Broadband in Balquhidder

Version 7.1, 8 March 2013

Background

Balquhidder, in common with much of rural Scotland, suffers from an antiquated and unreliable telecommunications infrastructure. This, plus an overall lack of capacity and the distance from the nearest exchange, means that much of the area cannot get modern (or frequently any) broadband provision, with no effective alternative for most homes and businesses.

This is a Market 1 area, with neither LLU services nor any third party to provide an alternative to the BT infrastructure. Previous initiatives to improve local broadband have been frustrated by both the lack of a coherent approach from the Scottish Government and by a historical lack of co-operation from BT, including a failure to release information required to inform community-driven initiatives.

Scottish Government policies now laudably aim at providing 'next-generation' broadband services by 2020, with 'significant progress' by 2015. For Balquhidder's businesses and its community to develop and thrive, a critical enabler is access to such online services and for access to those services to be pervasive across the local geography. Local businesses are already incurring significant costs, having to forgo development opportunities or even move outwith the area altogether due to the poor quality of the local infrastructure.

As well as local progress with the costing, selection and provision of effective broadband services in and around Balquhidder, we are now engaging with two public enabling initiatives: Community Broadband Scotland and Step Change 2015 – the latter via Stirling Council. This initiative is supported by local businesses and Balquhidder's Community Council.

This Document

This paper outlines the state of broadband provision in Balquhidder and the level of demand for services (updated from a comprehensive 2007 carried out by local resident Catriona Oldham). It also summarises the geographical and infrastructure issues specific to the area.

Balquhidder and its Broadband

Balquhidder is the principal glen in an area approximately 12 miles North of Callander, in Loch Lomond and Trossachs National Park. For the purposes of this document, it includes Kingshouse at its Eastern extent (from which the single track access road to Balquhidder exits the A84), Inverlochlarig to the West, Ballimore Glen to the South and Kirkton Glen to the North.

Balquhidder's permanent population is approximately 250, excluding holiday visitors. There are approximately 28 children of school age (as of July 2012 and up from three in the early 1990s) and more than seventy businesses operate locally, including a number of farms and farm-related enterprises, the

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Monachyle Mhor and Mhor 84 hotels, Highland Marketing, Hidden Glen Safaris, The Do Lab Ltd and a wide range of leisure and tourism enterprises.

Balquhidder does not have its own telephone exchange or distribution cabinet, with all lines coming from the Strathyre exchange, some 4.5 miles from Balquhidder village. The current local copper infrastructure is both extremely unreliable and seriously constrained in capacity. BT spent a rumoured £160,000 in 2007 to install conduit much of the way from Strathyre to Balquhidder but only installed additional copper line capacity – whilst making future upgrades easier, this made no difference to the quality of broadband provision. The Strathyre Exchange itself was originally scheduled for upgrade to BT's 21CN[1] platform in 2010. As of January 2013, there is still no sign of this happening and there is now no published schedule for the upgrade. There are no local LLU[2] services, leaving BT as the monopoly physical infrastructure provider.

Broadband History

ADSL services are available from the Strathyre exchange to part of the glen, those areas closest to the Strathyre end of the line achieving a maximum of 2-3Mbps, albeit with frequent disruptions to service. Much of the area is however outwith the reach of ADSL altogether.

A few properties use satellite (either two-way VSAT[3] or one-way + POTS[4] back channel), but these services are expensive (even where subsidised under an earlier Scottish Government initiative), are heavily constrained in bandwidth and inaccessible to many properties due to terrain obstruction. The latency and architecture of satellite-based systems also renders them unsuitable for many secure, real-time and interactive online services. Reliability is problematic, due to signal dropout whenever it rains or snows, both of which have been known in the area.

Several attempts have been made over a number of years to establish a solid, reliable and modern broadband infrastructure. The need for this is now absolutely critical, with local businesses incurring heavy costs, having to forego new opportunities and even having to move their operations out of the area altogether. Balquhidder is a diverse, cohesive and dynamic community but its continued viability will increasingly be predicated on the availability of effective communication for business, education and domestic use. This is critical now but will become even more important over the next few years as the drivers of economic activity in Scotland increasingly move from the public sector to SMEs.

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[1] BT's planned upgrade of its network to use Internet-based technologies

[2] Local Loop Unbundling – service operators who compete with BT.

[3] Very Small Aperture Terminal – one or two-way satellite service.

[4] Plain Old Telephone System – analogue telephone services.

Case Studies

Relatively few people in Balquhidder commute to salaried jobs: many work from home or run their own businesses, hence the high number of locally-based companies relative to the permanent population. Many more would however wish to work from home if the infrastructure permitted. Nor it is not possible to directly quantify the numbers of people and businesses who do not locate in the area due to inadequate infrastructure. Most local businesses can relate similar stories of constrained development, incurred costs and opportunities missed – two examples in different sectors are:

Monachyle Mhor

The Monachyle Mhor is an internationally renowned boutique hotel, restaurant and farm and an important local employer. It operates its own high-quality web site, an online booking system and needs to use online services extensively for ordering, communicating with clients and providing connectivity to guests of the hotel. Tom Lewis, owner of the Monachyle and its associated businesses , has estimated that the direct cost to the business of trying to compensate for poor local connectivity is at least the equivalent of one full-time member of staff. That however still ignores the indirect costs of being unable to provide the full range of communication services that are taken for granted by its target market. The Mhor group has now taken over the Kingshouse hotel in the glen, adding further pressure to the need for effective broadband.

The Do Lab

The Do Lab Ltd (TDL) is a innovation incubator in internet, television and social media technologies. Founded by several leading figures in the Internet, broadcast and mobile industries, including local entrepreneurs Richard Harris and Jonathan Marshall, TDL develops new ideas to commercial viability, then spins them out or sells them on to industry partners. Its most recent product, Connect TV, is revolutionising the television broadcast industry and, in 2011-12, its first year of operation, it generated £6m in contracts. The original business plan was to operate only a sales office in London, with research and development being carried out locally, in Balquhidder and Bridge of Allan. Unfortunately, due to the inadequate local infrastructure, Connect TV was forced to move nearly all its operations to London, with very little economic activity therefore being generated locally. TDL's next generation of products is now under development and, unless local services improve dramatically, the same is likely to happen again.

Developing Balquhidder's Infrastructure

Participants

A so far informal working group has been exploring the options and costs of providing Balquhidder with effective modern broadband. This group currently includes:

- Balquhidder Community Council
- Councillor Alycia Hayes
- Tom Lewis, Monachyle Mhor: Business user and local resident.
- Richard Harris, The Do Lab Ltd: Business user and Internet Consultant, local resident.
- Fearghas McKay: Business User and Networking expertise, local resident.

Goal

Our goal is to provide the whole Balquhidder area with effective, pervasive and progressively upgradeable broadband infrastructure, delivering bandwidth that is globally competitive. This could be delivered by one or (most likely) several local loop technologies. We assume that the local loop can be delivered from a a locally located node which in turn has an effective backhaul into the BT backbone.

Canvassing of the local community has demonstrated a consistent demand for broadband by those who currently cannot receive it and a similarly widespread dissatisfaction with the quality of BT's service by those who do currently have broadband, whichever internet service provider they actually use atop the BT infrastructure.

The migration of the Strathyre exchange to BT's 21CN network (as and when that happens) is unlikely to make a great deal of difference to attainable local speeds and BT's historically monopolistic pricing model for Tier 2/3 (unbundled rural) exchanges is likely to seriously inhibit the potential for competitive provision of network services, meaning that areas such as Balquhidder are likely to fall ever further behind the median of presumed service used by online service providers in the design and delivery of their services. And the further behind we fall, the fewer services we will be able to access.

Technical Considerations

Initial studies suggest that the most cost-effective balance between immediate provision and future development will be achieved by a hybrid solution, for which there are three key elements:

1. Provision of fibre to a central location in the area, providing backhaul to a demarcation point with BT's network, effectively providing a DSLAM within the village. Whether that point is a BT cabinet or a privately funded facility is under investigation. Thereafter, local loop can be provided by:
2. Provision of fibre or copper to those properties for which it is cost-effective.
3. Use of NGW (next-generation wireless) to provide connectivity to remoter properties and to mobile users. Examples include Wireless Internet Service Provision (WISP) products such as Ubiquiti or a standards-based LTE (4G) infrastructure providing point-to-point (PTP) connections within the area.

These are working assumptions only - one of our first requirements is to commission a proper geotechnical feasibility study to provide a baseline for our options. The exact technologies then chosen will depend on the cost-effectiveness of the available solutions, definition of a viable architecture and the ability to link to the nearest appropriate BT (or other) demarcation point.

Next Steps

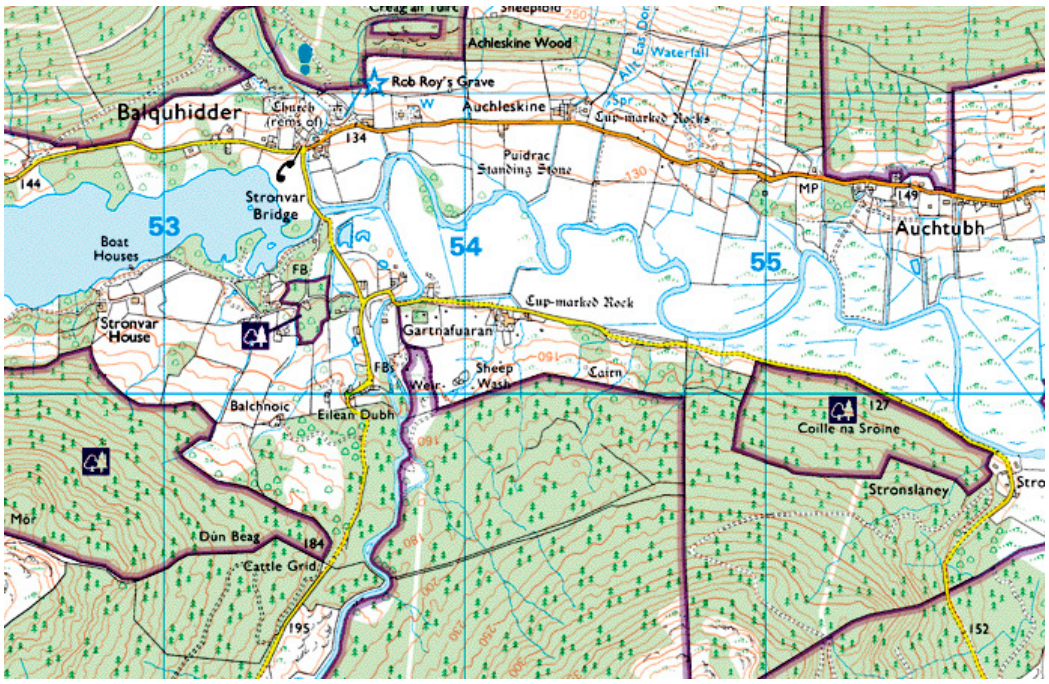
We're now at the stage where effort needs to be put into:

- A technical survey of the glen to validate network topology and develop technical options.
- Agreement and constitution of the community body needed to create and run such a network.
- Creation of a business plan for the initial capital cost and long-term provision of a service.
- Design and costing of the technology and services needed.
- Investigation of any necessary way leaves and other permissions, specifically related to our being in the National Park.
- Seeking funding for the initial development and running of the service.

We need to further canvas commitment from householders and businesses in the community (as opposed to the informal approaches that have been made so far) and to work out how we would constitute a community enterprise to manage the system. Approaches also need to be made to potential funding bodies to see how far we can offset the cost of design, implementation and running of the service.

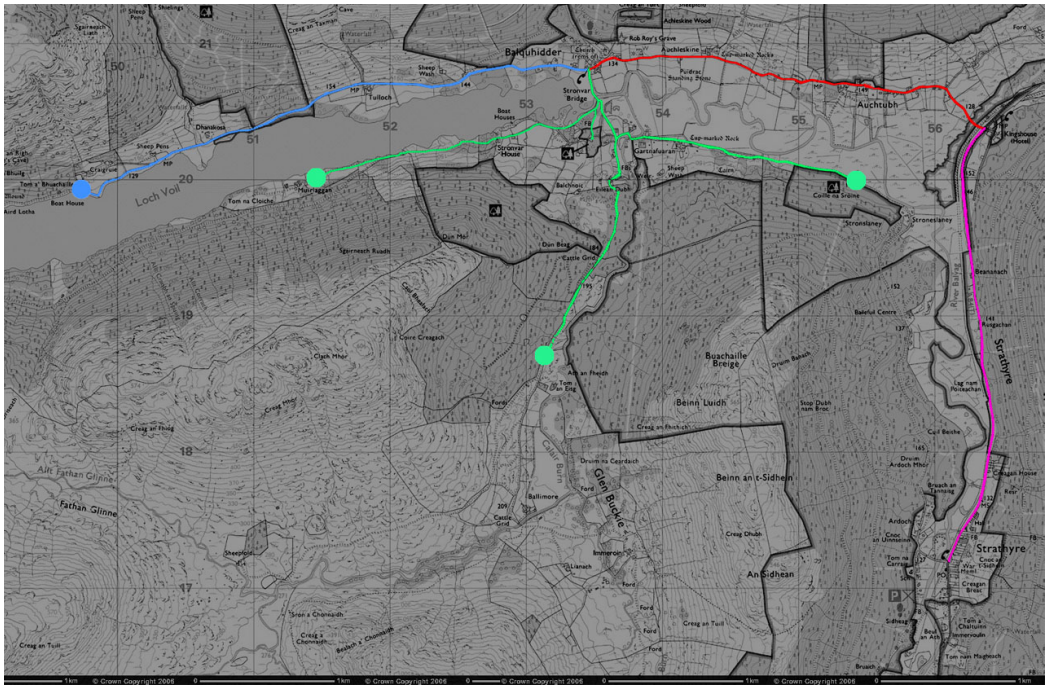
Given the existence locally of the Community Council and Community Trust, it would be plausible for a locally-constituted body to manage and bill for the service – this may also assuage any possible concerns about competitive pricing and community focus of the service. The alternative of contracting out these services is also worth considering – the balance between the two would depend on the nature of the contract and Service Level Agreement (SLA) that was negotiated.

Annex 1: Current Broadband Availability



Map 1: Central Area of Balquhidder

Setting aside the specific local issues outlined below, the fundamental limitation on broadband availability is the distance from the exchange factored by the quality and gauge of the conductors used in the cabling. In Balquhidder itself, there are three roads to consider for the route of the BT cables that diverge from the Village Hall. These are the Stronslaney Road, the Ballimore Road and the road West along the the North side of Loch Voil, as seen in Map 1 (above). Note that this map only shows the central area of Balquhidder itself and not the remainder of the Glen or adjacent glens which are served by the same infrastructure.



Map 2: Theoretical ADSL limits in Balquhidder (Central area only - remainder has no coverage)

Map 2 (above) now shows the very approximate limits of current broadband provision of any kind in the glen. Note that this simply refers to the theoretical ability to establish a connection of any kind and says nothing about achievable throughput or reliability of the infrastructure, both of which are very poor.

Here, purple shows the main cable route from the exchange at Strathyre, red the feed from Kingshouse to Balquhidder, blue the approximate limits of broadband provision over the 0.9mm cable along the North side of Loch Voil and green the same for provision over the 0.5mm cable on the South side of the loch and towards Stronslaney and Ballimore. Range over the cable with smaller-section conductors is less. BT have provided reference points for the limits of broadband availability along the North and South sides of Loch Voil, these being to approximately Grid Reference **NN498199** on the North side (Craigruie) and **NN514199** on the South side, just short of the property at Muirlaggan. These are only very indicative and any property anywhere near the notional limit can only be assessed on survey. Recent (2012) tests suggest that the effective limit of reach on the North of the Loch is at Dhanakosa, more than a kilometre short of the theoretical limit.

Applying approximately the same range constraints to the Stronslaney and Ballimore roads, and working from the village hall as the splitting point for the line to the South of Loch Voil, it appears that the approximate limit of broadband availability is at Grid Reference **NN555199** along the Stronslaney Road and at **NN532186** on the Ballimore Road. These are also shown on Map 2. Please note that, in all cases, these limits indicate the absolute limit of

range, at which performance of no better than 256-512Kbps could be expected.

Access & Performance

Using the cutoff points set out above means that there are currently a total of 24 properties in the glen which will not be able to receive broadband at all: 20 on the North side (including those properties on the South side who receive their phone line across the loch from the North); 1 on the South side; and 3 on the road to Ballimore. On the Stronslaney road, Stronslaney Farm itself has a broadband connection provided by a direct line across the glen to the main cable on the A84.

In addition to these, it is worth noting that the vast majority of properties in the glen will receive, at a maximum, between 1-2Mbps connectivity, with many below 1Mbps, due to the distance from the exchange – below the level needed to support modern internet services such as VOIP and video.

Annex 2: Demand and Supply

Working from existing line numbers, from known current developments and from a survey of properties in the glen (residential and business) carried out by the Balquhidder Community Council, a conservative estimate of likely demand includes (2007 figures):

- A minimum demand of 150 lines (including voice & broadband)
- Approximately 29 properties in the glen currently have broadband of any kind, of whom 12 regard their connection performance as 'poor'. No property above the church on the outskirts of Balquhidder village has a good quality or grade of connection.
- 54 properties in the glen who have responded want or possibly want a broadband connection (45:9). Of these, 3 are currently connected by satellite – all of whom wish to move to a terrestrial solution. This number does not include 11 new build properties either in progress or planned.
- There is a significant requirement for mobile use by remote workers on the hillsides. This cannot currently be satisfied as neither local mobile network covers the reaches of the Glen and neither provides even 2G data services locally.

Document Information

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About the author: Richard Harris is a Balquhidder-based technology, media and business strategist and entrepreneur. He has been an Internet researcher and pioneer since 1979, working with organisations such as Apple, Intel, AT&T and the BBC as well as founding a number of successful start-ups.