be shared with a large number of people, otherwise the monthly costs wold become prohibitive. Even then a comparable satellite broadband service remains expensive. Those solutions that are in a similar price range of that of ADSL tend to perform especially poorly, with speeds of only around 512kbps (and often much less) down and usually not more (and often much less) than 128Kbps up. These technical limitations inadvertently mean that satellite broadband is only really usable for basic browsing and non-demanding email traffic. Anything beyond that and the system becomes either too slow, or not useable.

APPENDIX A

Cairngorms National Park showing Local Authority boundaries and locations of exchanges and public services.



APPENDIX B

Cairngorms National Park showing locations of large businesses and industrial estates/business parks.



APPENDIX C

Cairngorms National Park showing locations of areas with known broadband problems



APPENDIX D

Overview of exchanges in and near the CNP

						Known problem
Exhange	Code	Postcode	Туре	Res	Non-res	areas
Aboyne*	NSABO	AB345HU	BET	1470	102	Glen Tanar
Advie**	NSADV	PH263LP	EA	76	2	
Aviemore	NSAVI	PH221RW	Max	1702	127	
Ballater	NSBLT	AB355GJ	Max	1085	92	Gairnshiel
Blair Atholl	ESBLA	PH185SG	Max	304	26	
Boat of Garten	NSBOG	PH243BL	Max	427	22	
Braemar	NSBMR	AB355YL	Max	364	42	Marr Lodge
Cairngorm	NSCGM	PH221QH	EA	25	9	Cairngorm Mountain
Calvine*	ESCLV	PH185UA	Max	93	12	
Carrbridge	NSCRB	PH233AQ	Max	337	25	
Clova*	ESCLO	DD84QR	EA	42	2	Glen Clova
Crathie	NSCTI	AB355UL	Max	155	10	
Dalwhinnie	NSDWH	PH191AB	Max	64	10	
Dinnet***			Max			
Dulnain Bridge	NSDUL	PH263LT	Max	213	14	
Glenkindie*	NSGKD	AB338SS	Max	145	6	
Glenlivet*	NSGLV	AB379BT	Max	319	32	Glenlivet
Glenshee	ESGSH	PH107QD	EA	42	7	
Grantow-on-spey	NSGOS	PH263JJ	Max	1497	145	Cromdale
Kincraig	NSKCG	PH211QD	Max	240	22	
Kingussie	NSKGS	PH211HN	Max	814	63	
Laggan	NSLAG	PH201AN	EA	141	13	Laggan
Nethy Bridge	NSNET	PH253DA	Max	480	22	
Newtonmore	NSNMR	PH201DH	Max	653	44	
Pitlochry	ESPIT	PH165BZ	21CN	1709	226	
						Corgarff and
Strathdon	NSSDN	AB368UL	Max	280	17	Glenbuchat
Tarfside*	ESTAR	DD97YU	Max	68	7	
Tarland*	NSTLD	AB344TX	Max	667	42	
Tomintoul	NSTTL	AB379ET	Max	270	36	
Cortachy**	ESCOY	DD84QL	Max	187	19	Glen Prosen
				13869	1196	

*These coverage of these exchanges reach

beyond the CNP area

** Uncertain if there are any connections to properties within

CNP boundaries

***Status of this exchanges is unkown

EA exchange information not 100 reliable and requires some input

key exchanges for high speed backhaul NG network

Res: number of residential connections

Non-res: number of non-residential connections

APPENDIX E

DIGITAL CONNECTIVITY SURVEY - SUMMARY OF KEY FINDINGS

An online survey was conducted between November 2011 and January 2012 to assess current digital connectivity provision across the Cairngorms National Park.

The full survey results are available online at <u>http://www.cairngorms.co.uk/live-work/digital-</u> <u>connectivity</u>. Key findings from the survey are as follows:

General

- 634 responses were received, with 201 from businesses.
- 64% of respondents use a residential type of broadband
- Of all respondents, 6.1% do not have broadband (because they don't need it or find it too expensive), or still use dialup. 15.3% use 3G mobile technology to access the internet

Business

- 36% of respondents to the survey say that they use a business type broadband service
- 57% of business respondents claimed that their current broadband facilities restricts their business in one way or another, whereas 55% of all respondents find that it generally restricts the way they use the internet.

Education

- 47% of respondents (including businesses) say that they use their broadband connection for education, such as undertaking research for assignments, participating in online learning or tutorials or a distance learning course.
- Only 51% of respondents find that their current broadband provision provides them with their requirements for education.

Mobile Communications

- 20% of all respondents said they have no mobile coverage at all in their home or business
- 39% of all respondents said they have a signal of only 1 or 2 bars (out of 5) in their premises (37% generally in the area).
- More than three quarters of respondents in the survey claimed that 3G coverage is either poor or non-existent. Half of all respondents claim they have no service at home or in their office. Only about 7.8% find that their service at home or in the office is good or very good and this drops to 6.7% for people who are using it generally within the Park.

Speed

- The average download speed given by 307 respondents is 3.46 Mbit/s, which is only 29% of the UK average (11.81 Mbit/s²⁶ for the UK, 9.79 Mbit/s worldwide).
- The average upload speed given by 300 respondents was 0.38 Mbit/s, which is only 20% of the UK average (1.95 Mbit/s for the UK and 3.60 Mbit/s worldwide).
- 39% of all respondents currently receive a service that <u>does not</u> meet BDUKs²⁷ planned 2015 universal service commitment of 2 Mbit/s. This is substantially more than the average figures for each of the local authorities in the Park (for example, 17.2% in Highland) and higher than in any local authority in the UK (Fermanagh is the highest in the UK at 33% whilst in Scotland the highest is 28% in Clackmannanshire)²⁸.
- About half of all respondents have a service of about 3 Mbit/s.
- The acceptable range for a majority of people appears to be 4 Mbit/s or better, which currently only 44% of respondents in the Park can get.

Reliability

• Only 7% of the respondents find that their service is very reliable. 56% find that the speed varies, but the connection never drops. 32% claim that their service not only varies in speed, but also regularly drops out altogether. 4.5% report very unreliable services.

Pricing

• The average price residents currently pay in the Park appears to be slightly lower than the UK average. This could be because certain more expensive superfast services are not available. The survey indicates an even spread of fees that people pay, although a majority of people pay prices within the £15 to £35 bracket, the higher part of this bracket (£25 to £35) often includes telephone calls.

²⁶ Source: Net Index by Ookla (<u>www.netindex.com</u>). This information was correct at the time of compilation of this report, and increases on a daily basis. Ofcom have also conducted research and published their own report: Communications Infrastructure Report 2011 (<u>http://maps.ofcom.org.uk/broadband/index.html</u>). They quote an average synch speed of 7.6 Mbit/s for Scotland. However, this does not include superfast broadband and sync speed is different from actual download speed and therefore not 100% comparable with data from the survey.

 ²⁷ Broadband Delivery UK, the UK Government's delivery vehicle to stimulate private sector investment.
 ²⁸ Source: Ofcom Communications Infrastructure Report 2011

^{(&}lt;u>http://maps.ofcom.org.uk/broadband/index.html</u>). The Ofcom data for this measure has been corrected to reflect actual download speeds (2.2 Mbit/s sync speed), so can be used as a comparison. Naturally this excludes superfast broadband connections.