



Broadband for the Rural North Ltd

WWW.B4RN.ORG.UK



Business Plan

V5.2

Author - Barry Forde

B.Forde@b4rn.org.uk

Contents

1. Executive Summary	3
2. Background	5
3. Project Proposal	7
3.1 People	10
4. Network Design	13
5. Project Costs	20
5.1 CAPEX	20
5.2 OPEX	20
5.3 Capital Repayment	21
6. Project Funding	22
6.1 Shares	22
6.1.1 Enterprise Investment Scheme	23
6.2 Connection fee and service charges	23
6.3 Additional Services	24
6.3.1 Telephony	24
6.3.2 Leased Line Services	25
6.3.3 Security Services	25
6.3.4 Innovative Services	25
6.4 Grant Funding	26
6.5 Funding summary	26
7. Project Progress	27
Appendix 1 – Budget spreadsheet	29
Appendix 2 – Coverage Post Codes	31

1. Executive Summary

Most rural areas in the UK suffer from poor broadband. This is down to the long line lengths between properties and their serving telephone exchanges. Upgrading the network to provide Next Generation Broadband (NGA) will be time consuming and very expensive. Given the financial constraints that the telecommunication industry finds itself in, it's unlikely that rural areas will receive the necessary investment in the foreseeable future if they are left to their own devices.

BT has committed £2.5B of investment to upgrade the infrastructure serving up to 60% of the UK population to provide up to 80Mbs service, their much publicised "Infinity" product. In conjunction with Virgin Media's network this means that urban dwellers will in general have access to at least one provider of NGA service offering 30Mbs or better download speeds.

The UK government recognises that stopping at 60% is unacceptable both socially and economically and is making additional funding available to help lift high speed broadband coverage to 90% of the UK population. So far it has made £530M available from the BBC Licence fee and has also established Broadband Delivery UK (BDUK) team within DCMS to manage this process.

The remaining 10% of the population is in the deeply rural areas and is considered too expensive to be included in the super fast broadband target of 30Mbs or greater. Instead the government has stated that it is their intention that suppliers should deliver at least 2Mbs to this group BUT it isn't a legally binding requirement, merely an ambition.

Over rural distances existing copper cables cannot physically supply reliable high speed service. Due to propagation issues and spectrum limitations neither can satellite or 3G/4G/LTE mobile broadband deliver genuine NGA service. To ensure that the rural communities attain a true high speed broadband which is future proofed – installed once and capable of all known future speed requirements for decades ahead - the only answer is to lay fibre optic cables all the way to the property. This is known as Fibre to the Home (FTTH). Given the lack of any existing telecommunications company showing any inclination to upgrade our area to FTTH we decided to do the job ourselves. The original service area was set to cover 8 full parishes plus parts of another two amounting to around 235Km² containing 1450 properties. Estimated build cost was £1.723M.

B4RN's purpose is to undertake the supply, installation and operation of a full FTTH network providing a fibre link directly into every property in its service area. It works on a parish by parish basis and aims to deliver both technical excellence and 100% inclusivity within those targeted parishes. No exclusions because a property is too far away or too difficult to reach – it will be available to everyone. This is world class broadband offering 1Gbs (1000 megabits a second) service speeds and will jump our rural community from the slow lane to the leading edge of technology and keep it there for decades to come. In addition, FTTH is a fundamentally reliable technology. This dramatic increase in speed and reliability will allow, in addition to the basic broadband service, alarm system monitoring, remote CCTV, high quality VoIP telephone services (ceasing existing land line charges whilst retaining existing numbers) and down the line supply of HD television which will change substantially over the coming years with the emergence of YouView broadcast services, on- demand TV and of course 3-D. Even the emerging Ultra HD (4K) and its successor 8K can be handled with ease on the B4RN network.

As a community company, the project will be funded, and to a great extent built, by the community for the community. Our ambition is to keep expenditure, where possible, within the community. In addition to purchasing shares, the community will have the opportunity to earn equity by putting in effort.

Broadband for the Rural North Ltd (B4RN) was setup as a not for profit social enterprise rather than as a standard limited company to reflect its commitment to the community rather than any profit

motive. It was registered as a Community Benefit Society within the Industrial and Provident Societies Act 1965 (IPS) on 15th August 2011, and is regulated by the Financial Services Authority.

It was established in a form ready to issue shares to generate the investment needed to deliver the project. The first share issue of up to £2M was launched on the 14th December 2011 and was constructed to ensure it complied with the Enterprise Investment Scheme (EIS) established by HMRC to encourage individual share holdings in new, and therefore riskier, start-up companies. Under normal circumstances investors, who are also tax payers, can reclaim 30% of the value of shares purchased via a tax refund. Investments between the minimum set by HMRC of £500, and the maximum individual permitted investment in a community benefit society set by the FSA of £20000, is eligible for the EIS tax relief.

To encourage investment we offered an incentive of a free connection and 12 months free service for those taking at least £1500 worth of shares either via the cash or effort routes. This share issue has raised £500K so far but the final figure will climb as the build out progresses. This is because many farmers and landowners have opted to invest via effort rather than cash, taking shares as payment for work done, such as digging the ducts to take the fibre. However much of the work has been delayed by the awful weather of 2012 and has yet to be done. We anticipate at least another £250K will be realised over the coming months as they catch up.

Once the original project got under way there was a massive amount of interest and many groups from adjacent parishes became active and wanted to be included. Where sufficient interest has been shown we have added these to the service area which has now grown to 21 parishes covering 420Km² and containing 3200 properties. The cost has climbed to £3.5M so a second share offer of £3,000,000 has now been started

Given that the risks associated with investing have significantly reduced the terms for this second issue have been changed. The EIS tax relief is still in place and for those investing £1500 or more there will still be a free connection but the 12 months free service has been withdrawn.

The project timeline has also been changed to accommodate the increased work needed and we are now aiming to complete the build out by the end of 2014.

The core operating costs, excluding staffing, for the B4RN network is £90K/pa. At 300 paying connections we can cover this from income and become self sustaining. However this assumes that all labour will continue to be provided by volunteers without charge or by them accepting shares in lieu of cash payments. Clearly this cannot be sustained for long before volunteer fatigue sets in so above 300 connections the free income will be used to take on paid staff. We estimate that we will need 5 or 6 full time equivalent staff to operate the network and this will cost £210K/pa. Once we reach 1000 homes connected, generating £300K/pa, we can cover both core costs and staffing costs. The free income from connections over the first 1000 will be put into a sinking fund to pay the 5% dividend and also allow investors to withdraw their shares if they so desire

A very conservative 50% take up gives 1600 connections yielding £480K/pa which will allow for core costs and staffing and leave £180Ka to pay dividends and cover withdrawals. So far our take up rate on the first routes built is in excess of 65% with some routes hitting over 90%. We are therefore very confident that a much higher take up rate than the 50% used for budgetary purposes will be achieved and we will have sufficient income to pay down the shareholders in 10 years.

2. Background

The provision of good quality broadband to properties in the rural areas of the UK has been a long standing problem. Current technology that uses existing copper phone lines has both range and speed limitations leaving many rural properties unable to access service at above the basic minimum speed of 512Kbs. There are also many properties which cannot get any service at all due to their excessive distance or the quality of the line from the telephone exchange.

The Government has made a commitment, the “Universal Service Commitment” (USC) which states that all properties in the UK will get a minimum of 2Mbps broadband service by 2015. They also wish the UK to be at the leading edge of broadband across the EU by the same date. To do this means not only delivering the USC but ensuring a substantial percentage of the population will get Next Generation Broadband (NGB) which is generally considered to be 100Mbps upwards. However the definition of NGB tends to get shifted depending on who is making it and how it's to be paid for. Broadband Delivery UK (BDUK) define Super Fast Broadband as 24Mbps upwards which seems to be about the lowest level envisaged. Most other organisations set the lower limit at 50Mbps upwards. However it must be remembered that these are usually asymmetrical with much lower upload than download speeds. For current broadband applications this is not too important but for next generation applications upload speed will become progressively more critical. Cloud applications for instance need you to be able to not just download files but upload them too, so both directions need high speed. The Government believes that two thirds of the population will get NGB via standard commercial operators who can make a business case to invest in the required infrastructure.

The Government established BDUK was tasked with ensuring that all properties will get at least the USC by 2015. It has been allocated £530M initially with another £300M proposed for the following three years from 2015-2018. It intends to use this money to not only achieve the USC 2Mbps but wherever possible NGB as well. However due to the geographical realities, getting more than USC to the deeply rural areas is a huge challenge and the funding available to them is unlikely to be sufficient. In all probability, without some novel approaches and/or substantial additional investment, the last 10-20% will get no more than the USC. B4RN's interest lies in helping solve this problem in the rural parts of the North of England where many properties fall into the last 20% category.

BT is in the process of spending £2.5B to upgrade its network and offer higher speeds than the existing 8Mbps service. It is doing this by taking the existing ADSL2 equipment in exchanges up to ADSL2+ standard which can offer up to 24Mbps. Unfortunately the rural properties which are currently in bad service areas will not benefit at all from this upgrade as the long line lengths will still limit service to no more than that currently available. If someone is lucky enough to be getting close to the 8Mbps upper limit of ADSL2 now, then they may get an increase in speed. Those getting less than 8Mbps will see either marginal increases or none at all.

BT's second method of upgrading their network is known as FTTC or Fibre to the Cabinet. Here they run fibre from exchanges out to street cabinets and then run VDSL2 from there to properties over the existing copper circuits. The fibre part of the network can be run at very high speeds and because the copper section has been reduced in length it should be possible to increase the speed offered over it. However to achieve this increased speed there has to be a suitably located cabinet to upgrade and in many rural locations the cabinet is still too far from the property to sustain the higher speeds. The final option being used by BT is known as Fibre to the Property (FTTP) and this requires new fibre to be laid the whole way from the exchange to the property without falling back onto copper along the route. This is very costly to BT and hence very little FTTP has been scheduled so far, although BT do say that one third of the investment in NGB will be FTTP with the remainder being FTTC. The general consensus is that the FTTP rollout will be restricted to more urbanised areas where it is possible to make a business case for deploying it to commercial rather than domestic premises.

With a limited budget BT is going to concentrate on upgrading those exchanges with high user counts which will give a better ROI than smaller ones. With BDUK support it is expected that the proportion of the population which will get FTTC upgrades will increase from 60% to around 85%, possibly 90% as some of these smaller exchanges get upgrades. However this still leaves around 10% of properties unable to get high speed broadband. Alternative broadband providers such as Virgin Media and new entrant Fujitsu will also be focused on the more profitable areas in the same way that BT will. It is therefore quite likely that within the 60% zone one or more companies will fight for market share but if you live in the last 10% there's not only no competition but no service either. The only way that rural properties are going to get true Next Generation Broadband (NGB) is by laying fibre all the way out to them. This is a costly process, the Broadband Stakeholders Group (BSG) report quoted figures from Analysis Mason of over £10,000 per property to service deeply rural properties. Neither BT nor the cable companies can make any commercial case to invest these sums. The BDUK subsidy will amount to between £100 and £250 per property. Even with other public sector support in the way of anchor tenants and aggregation of services the subsidy on offer will only extend service to a limited number of additional properties. It is generally agreed that the last 10% are going to have to live with a mixture of basic asymmetrical 2Mbs service via copper, 10Mbs via satellite or possibly LTE/4G mobile service coverage which will also be of limited speed and availability. The rural population will remain disadvantaged and unable to access existing and emerging services dependant on NGB.

Having spent £830M the government will be reluctant to provide more funding as they are likely to feel they have already done their bit. The options for rural communities will be to do nothing and live with the consequences, or as, B4RN is proposing, to solve the problem with a true NGB solution by mobilising both the ingenuity and resources of the local community.

Martha Lane-Fox, the Government's UK Digital Champion published a document "Manifesto for a networked Nation"¹ in July 2010 which gives some useful insights on the effects of exclusion from the Internet.

- *The economic and social case for a networked nation is overwhelming. Access to the internet can create benefits through higher educational attainment for children, access to employment opportunities for workless adults, improved standards of living for older people and increased democratic engagement and access to information. Furthermore, it can provide a lifeline from social isolation for the 3.1m people in the UK aged over 65 who go longer than a week without seeing a friend, neighbour or family member.*
- *PwC estimates that the total economic benefits of getting everyone in the UK online is in excess of £22bn*
- *Offline households are missing out on average consumer savings of £560 per year*
- *If the 1.6 million children who live in families without the internet got online at home, it could boost their total lifetime earnings by over £10bn.*
- *If just 3½% of unemployed non-internet users found a job by getting online it would deliver a net economic benefit of £560m.*
- *People with good ICT skills earn between 3% and 10% more than people without such skills. If every non-internet user in employment got online, each of them could increase their earnings by an average of over £8,300 in their lifetime and deliver between £560m and £1,680m of overall economic benefit.*
- *Each contact and transaction with government switched online could generate savings of between £3.30 and £12. There are an estimated 1.8 billion contacts with public services every year of which only about 20% are online.*
- *If all offline adults began using the internet and made just one online contact each month with government instead of a telephone or face-to-face contact it would save an estimated £900m per annum*

¹ http://raceonline2012.org/sites/default/files/resources/manifesto_text_version.pdf

3. Project Proposal

Laying new fibre optic cables all the way to remote rural properties is an expensive exercise. The headline figure per property quoted by the BSG in their report² is £10k per property. However the costs can be reduced to around £1.1K per property if a different ownership, funding and operating model is used instead of that traditionally deployed by the telecommunications industry.. Whilst still a lot of money, it is affordable; especially if we take advantage of tax breaks and government grants.

The majority of the cost of the fibre laying is for digging trenches, installing duct and fibre and then making good. Traditionally telecommunications companies have used their code powers and installed duct under the highway or associated verges. This is expensive for several reasons not least the high costs associated with complying with health and safety and the street works act along with needing to reinstate tarmac and road signage. From their point of view this is a manageable process as issues around access and wayleaves are solved for them without having to negotiate with hundreds of landlords and regulatory bodies. Openreach publish a tariff of what they term Excess Construction Charges (ECC) which sets out what they would charge a third party for work done laying duct, installing poles etc.³ As can be seen their charges for soft digging is currently £39/m whilst footway work comes in at £88/m and highway at £154/m. Across the B4RN area the total duct length that we need to dig is a touch under 500Km to link 3200 properties. Assuming all this was dug using highways in the traditional model would cost £77M, or if it were all soft digging £19,5M, giving a per property cost of between £6K and £24K and this is just for the duct digging and ignores all the ancillary costs. Clearly, on the Openreach model, this is not a financially viable proposition.

B4RN adopts a different approach, laying the duct not on the highway but across farmland on the other side of the wall so it is all soft digging. We then install narrow bore duct into which we blow fibre mini cables once the route is completed. Digging a narrow trench and installing duct within it is dramatically less expensive across private farmland than along the highway. The work can be done by agricultural contractors and the farmers themselves; it's not high technology, similar to laying a simple water or drainage pipe which they do all the time. The combination of lower cost labour and simple installation without the regulatory burden of the street works act and similar impediments results in a dramatic reduction in cost per metre installed. Of course the costs of the materials will actually be rather higher than those paid by telecommunications companies due to our smaller scale of operations; however this is much more than offset by the reduced laying costs. Where necessary we use the highways but this is for a small proportion of the duct length, mainly for road crossings and short sections where the farmland is either not available to us or unsuitable. We will be applying to OFCOM for Code Powers to permit us to do this in the same way as any other telecommunications company. The B4RN network will cost £3.5M to build giving a per metre cost of £7 but this includes all the central equipment and setup costs. Excluding everything but the duct/fibre work gives us a cost closer to £5/metre making the project affordable.

The big problem is that for this model to work the land owners must be prepared to grant free wayleaves to lay duct across their land. Clearly they would refuse to do this if the applicant were a traditional telecommunications company working to the traditional profit model, but if it were a community owned cooperative run for the benefit of the community the story is different.

B4RN is registered under the 1965 Industrial and Provident Society Act taking the Community Benefit option rather than the pure cooperative one. This reflects the fact that it will operate for the benefit of

² <http://www.analysismason.com/Consulting/Sectors-we-cover/Fixed-operators/Digital-Britain/Press-releases/BSG-publishes-Analysys-Mason-report-on-costs-of-deploying-fibre-based-broadband/>

³

<http://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=uBVUx%2FA1Yri6v477qpx5dw53kUQnGDAeritfVHpB5XFZ6rNZujnCs99NbIKJZPD9hXYmiiijxH6wr%0ACQm97GZMyQ%3D%3D>

the community rather than its shareholders. However it needs to issue shares to raise the capital required to build the network. These shares are withdrawable shares with a face value of £1 and only redeemable at par, there is no possibility of a capital gain. However the shares will attract interest and offer tax relief where applicable, this should make them attractive to community investors. The community benefit route also means there is an asset lock which ensures that the network and any other company assets cannot be sold off to another company but must be held for the benefit of the community. Given this structure and asset lock the majority of landowners contacted so far are prepared to grant free wayleaves as it clearly benefits the community and they see no risk of anyone making a profit out of them.

In addition the community cooperative model is one where we can expect members of the community to volunteer labour to help establish the network. As mentioned above the work involved in laying fibre duct in a trench is well within the skill set of many members of our community. Around 60% of the project costs are for materials and the remaining 40% is labour. So as well as granting wayleaves we are able to ask the farmers and landowners to dig the sections across their land by way of supporting the project. In return for them doing this work we will pay them according to an agreed piece work table and they then use this to buy an equivalent number of B4RN shares transaction. As well as reducing the amount of cash we need to raise this allows members of the community to become actively involved with the project and take a long term interest as shareholders.

The original business plan issued in the summer of 2011 was for a limited rollout across 8 parishes with some 1400 properties covered. We have since then significantly expanded our plans and are now looking to provide network coverage to 21 rural parishes covering 420Km² with 3200 properties. These parishes have been selected because they suffer from poor network availability, as only a few telephone exchanges serve a large rural area. The resulting long telephone lines leave many properties with vestigial or no network service. We have plenty of evidence of a substantial pent up demand by members of the community and a willingness to support the project with both money and effort.

Providing 100% coverage in those parishes plus spill over areas will deliver service to 3200 properties, cost £3.5M and take 36 months to deliver. A detailed design has been completed and work is already under way.

We established a web site⁴ in mid 2011 and did a leaflet drop to homes and business in the first 8 parishes inviting people to sign up for service and indicate their willingness to buy shares and donate labour. This was backed up with a series of meetings in which B4RN gave a presentation of the project and answered questions. We also took out advertisements in the local newspaper publicising the project and the parish meetings. The project was launched on the 14th December 2011 with a public meeting held at the Storey in Lancaster. To date over 1100 properties have registered on the web site indicating their intention to sign up for service

At the launch event we also issued our first shares offer inviting individuals and companies to subscribe for an initial tranche of up to £2M of £1 ordinary shares. This figure was selected to comply with the EIS limits for 2011/2012 which set an upper cap of £2M to be eligible for the 30% tax relief. The intention was to issue a second share offer in 2012 or 2013 once the limit was lifted to £5M on the 6th April 2012. To date we have raised nearly £500K from our first shares issue and expect more over the coming months. We have also just launched a second shares issue of £3M. The original one was targeted mainly at the initial 8 parishes in the first business plan. This second share issue will be focused primarily on the 1800 properties which were not covered in the original phase 1 plan, but, of course they too are welcome to invest if they haven't already done so.

⁴ www.b4rn.org.uk

Whilst a 100% build out would cost £3.5M we are working on the assumption of an initial take up rate of 50% which reduces the build cost to £2.25M. This is because we do not need to dig the final spur to properties not yet signing up. We do provision fibre in the serving access chamber and have everything ready to bring them such properties on line when they ask for service, but there is no point incurring the spur dig, material and equipment costs until they do request connection. Across the network the average cost of this final connection phase is £420 which need only be incurred when the connection is requested. So we can build the entire trunk network, install fibre for 100% of properties and put in place all the elements needed to respond rapidly to a request for a connection for £2.25M. When a customer requests a connection we complete the work and take on the £420 costs associated with it. However the income in year one between the connection fee, £125 and 12 months service at £25/month yields us £425 which covers the connection costs allowing us to recoup the investment in the first year.

Once up and running people will be able to see the service and experience the terrific speed and quality. We are confident that the take up rate will climb rapidly and we are therefore assuming 60% in year 2, 70% in year 3 topping out at 80% in year 4. However on the first routes that we have completed we have an average take up rate of 61.5% with a number of them in excess of 90%. Clearly we are being a bit conservative with our estimated take up rate. Should funding fall short of target then the build rate would be slowed whilst additional funding was sought.

We need 300 customer connections to cover our core operating costs and will reach this number within a few of months. Thereafter we will devote cash flow from additional connections to employing staff to take over the work load from the volunteers. To cover the cost of a full set of staff, 5-6 FTE £210K/pa, we will need approaching 1000 customers. The transition from all volunteers to all paid staff will be progressive and track the sign ups.

Above 1000 connections the free cash will be assigned to a pool to be used to redeem investor's shares if required.

Based on a 50% take up we will have 1600 paying customers giving us a substantial cash pool which will allow us to repay all the shares in about 15 years.

However we expect the take up to be substantially higher than this as we are finding that completed routes are hitting over 50% on day 1 and some routes are above 80% already which is our year 4 target. As connection levels climb and we bring more services online we expect the revenue to reach a level permitting full pay back of any investments and loans within a 10 year window.

3.1 People

Behind B4RN is a team of people who have over the last two years put in a huge amount of time and effort to get the project off the ground. We are local people who care deeply about the lack of quality broadband in our communities and are determined to do something about it. Between us there is a range of skills spanning everything from network design, engineering, IT, community engagement, marketing, management and business development. Below are short biographies of the main people who form the interim management committee tasked with getting the project off the blocks. There are many other people who offer very valuable specialist advice and contribute their time and effort and whose input we are very grateful for.

Barry Forde (B4RN Chief Executive)

is a networking expert with many years experience of designing, building and operating high performance networks. He was responsible for the CLEO network which provides connectivity to over 1000 schools and public sector sites across Lancashire and Cumbria. He was the founding Technical Director of LUNS Ltd a telecommunications company which was one of the earliest independent companies to undertake local loop unbundling and which deployed equipment into 157 BT exchanges across the North West to offer private ADSL2+ and symmetrical broadband services. During his career at Lancaster University he was head of networking, head of technical services and Deputy Director of Information Systems Services. In these roles he was responsible for the University's networking and IT systems as well as overseeing the regional academic network C&NLMAN. He was a member of the JISC Joint Committee on Networking which oversees the JANET academic network which provides links to thousands of college and University sites. He was a member of the NWDA Broadband Advisory Group and sits on a number of committees involved with networking at a national level. Apart from providing the technical input for B4RN he also acts as a consultant to a number of local authorities establishing local high speed broadband plans. He holds a Professorial Fellowship in computer networking within the Department of Computing, Lancaster University.

Mary Jackson (Company Secretary)

is originally from an education background having taught in secondary schools in North Wales for some years. Then moved to LEA work, where she held Senior General and Principal Adviser roles, her interest and expertise in schools' use of ICT led to parallel ICT advisory posts in two Local Education Authorities. This involved, initially, the rollout of National Grid for Learning funding and subsequent schools' connectivity budgets. She participated in local, regional and national fora for schools' ICT and developed bids for national, European and International funding streams. Networking experience included the management of the installation of the education elements of Sefton's borough wide fibre optic network and subsequently a period of time managing the Manchester Education ICT network. Following her education career she ran her own business for three years.

Since moving to the Lune Valley in 2010 she has become Chair of Governors at her local school, is a Parish Councillor, and is Honorary Secretary of the Lancaster branch of the Lancaster Association of Local Councils. She joined B4RN in early 2012 as Company Secretary which capitalises on her MSc in Management.

Monica Lee

came to academe from the business world where she was Managing Director of a development consultancy and worked with a wide portfolio of organisations. She has worked extensively in Central Europe, CIS and the USA coordinating and collaborating in management development, research and teaching initiatives. She is Visiting Professor to Newcastle Business School and has been awarded Life-Membership of Lancaster University. She is a Chartered Psychologist, and is a Fellow of CIPD. She is Founding Editor in Chief of '*Human Resource Development International (1998 to 2002)*' and Editor of the Routledge monograph series '*Studies in HRD*', and is Executive Secretary to the *University Forum for HRD*. She has published over 100 articles and books in this

area. She is also actively involved in the local community. Amongst other activities, she is Chair of Governors of Cawthorne's Endowed School, Abbeystead, and a Trustee of the Cawthorne Educational Foundation, and of the Over Wyresdale Parish Hall. She is also a Director of L&K Group plc. which comprises a group of companies that serve the agricultural communities in the North West. She believes that this project will be of particular benefit to such communities.

Bruce Alexander

has lived in Quernmore since 1986 and ran the village Post Office until its closure in 2008. He still works part-time in Bowerham Post Office and is Clerk to both Quernmore and Caton-with-Littledale Parish Councils. He has a degree in Engineering Science and previously worked for Leyland Vehicles. He is closely involved with a number of village groups and sees the success of this project as vital to the rural infrastructure

Christine Conder

has lived in the Lune Valley for many years and is married to a farmer in Wray. She has been involved with the community in many roles over the years; for instance school governor and chair of Wray Endowed school during the eighties and early nineties and more recently supporter of a number of rural broadband projects. In 2002 she began campaigning for rural broadband and over the next few years helped establish a wireless network around Wray and a satellite network for rural farms. A founder member of Wray Com Com in 2003 (<http://www.wraycomcom.org.uk/>) and Wennet CIC in 2005 (<http://wrayvillage.co.uk/wennet.htm>). She is a pioneer of self installation fibre and a regular speaker at broadband events on the topic of rural broadband and DIY fibre build.

Martyn Dews

has been involved in IT ever since receiving a Sinclair ZX Spectrum for Christmas as a child. This sparked an interest that has never gone away. Having studied computer technology and programming at college he has worked in various areas of IT throughout his career such as hardware support on large mainframes, peripheral support, networking and software support. For the past 15 years he has worked for global IT services provider [CSC](#) and has been involved in managing systems for accounts with several thousand users. Due to his deep interest in IT he is aware what can be achieved when the community has the access to the best IT services and is why he has become involved in B4RN. He lives in the Lune Valley, (fortunately for him, the better connected part in terms of broadband) and an ex "townie" now fully converted to country living and so is keen to help the community get the best connectivity possible.

Thomas Hartley

has lived and worked in the Lune Valley for all his life. For the last 23 years has run a small engineering company in partnership with his wife. He became involved with B4RN through his work as the installer for the Wray and Wennet wireless networks. Thomas brings his extensive knowledge of the local area to the project. Because of his work on farms he is aware of installation issues, topography and engineering issues. Thomas is a mechanical engineer.

Carl Hunter

has worked for the NHS for the past 30 years. He is a Registered Nurse and a Member of the Chartered Institute of Personnel and Development; he is currently employed by the University Hospitals of Morecambe Bay NHS Foundation Trust as a Learning & Development Specialist. His special interest is in clinical leadership & management development. Carl has worked on several regional and national working groups related to NHS staff development

Outside of his day job, Carl worked as a school Governor of 8 years and is also a Local Parish Councillor (Wennington). He has a keen interest (and some basic skills – all self-taught!) in information & communication technology and is regularly called upon by his immediate and extended family, as well friends, to help resolve their PC and computer network related issues. Carl is

passionate about helping deliver super-fast broadband to rural communities who, from a business and political perspective, are all too often forgotten or ignored.

Christopher May

is the Associate Dean, Enterprise, for the Faculty of Arts and Social Sciences at Lancaster University, and lives in Arkholme. Before becoming part of the university education sector, Chris worked in the music business and was for a time Managing Director of his family's small international specialist library supply booksellers. He has acted as a business consultant in the retail sector, and as a research consultant for the National Consumer Council. He is now leading the Faculty's business/enterprise engagement strategy and is part of a local community music promotions group who are working to further develop the Lune Valley's music scene.

Ian Threlfall

has been employed as a Network Architect by a large US based company for the last 11 years. Prior to that he worked for a UK bank, helping support what was then one of the largest Internet banking systems in Europe. His specialist area of expertise is Network Security and he holds a CISSP Information Security accreditation. He started his career as a Civil Engineer working on projects around the UK and then went onto complete a M.S. degree in the US. Whilst there he funded his education by working as Network Administrator in the Engineering School which then resulted in retiring the "hard hat" in pursuit of fame and fortune in IT. He grew up in the Lune Valley and returned 7 years ago. Since then he has been involved with rural broadband, in particular with helping Wennet CIC a local community wireless broadband service.

Eric Lange

Is a resident of Arkholme and became the village champion for B4RN. A geology graduate from Birmingham University and recently retired Detective Inspector having served 30 years with Lancashire Constabulary. Previous experience in a range of community projects including as chair of the development group that financed and built Arkholme's award winning hall. Divides his time between voluntary work and sailing the west coast of Scotland.

Iain Robertson

Studied horticulture at Pershore. Landscape contracting for Cheshire County Council, Wirral and Runcorn. Built and ran small business workshops at Farndon Cheshire. Woodwork, design and build commissions, church carpentry, work for National Trust, English Heritage and Conran. Last 15 years in Lancashire, private work and one to one woodwork tuition helping 80+ locals with furniture making. Project managed building of present home. Practical problem solving, fully committed to bringing vital broadband to us rural folk. Spare time listening to post 1805 music, Supported by rigorous wife Judy and feisty Millie the terrier

4. Network Design

The original 2011 plan proposed a build out in 8 parish areas with some spill over into bits of adjacent parishes. This amounted to approximately 1450 properties. However due to demand and some engineering improvements we have now increased the number of parishes to 21 and also redefined phase 1 to be the period through to the end of 2014.

Parish	Properties
Arkholme with Cawood	196
Bleasdale	70
Burrow with Burrow	95
Cantsfield	59
Caton with Littledale(partial only)	288
Cloughton	57
Dolphinholme area	378
Gressingham	68
Halton (Aughton area)	48
Halton (Forgebank area)	50
Hornby with Farleton	319
Ireby	32
Leck	86
Melling with Wrayton	157
Over Wyresdale	136
Quernmore	370
Roeburndale	26
Scotforth	96
Tatham	188
Tunstall	55
Wennington	68
Whittington	133
Wray with Botton	231
	3206

This increases the number of properties to 3206. Parishes highlighted in pink in the table above are partial areas rather than whole parish areas. For instance the Dolphinholme area is now included, as is much of the land mass of Ellel parish. However Galgate is within Ellel parish but is urban in nature and contains a BT telephone exchange. So we will do the rural parts of the parish (90% of the land mass) but not the urban bit. So the “to be connected” property count is well below the total for Ellel parish of 1064. Similarly there are two areas of Halton with Aughton parish which are now included, the village of Aughton itself and also the area around Forgebank where the cooperative housing development is being built. The rest of the Halton area is urban with a BT exchange in the centre and has been left out of the phase 1 plan.

The map below shows the whole of the Lancaster District with parish boundaries and the phase 1 coverage area in green. Note that parish outlines in red are those outside of Lancaster District but within the phase 1 build. For instance part of Nether Wyresdale is included as is all of Bleasdale which are both in Wyre District not Lancaster.

Appendix 2 contains a full list of post codes for the coverage area. Any property in those post codes will be able to request connection to the B4RN network.

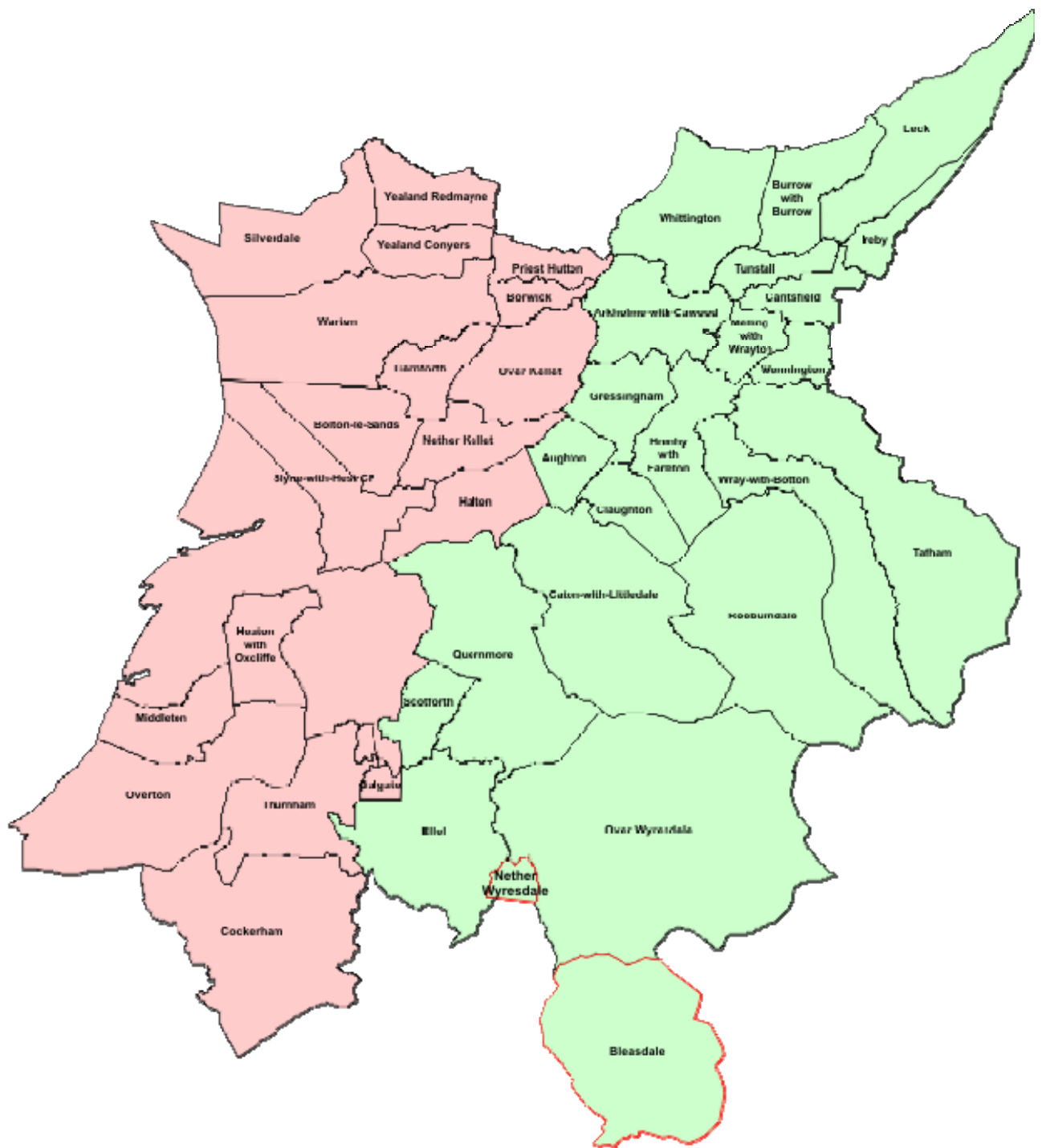


Figure 1 - (2012-2014) coverage map

The vision is to deliver true future proofed next generation broadband and this can only be done via fibre optic cables. We will create twelve network nodes across the coverage area and from them run a two fibre single mode G652d or G657b cable to every property around the node; this is Point to Point (PtP) Fibre to the Home (FTTH). Once installed the fibre will be operated at 1Gbs symmetrical speeds without any rate limiting.

To cover the whole area we are locating twelve network nodes in positions where they can both serve local properties and also have diverse links into our network core. The diversity is important to ensure that a break in any trunk cable from a node does not take down service to all the properties served by it.

The twelve network nodes are to be located in : -

- Over Wyresdale
- Arkholme
- Bleasdale
- Caton
- Dolphinholme
- Halton
- Hornby
- Quernmore
- Melling
- Tunstall
- Whittington
- Wray

The map below shows these locations and the routes interconnecting them.

Of these node the ones located in Arkholme and Quernmore are primary switching centres with 10GbE switches installed. They are shown in red whilst the ordinary nodes are shown in blue.

Each village node has two 10Gbs links carrying external traffic, one to each of the primary switches. With this redundancy we can ensure that even if a primary switch fails, service will continue throughout the network with little or no effect on users.

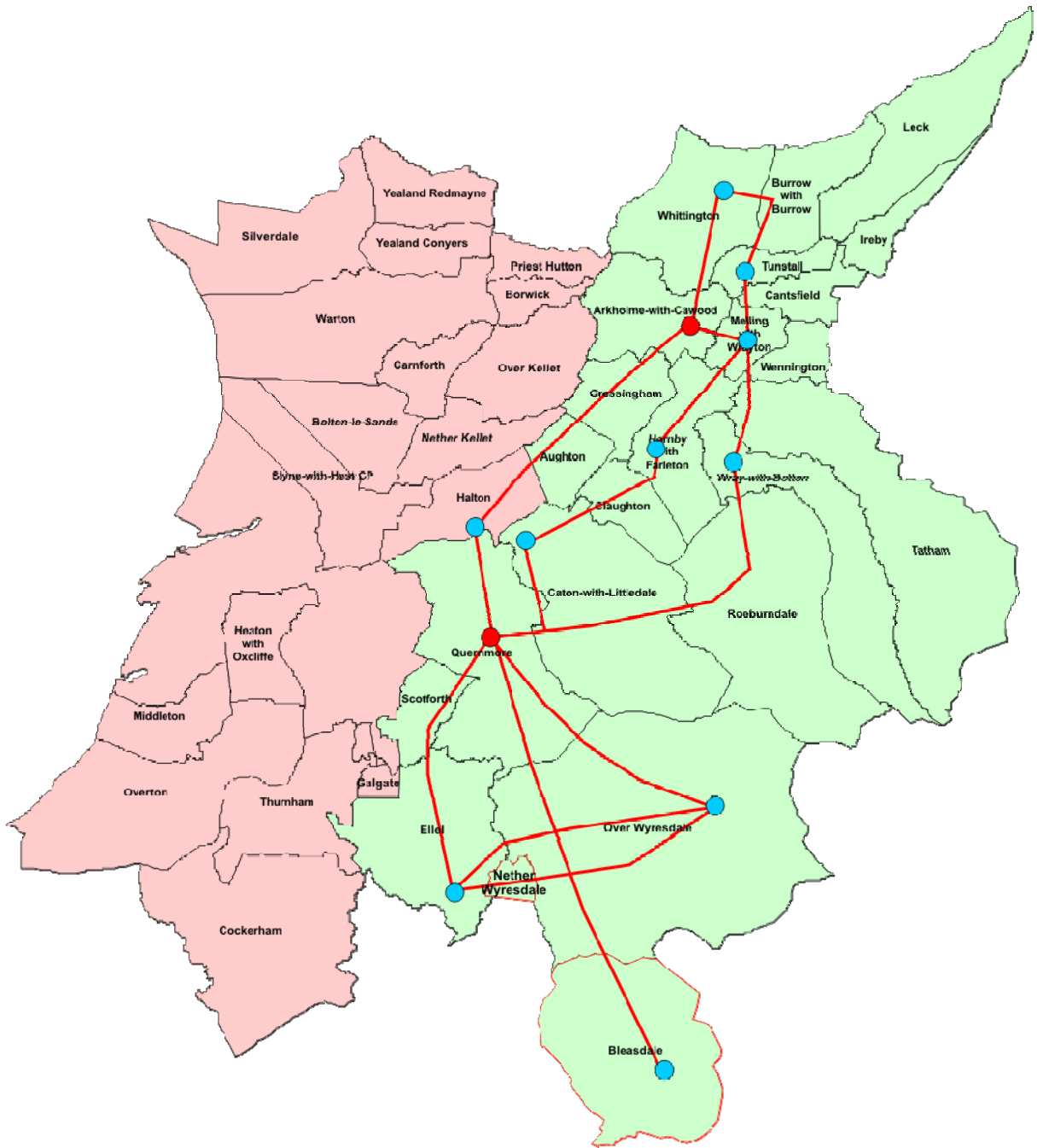


Figure 2 – Network nodes and interconnects

Each node contains the active equipment to service the properties surrounding the node. The active equipment is powered via standby power supplies and the cabinets have external power sockets that will allow us to connect external generators during long power outages. As mentioned above the network nodes all have diverse fibre routes to prevent single fibre breaks taking down the whole village. These links will initially operate at 10GbE speeds but much higher speeds are possible if demand warrants it and multiple 10GbE links can also be run if required. We anticipate that within three to four years 100Gbs switching equipment will become widely available and at an affordable price. It will then be possible to change the village switches for ones with 100Gbs backhauls and the core switches in Arkholme and Quernmore into 100Gbs switches to handle the load.

For the present we consider 20Gbs of external capacity from each village node serving up to 192 properties to be much more than adequate. In practice we are finding that apart from very short duration contrived speed tests a typical domestic machine struggles to take or deliver more than about 100Mbs and even that only for short periods. However as personal computers and other devices become ever more powerful and their ability to really use up a 1Gbs link grows we have the option to take the node's external links to 200Gbs which could cope with all 192 devices running flat out.

There are 73 trunk routes radiating out from the twelve village nodes which between them optimally pass all properties in the coverage area. Each trunk will have between 1 and 7 HDPE ducts of 16mm OD, 12mm ID installed into which we will blow 144, 96, 72, 48 or 24 fibre cables. At suitable locations along the trunk routes we install access chambers where the trunk cable can be broken into and sufficient pairs of fibre split out for local distribution. We then run 7mm OD, 3.5mm ID duct from the chamber to each local property and then blow in a 2 fibre cable. This is then spliced onto the dropped pairs in the splice bullet and at the property end it terminates on a fibre tray. Currently just one of the two fibres is used and this has an SC pigtail spliced onto it which is locked into a holder on the tray ready for the CPE to be clicked on. The second fibre is coiled up in the tray ready for future use.

Because we have made provision for 100% of properties we can accurately size the number of fibres needed on each trunk route. However we are ensuring sufficient spare fibres to allow for potential new builds and property splits.

Currently every Internet Service Provider (ISP) offers broadband customers a range of different services which are differentiated by various "up to" speeds. These are theoretical figures based on short line lengths and good quality copper and in practice the number of customer lines delivering speeds approaching the number quoted is small. In rural areas where lines are generally longer than in urban areas the numbers achieving the "up to" figures is very small. It must also be remembered that the speeds quoted are not both way speeds but the maximum download speed, the upload speed will be very much slower, this is why the service is called asymmetrical, upload and download are not the same.

B4RN offers a single service which is 1Gbs symmetrical, i.e. upload and download speeds both at 1Gbs. The differential cost of deploying 1Gbs as opposed to 100Mbs is negligible and in fact slightly cheaper as 1Gbs components are used around the world in much greater quantities than 100Mbs and hence the benefits of scale give cheaper pricing.

Having a symmetrical service rather than an asymmetrical one is vital as we move to next generation applications. There is a fundamental shift under way towards a world where users are not only consumers of data but also providers. For instance Cloud computing means that rather than using a local disc for storage it is all held on virtual storage out there somewhere in the Internet. But to use Cloud services you need to be able to upload your files as quickly as you could to your hard disc, not just download them, otherwise the whole exercise becomes painful and unusable. Similarly applications like voice and video conferencing are two way processes. With Skype a voice call takes little bandwidth and can probably fit into an asynchronous pipe's upload capacity, but move to their

new video conferencing and use an HD camera on your PC or Mac and suddenly the load shifts up a gear and you need symmetry. As more and more people realise that HD quality video conferencing will let them get together with family and friends around the world demand for bandwidth will soar.

Unlike broadband over copper we will not suffer from any range limitations. The standard optics⁵ we are using can reach out to properties up to 10Km from the local hubs and our design does not have any properties further out than that. However there are 20Km, 40Km, 80Km and 120Km optics available at steadily increasing prices if ever required.

The fibre we are laying to each property can operate at 1Gbs and 10Gbs today and 100Gbs tomorrow when cheaper optics begins to emerge. It is impossible to envisage any applications emerging over the next 25 years which we could not support with at most a change of optical drivers. This is true future proofing.

The duct being installed is HDPE which also has a very long service life, exactly how long seems to be a matter of argument, but at least 25 years and probably much longer, over 100 years has been claimed by some manufacturers.

We install a CPE in the property which links to the fibre cable and to which any user equipment can be connected. OFCOM recommend that fibre delivered high speed broadband has a battery backup in the customer's premises capable of maintaining service for up to an hour should mains power fail⁶. This is so that those who wish to use VoIP telephony services can still access them when the power fails in the same way as standard BT landline phones. This in turn will allow users to give up their landlines. Although this battery backup facility has not yet become a requirement, B4RN includes it as part of our standard service for those wishing to use VoIP telephony so those wishing to relinquish their landlines can save the monthly rental pulling the relative cost of a B4RN connection down accordingly. We will also offer our own VoIP telephony service and move existing landline number across to our system. There are also a number of commercial telephony providers who offer attractive packages of inclusive calls using VoIP systems and these will all operate reliably over our network.

As well as the standard provision CPE a range of alternative CPEs could be offered at additional cost. However our standard one offers two phone ports for ordinary phones, four Ethernet ports each 10/100/1000Mbps and also a wifi access point running 802.11n wifi. We are also looking at the possibility of offering FemtoCells for enhanced cellular phone access within properties.

Each stack will operate its own OSPF IPv4/IPv6 routing domain and will provide connectivity both locally and to the Internet. Traffic within the parish served will be contained within the village node and that destined for other nodes in other parishes will flow into the core router and then out again to the destination parish. In both instances the traffic stays local to B4RN's network and puts no load on the backhaul or Internet feed.

From our core node B4RN has leased a fibre optic cable to Telecity in Manchester, 128Km away. This fibre cable utilises DWDM⁷ technology to support up to 32 wavelengths running at 1, 10 or 100Gbs each. At Telecity our core router, a Juniper MX240 has multiple links over the DWDM to Quernmore and Arkholme and also a link to the EDGE-IX⁸ and IX-Manchester routers for peering and another to a Tier 1 Internet provider for IP transit. EDGE-IX and IX-Manchester are peering points where most service providers interconnect and exchange traffic. By peering they avoid the costs associated with sending data out to the internet, for which they pay on a usage basis, and instead have a static cost of running a simple link to the peering router. By agreeing a peering policy with

⁵ 1000Base-LX 1310nm, 5M, 8dB, 10Km

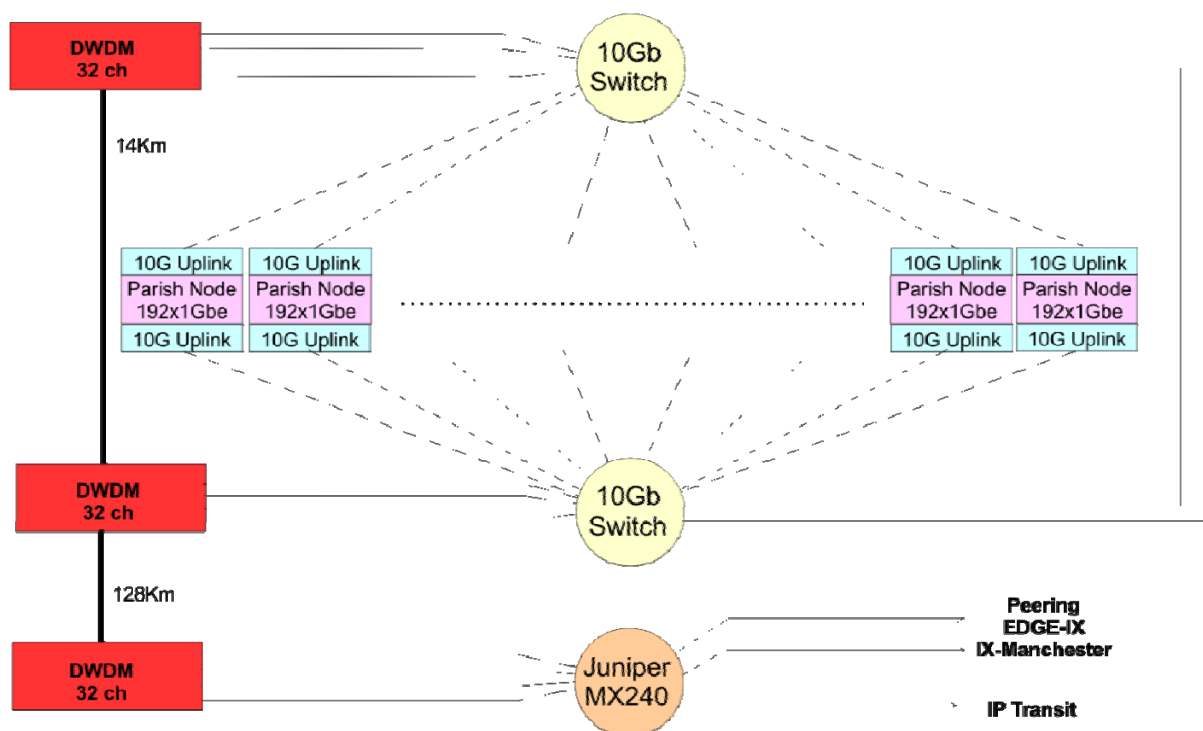
⁶ <http://stakeholders.ofcom.org.uk/consultations/superfast-broadband/summary>

⁷ http://en.wikipedia.org/wiki/DWDM#Dense_WDM

⁸ <http://www.edge-ix.net/>

other providers at the peering centres we benefit from this model as well. For instance the BBC and Google have peering connections at Manchester so traffic from iPlayer, BBC.Co.Uk, Google and YouTube would all come down the peering link. Another peering organisation is JANET⁹ which provides the connections to the education networks such as CLEO¹⁰ which links Lancashire and Cumbria's schools. It also provides connections into Lancashire County Council's services including libraries and corporate systems. So students can come home from school and use their home internet links to get very high speed connections to their school networks whilst their parents can access local government services equally easily. New services about to emerge include YouView¹¹ which is the new Internet equivalent of FreeView/FreeSat and will carry all UK free to air TV channels as well as subscription channels and pay per view services. They will also be offering a Video on Demand service and a full range of High Definition and 3D channels. Users in our network accessing these will get superb quality as there is more than enough capacity in our peering channel backhaul to support every user pulling a 3D/HD video at the same time without any congestion. They will also not need an aerial or dish to access these services. B4RN will be the first production service able to support it.

The target is to have more than 50% of our B4RN traffic coming from the peering point and we will monitor traffic flows to identify high traffic sites not coming via the peering and try to arrange a peering relationship. The remaining Internet traffic will be passed over the second 10Gbs link to a Tier 1 Internet provider and this is charged on a monthly per megabit rate dependant on usage. By going to Telecity and using a Tier 1 provider the cost is dramatically lower then capacity delivered locally in Lancaster. This ability to make use of statically charged peering traffic and wholesale Telecity Internet transit is key to keeping costs down and making the project sustainable with modest monthly charges.



⁹ JANET Joint Academic NETwork see <http://www.ja.net/>

¹⁰ CLEO= Cumbria and Lancashire Education Online see <http://www.cleo.net.uk/>

¹¹ You View is at <http://www.youview.com/>

5. Project Costs

5.1 CAPEX

Based on our estimated costs, which have been confirmed by experience on the build out so far, the total cost for a 100% build out to all 3206 properties will be £3.58M giving an **average** cost per property of £1116 inclusive of central costs and equipment for connecting the property. This £3.58M can be broken down as follows:-

- £230K for central equipment, office etc
- £2.0M for core routes
 - £1.5M is for materials
 - £0.5M is labour
- £1.346M for spurs to properties and connection costs
 - £798K is for materials
 - £548K is labour

The £3.58M figure assumes all properties opt to take service, so any take-up below 100% will result in a lower build cost as the associated spurs do not have to be dug nor equipment installed. However we still have to build ALL of the core routes and install the appropriate trunk fibres so as to be able to connect any property that requests it. The FTTH Council definition of **homes passed** is where the trunk network is in place and any property requesting a connection can receive it with only minor construction work needed to reach the property. By building 100% of the core routes we meet these criteria and can truthfully say that as each trunk route is completed the properties to be served from it can be counted in our homes passed totals.

So to cover central costs and build the full trunk network will require £2.23M.

The average cost of extending the fibre from the nearest access chamber on the trunk route to a property and supplying and installing the equipment at both ends comes to £420 per property.

At a 50% take up rate on any route built we would then add £420 times half the number of properties on those routes. Across the whole project this would give us $1603 \times £420 = £673,260$ of additional funding requirement on top of the core build figure of £2.23M making a total of £2.9M.

5.2 OPEX

Our operating costs are made up of a number of things, leasing the fibre to Telecity and space to install our equipment there, the maintenance of our equipment, IP-Transit and peering charges and general company costs such as office space, insurances and day to day expenses.

These amount to £90K per annum excluding any staffing costs. During the first year the delivery team are all working either for nothing or for shares of value equivalent to the work done. However we are proposing to take on paid staff once cash flow permits: once our income exceeds the £90K needed for core operating costs. Our estimate is that we will need 5-6 FTE staff at a cost of around £210K per year and so we will be fully staffed once connections reach the 1000 level generating the required £300K.

It may well be that some volunteers, who will have gained a lot of practical experience of building out the network, move across to these paid posts. Other volunteers will choose to step back into a less active role of supporting the staff rather than doing all the work themselves.

The staffing would consist of three engineering posts, one each for civil engineering, optical and active equipment. We would also have a general admin manager with an assistant plus first line

support people using primarily part timers working from home under the direction of the core staff. This will allow us to offer employment to suitably qualified people from within the community on the basis of willingness and availability.

5.3 Capital repayment

Once we pass the 1000 connections point and are fully staffed the unallocated funds will be divided between a number of strands including a shares withdrawal pool. This pool will be used to satisfy requests from investors who wish to redeem their shares. Clearly the amount of redemption possible in any year will depend upon the amount of cash that can be put into that pool.

Given that the first shares issue was on the 15th December 2011 and there is a three year lock in on redemptions, the first redemption requests can only occur from the 16th December 2014 so we need to make provision to start repayments from 2015.

Using a standard amortization formula to repay a sum over 10 years whilst paying 5% interest gives us an annual funding requirement of :-

2015	£ 3,458
2016	£ 58,990
2017	£ 97,129
2018 to 2024	£194,257
2025	£190,799
2026	£135,267
2027	£ 97,128

We have therefore allocated these amounts in our budget, see appendix 1. As can be seen this still leaves us in a healthy situation with a good level of free cash flow in every year.

Withdrawals will be prioritised to firstly cover any shares that were allocated by way of interest to the member. The intention is to pay interest by adding 5% to the value of the member's shares so those wishing to withdraw this interest will get paid out first. Next we will take into account any special circumstances such as deaths or members in financial difficulty before processing the rest in the order of first come first served.

6. Project funding

The current plan covers 3200 properties and will cost £3.58M to deliver. However this cost can be broken down into two parts; that which has to be fully funded irrespective of how many customers wish to take service, and that which is only incurred when connecting a paying customer. The first part amounts to £2.23M and then the second amount to another £420 for each customer connected.

Taking the core costs first this can again be broken down into three parts, core equipment, materials to build out the core routes and finally the labour involved in constructing the network.

Core Equipment	£ 230k
Core Routes materials	£1,500k
Labour	£ 500k

Clearly equipment and materials have to be purchased so there is no way of avoiding needing to raise the cash for these. However the labour element can be contributed by the community in return for shares. From our viewpoint there is no difference between us receiving funding via shares purchased which we then spend to build the network and community members doing the work directly and taking the appropriate number of shares in return.

6.1 Shares

The first shares issue was in December 2011 and was targeted primarily on the eight parishes that we proposed building out to in our original business plan. This had two components, £1.5M of type “A” shares which anyone could subscribe to purchase, and £500K of type “B” shares which were reserved for issue to members of the community contributing effort to the project rather than cash. We opted for this structure just in case the issue was heavily subscribed and those wishing to do the work were hence locked out. The split between the two types was set so that the £500K labour element identified in the design could all come via community effort against shares.

We feel strongly that a community project should offer opportunities to members of the community. However we did reserve the right to convert A shares to B shares and vice versa as demand became clearer. Both types of shares are identical in all other respects

They have a face value of £1 and are withdrawable not transferrable shares and hence cannot be sold to a third party, only back to B4RN. When the investor applies to cash in or withdraw their investment B4RN will pay the £1 face value, there is no potential for any capital gains.

The shares cannot be withdrawn during the first three years of ownership nor will we pay any interest on them. In year 4 and onwards we are proposing to pay interest at a rate of 5%/pa on the outstanding shares but this will depend upon us having sufficient income and will be at the discretion of the board of directors. We also intend to put aside an amount each year towards meeting requests from members to withdraw their capital. Again the amount will depend on our trading position and the board will need to decide the amount to be set aside for this purpose once the financial position is clear. However our plan is to begin redemptions in 2015 and redeem all shares which investors wish to cash in by 2023, a ten year period.

Each member gets a share account which is credited with the number of shares they purchase. In year 4 and annually thereafter we will pay interest at the agreed rate by adding shares of an equivalent value to the shares account after allowing for any tax deductions required by HMRC. So assuming the interest rate was 5%, as currently planned, and then a member with £1000 of shares would receive gross interest of £50 worth of shares less tax deducted at source as required by HMRC.

The minimum investment permitted is £100 and the maximum, set by the IPS rules is £20,000. Any investor with at least the minimum shareholding is a member of B4RN and eligible to vote at meetings. As a Community Benefit Society the rule is that each member gets one vote irrespective of the number of shares held and the company has to operate for the benefit of the community not of its shareholders. So we can pay interest on the issued shares but this must be at a rate appropriate to attract and keep investment only. As mentioned previously the intention is to pay interest at a rate of 5%/pa from year 4 but this will be at the discretion of the directors once the year 4 accounts are available.

To date nearly £500K of shares have been taken up with virtually all being in the cash purchase “A” category. However we are aware of a very substantial backlog of work planned by community members in the form of digging ducts, which has been drastically delayed due to the awful weather over the summer. It is entirely realistic to expect at least another £250K of shares to be issued against that work which corresponds to about 50% of the total work to build the core. So taking a very conservative stance we anticipate not less than £750K of shares from the first issue will be taken up by the end of the year.

Now that the area has been very significantly widened we need to issue a second tranche of £3M of shares which will be targeted more at the 13 new parish areas than the old, but not exclusively so. Out of the 1450 properties in the original plan we have had around 250 buying shares. Clearly the remaining 1200 may decide to subscribe to this second offer. Assuming the same level of support from the new parishes as we got from the original ones (in which we raised £750K from 1450 properties) we would raise £1.6M. However taking a more pessimistic view we are looking to raise another £750K again split between cash and effort as with the first issue.

Given that the risks associated with investing in B4RN have significantly reduced, in that we are now operational and connecting customers and generating income, the investment incentives have been scaled back. For this issue the EIS tax relief still applies and investors will still get a free connection, but the 12 months free service is no longer included available.

6.1.1 EIS Tax Relief

The share issue was constructed to be compatible with the Enterprise Investment Scheme (EIS) operated by HMRC. This offers eligible tax payers a rebate of 30% of the value of the shares bought via a tax rebate. This of course is subject to them paying that amount of tax in the first place, either in the current or previous tax years. An investment must be between £500 and £500,000 to be eligible for EIS relief but in our case the upper limit is locked at the £20K individual cap on any one personal member. So on investments between £500 and £20000 the investor would get an Inland Revenue rebate of between £150 and £6000.

One restriction is that shares must be held for a minimum of three years during which the investor cannot withdraw their shares without losing the tax relief. We include a three year lock in as part of the shares issue. HMRC have examined our business plan and offer documents and have issued us with a pre-approval certificate confirming the offer is eligible.

Given that EIS tax relief is currently 30% this amounts to an annual gross return of over 16% for a higher rate tax payer which is a substantial return and makes investment attractive on a purely financial basis.

6.2 Connection fees and service charges

As we add each customer to the network we get the connection fee of £150 (£125 ex VAT). Based on a build out spread over the next two years we would have 1600 properties passed by the end of 2013 and 3200 by the end of 2014. At a 50% take up this will give us 800 connections in 2013 with another

800 in 2014. However we have to allow for members who invested £1500 or more and hence get a free connection. So factoring in roughly 25% of connected customers being higher level investors leaves the other 75% paying the connection fees which will therefore raise £75K in the first year. By year 2 we expect the take up rate to climb to 60% so factoring this in we should achieve £105K.

Once connected each customer pays £30/monthly for service, this generates £300/pa ex VAT. In 2013 we expect to pass 1600 homes and connect 800 of them, a 50% take up rate. In a full year this would generate £240K but if we assume the build out is linear across the year we would generate only half of a year's income per customer on average yielding £120K. In the next year, 2014 we would get the full income from customers connected in the previous year plus half of the yearly total for the second group of 800 new customers plus the additional income expected from an increase in the take up rate to 60%. So our yield will be £408K.

In the following years the coverage area is assumed to be unchanged but we do expect a steady increase in the take up rate to hit 80% by 2016 giving us an income of £768K.

We also feel that as more and more government services including health and third age support move on line, and more entertainment and commercial services shift to the web that the last 20% of non users will be won over. Of course it is unlikely that we will ever reach 100% take up but a 90% target by 2021 is not fanciful and this has been factored into the business plan. It should also be remembered that there is likely to be little or no competition for B4RN in the vast majority of our territory. Nearly every house is beyond reach of either exchange or cabinet based copper lines so without a huge investment by Openreach their offering will only stay at the current levels which are very inadequate already. So the likelihood of any competitive offering from them is very small.

There are new satellite services coming on-stream but they are of very slow speed compared to the B4RN offering and are expensive whilst also suffering from latency and other technical limitations which reduce their appeal. We don't expect them to pick up any properties if there is B4RN service available as an alternative.

This leaves the 4G/mobile networks and as ever these are likely to be patchy in the rural areas where our coverage lies and not in any position to compete with us.

So all in all we feel pretty safe from any serious competition and comfortable that we will get a high take up rate and little churn of customers.

Based on a 90% take up we would be generating £250k of free cash by 2022 and once the shares are redeemed and loans paid off our annual free cash would be over £500K/pa from 2028.

6.3 Additional Services

At present we have identified several sources of income other than the standard broadband service fees. As it is difficult to quantify the income from these services only a small amount has been included in the budget, £25K in 2013 climbing to £50K in 2014. This is probably very conservative and will undoubtedly need revising before too long.

6.3.1 Telephony

We are offering a VoIP based full telephony service and encouraging subscribers to cease their landlines moving all telephony to us. Our telephony system will include a battery backup on the customer's telephony equipment and we will support location provision with 999 calls. We are not proposing to make any monthly charges for telephony provision but only bill for calls made. We expect to make a modest profit on these calls.

6.3.2 Leased line services

As well as the standard £30/month for our broadband service we will offer a range of managed bandwidth and leased line services.

Within the B4RN fibre area customers will be offered point to point links at both 100Mbps and 1Gbs as a managed service.

Additionally we will offer dark fibre service between any two points within the B4RN fibre area.

Finally we will also offer leased line managed services to Manchester Telecity over our DWDM link with capacities of 100Mbps, 1Gbs and 10Gbs.

It is anticipated that there will be a reasonable demand for these services both from new customers setting up for the first time and from existing users looking for a diverse/resilient service to backup an existing one.

6.3.3 Security Services

We are looking to enter into a partnership agreement with a security company so as to be able to offer CCTV and other security services to farms and properties in our coverage areas. With the increase in thefts of animals, diesel and equipment from farms we anticipate an interest in having a facility where a combination of motion sensing HD cameras and a central monitoring station will provide much needed security. This will be via a third party but we can generate income via a profit sharing arrangement.

6.3.4 Innovative Services

There are considerable possibilities for new and innovative services around supporting the elderly and those with medical problems within their homes. Also breaking down isolation and supporting carers within the community. We will be looking to work with a number of agencies with similar agendas and they may be prepared to put funding into pilot and then operational schemes.

6.4 Grant funding

We have submitted a bid to DEFRA against their Rural Communities Broadband Fund¹² (RCBF) scheme. This has been setup to assist groups such as ours build out NGA networks in the rural areas where costs are high. The grants amount to £300 per property subject to that being no more than 50% of the cost of the connection and the bidder being able to provide matched funding. Applications from Upland areas are being given higher priority to reflect the special challenges faced there.

Given that our costs are £1100 per property and the grant is £300 then clearly we are inside that limit. Also all our area is in the Uplands classification which again helps our case. Finally the matched funding is not an issue as the remaining £800/property of costs will be raised by B4RN through a mix of shares, effort in kind and borrowings.

We did submit a bid based on 2500 properties and this has passed the Expression of Interest stage and gone through to the final negotiation part of the process. However given that our area has increased in size we now have 3206 properties and so the final paperwork going into DEFRA will be for that number making the grant applied for £961,800. However even if successful the grant is paid in arrears against delivery of agreed targets so this has to be factored into the budget. We are working on a £750K grant element in 2013 and a further £240K in 2014 which could be either RCBF or other grants..

As well as bidding against the RCBF we will investigate sources such as the Big Lottery Fund and other community initiatives as well as regional and EU funding streams.

¹² <http://www.defra.gov.uk/news/2011/03/10/uplands/>

7. Project Progress

Following the take up of the initial shares issue reaching £200K at the end of February 2012 we decided to start building the network. Quite a bit of progress has now been made.

Core

The dark fibre leased from GEO Networks from Quernmore to Telecity Manchester (128Km) is operational with the DWDM equipment installed and configured to support up to 16 wavelengths of 10Gbs each. The equipment is a specially configured unit from SmartOptics of Norway with appropriate EDFA pre and post amplifiers to handle the attenuation over the 128Km range plus special filters and circulators to accommodate single fibre working. It is expandable to 32 wavelengths via an expansion port and this can be done seamlessly when needed.

The core Juniper MX240 router is also installed at Telecity and we have 6x10GbE ports and 20x1GbE ports available and these can be increased as needed. The router is a fully redundant version with all active equipment duplicated along with n+1 power supplies. The router can handle up to 240Gbs of routing in its current form but can be expanded easily by replacing the chassis with a 480Gbs or 960Gbs version and simply moving all the cards across to it. This is a relatively small cost and easily done. The MX range of routers is already 100Gbs Ethernet capable and we could if required move from 10Gbs trunks to 100Gbs if/when traffic requires it.

B4RN is registered as a Local Internet Registry (LIR) which allows us to electronically access RIPE for v4 and v6 IP addresses when needed and can allocate these to our connected sites. We also have our own AS number which allows us to peer with other networks.

The second leg of our leased fibre between Quernmore and Arkholme (15Km) is also operational and again we have 16 wavelengths available.

One 10GbE port on our router at Telecity is connected to EDGE-IX for peering and we are using the route reflector to enable an open peering policy. A second peering port will be connected shortly to IX-Manchester which is the northern internet exchange for LINX whose primary location is in London's docklands. We have our IP transit feed in place and it is providing us with a route for all non-peering traffic.

The primary network nodes at Quernmore and Arkholme are installed and fully operational. Each is connected to the core router at Telecity with 10GbE links and is also connected to each other with further 10GbE links. We also have the village node in Abbeystead installed and ready to provide service. A fourth cabinet is in stock ready for deployment in Melling once our fibre core gets closer.

Fibre routes and take-up

We have now dug nearly 50Km of trunk and spur routes with an equivalent amount under detailed planning. We have not experienced any significant difficulties with getting wayleaves from land owners nor in getting the work done, apart that is from the weather which has slowed work significantly.

On the routes completed so far we are averaging a better than 60% take up rate which is comfortably above our original prediction of 50% by the end of the first year in which a route is completed. Our experience is that most routes show around 30-35% sign up rates before work starts. Once digging gets underway this climbs steeply and no route has failed to achieve over 50% before the route is completed. We then get a pretty steady increase in take up as connected users talk to neighbours and many routes hit 80% or over within a short time. We have routes planned which have sign up rates of over 90% before we even start digging.

We have always believed that because we are only operating in areas where existing broadband provision is very poor the take up rate would be high. The current experience of BT and other ISPs is that take up is very modest with only a small percentage switching from their first generation broadband to the newer “up to 80Mbps” Infinity product. However most households that will benefit from the higher speeds of the FTTC system must be close to serving exchanges and hence getting pretty good ADSL speeds. They are therefore under no great pressure to migrate to faster/more expensive alternatives until they hit upon applications that require the higher speeds. By contrast the B4RN area is characterised by very poor broadband service with the vast majority of households below 1Mbps. So for those properties there is a compelling reason to shift to B4RN’s 1Gbs service, and so they do.

Appendix 1 – B4RN Budget 2013 to 2028

	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>
Take up %	50%	60%	70%	80%	82%	84%	86%	88%
Total properties passed	1600	3200	3200	3200	3200	3200	3200	3200
Properties connected	800	1920	2240	2560	2624	2688	2752	2816
New Property connections	800	1120	320	320	64	64	64	64
Build cost - Core (2013) 50% in first year	£ 1,125,000							
Build cost - Core (2014) 50% in second year		£ 1,125,000						
Costs of connecting properties (@£420)	£ 336,000	£ 470,400	£ 134,400	£ 134,400	£ 26,880	£ 26,880	£ 26,880	£ 26,880
CAPEX =	£ 1,461,000	£ 1,595,400	£ 134,400	£ 134,400	£ 26,880	£ 26,880	£ 26,880	£ 26,880
Core Costs	£ 90,000	£ 100,000	£ 110,000	£ 120,000	£ 120,000	£ 120,000	£ 130,000	£ 130,000
Loan repayments (@ 7% 10 year term)		£7,000	£70,000	£70,000	£70,000	£70,000	£70,000	£70,000
Shares repayments with 5% interest 10yr period			£3,458	£58,990	£97,129	£194,257	£194,257	£194,257
Staffing Costs	£ 177,500	£ 220,000	£ 220,000	£ 250,000	£ 250,000	£ 250,000	£ 250,000	£ 250,000
OPEX =	£ 267,504	£ 327,006	£ 403,464	£ 498,997	£ 537,136	£ 634,264	£ 644,264	£ 644,264
Expenditure =	£ 1,728,504	£ 1,922,406	£ 537,864	£ 633,397	£ 564,016	£ 661,144	£ 671,144	£ 671,144
Income from shares	£ 750,000	£ 750,000						
Income from grants	£ 750,000	£ 240,000						
Income from loans	£ 50,000	£ 450,000						
Income from connection fees	£ 75,000	£ 105,000	£ 40,000	£ 40,000	£ 8,000	£ 8,000	£ 8,000	£ 8,000
Income from monthly service fees	£ 120,000	£ 408,000	£ 672,000	£ 768,000	£ 787,200	£ 806,400	£ 825,600	£ 844,800
Income from additional services	£ 25,000	£ 25,000	£ 50,000	£ 50,000	£ 50,000	£ 50,000	£ 50,000	£ 50,000
Income =	£ 1,770,000	£ 1,978,000	£ 762,000	£ 858,000	£ 845,200	£ 864,400	£ 883,600	£ 902,800
Cash flow =	£41,496	£55,595	£224,137	£224,604	£281,185	£203,257	£212,457	£231,657
Cumulative Balance =	£41,496	£97,090	£321,227	£545,830	£827,015	£1,030,271	£1,242,728	£1,474,384

Appendix 1 – B4RN Budget 2013 to 2028

	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	<u>2027</u>	<u>2028</u>
Take up %	90%	90%	90%	90%	90%	90%	90%	90%
Total properties passed	3200	3200	3200	3200	3200	3200	3200	3200
Properties connected	2880	2880	2880	2880	2880	2880	2880	2880
New Property connections	64	0	0	0	0	0	0	0
Build cost - Core (2013) 50% in first year								
Build cost - Core (2014) 50% in second year								
Costs of connecting properties (@£420)	£ 26,880	£ -	£ -	£ -	£ -	£ -	£ -	£ -
CAPEX =	£ 26,880	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Core Costs	£ 140,000	£ 140,000	£ 140,000	£ 140,000	£ 140,000	£ 140,000	£ 140,000	£ 140,000
Loan repayments (@ 7% 10 year term)	£70,000	£70,000	£70,000	£70,000				
Shares repayments with 5% interest 10yr period	£194,257	£194,257	£194,257	£194,257	£190,799	£135,267	£97,128	
Staffing Costs	£ 250,000	£ 250,000	£ 250,000	£ 250,000	£ 250,000	£ 250,000	£ 250,000	£ 250,000
OPEX =	£ 654,264	£ 654,264	£ 654,264	£ 654,264	£ 580,806	£ 525,274	£ 487,135	£ 390,007
Expenditure =	£ 681,144	£ 654,264	£ 654,264	£ 654,264	£ 580,806	£ 525,274	£ 487,135	£ 390,007
Income from shares								
Income from grants								
Income from loans								
Income from connection fees	£ 8,000	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Income from monthly service fees	£ 864,000	£ 864,000	£ 864,000	£ 864,000	£ 864,000	£ 864,000	£ 864,000	£ 864,000
Income from additional services	£ 50,000	£ 50,000	£ 50,000	£ 50,000	£ 50,000	£ 50,000	£ 50,000	£ 50,000
Income =	£ 922,000	£ 914,000	£ 914,000	£ 914,000	£ 914,000	£ 914,000	£ 914,000	£ 914,000
Cash flow =	£240,857	£259,737	£259,737	£259,737	£333,195	£388,727	£426,866	£523,994
Cumulative Balance =	£1,715,241	£1,974,977	£2,234,714	£2,494,450	£2,827,645	£3,216,371	£3,643,237	£4,167,230

Appendix 2 – List of post codes in B4RN coverage area

LA1 3JH	LA2 0PZ	LA2 7ET	LA2 8LX	LA2 8PN	LA2 8RB	LA2 9BB	LA2 9DT	LA2 9HN	LA2 9LJ	LA2 9RY	LA6 2JD	LA6 2QS	PR3 1UP
LA1 3JJ	LA2 0QA	LA2 7EU	LA2 8LY	LA2 8PP	LA2 8RD	LA2 9BD	LA2 9DW	LA2 9HQ	LA2 9LL	LA2 9RZ	LA6 2JE	LA6 2QT	PR3 1UR
LA1 3JL	LA2 0QB	LA2 8JF	LA2 8LZ	LA2 8PQ	LA2 8RE	LA2 9BE	LA2 9DX	LA2 9HR	LA2 9LN	LA2 9SA	LA6 2JF	LA6 2QU	PR3 1US
LA1 3JN	LA2 0QD	LA2 8JL	LA2 8NA	LA2 8PR	LA2 8RF	LA2 9BG	LA2 9EA	LA2 9HS	LA2 9LP	LA2 9SH	LA6 2JG	LA6 2QW	PR3 1UT
LA1 3JQ	LA2 0QE	LA2 8JN	LA2 8ND	LA2 8PS	LA2 8RG	LA2 9BH	LA2 9EB	LA2 9HW	LA2 9LQ	LA6 1AN	LA6 2JH	LA6 2QY	PR3 1UY
LA1 3JW	LA2 0QF	LA2 8JP	LA2 8NE	LA2 8PT	LA2 8RH	LA2 9BJ	LA2 9ED	LA2 9HX	LA2 9LS	LA6 1AP	LA6 2JJ	LA6 2QZ	PR3 1UZ
LA1 3JY	LA2 0QG	LA2 8JR	LA2 8NF	LA2 8PU	LA2 8RZ	LA2 9BL	LA2 9EE	LA2 9JB	LA2 9LU	LA6 1AR	LA6 2JL	LA6 2RA	
LA1 3PE	LA2 0QH	LA2 8JS	LA2 8NG	LA2 8PW	LA2 8SB	LA2 9BN	LA2 9EF	LA2 9JD	LA2 9LW	LA6 1AS	LA6 2JN	LA6 2RB	
LA1 3PG	LA2 0QJ	LA2 8JT	LA2 8NH	LA2 8PX	LA2 8SD	LA2 9BP	LA2 9EG	LA2 9JE	LA2 9LX	LA6 1AT	LA6 2JQ	LA6 2RD	
LA1 3RA	LA2 0QL	LA2 8JW	LA2 8NL	LA2 8QA	LA2 8SE	LA2 9BQ	LA2 9EH	LA2 9JG	LA2 9LY	LA6 1AU	LA6 2JT	LA6 2RE	
LA1 3RQ	LA2 0QN	LA2 8JX	LA2 8NN	LA2 8QB	LA2 9AA	LA2 9BS	LA2 9EJ	LA2 9JH	LA2 9LZ	LA6 1AX	LA6 2JY	LA6 2RF	
LA1 3SW	LA2 0QP	LA2 8JY	LA2 8NP	LA2 8QD	LA2 9AB	LA2 9BT	LA2 9EL	LA2 9JJ	LA2 9NA	LA61AY	LA6 2JZ	LA6 2RG	
LA1 4HQ	LA2 0QQ	LA2 8JZ	LA2 8NQ	LA2 8QE	LA2 9AE	LA2 9BU	LA2 9EN	LA2 9JL	LA2 9NB	LA6 1AZ	LA6 2NJ	LA6 2RH	
LA2 0HJ	LA2 0QR	LA2 8LA	LA2 8NR	LA2 8QF	LA2 9AF	LA2 9BW	LA2 9EP	LA2 9JN	LA2 9ND	LA6 1BA	LA6 2NL	LA6 2RJ	
LA2 0HL	LA2 0QS	LA2 8LB	LA2 8NS	LA2 8QG	LA2 9AG	LA2 9BX	LA2 9EQ	LA2 9JP	LA2 9NE	LA6 1BB	LA6 2NR	LA6 2RL	
LA2 0HN	LA2 0QT	LA2 8LD	LA2 8NT	LA2 8QH	LA2 9AH	LA2 9BY	LA2 9ER	LA2 9JS	LA2 9NP	LA6 1BD	LA6 2NS	LA6 2RN	
LA2 0HP	LA2 0QW	LA2 8LE	LA2 8NU	LA2 8QJ	LA2 9AJ	LA2 9BZ	LA2 9ES	LA2 9JT	LA2 9NW	LA6 1BE	LA6 2NT	LA6 2RP	
LA2 0HQ	LA2 0RD	LA2 8LF	LA2 8NW	LA2 8QL	LA2 9AL	LA2 9DA	LA2 9ET	LA2 9JU	LA2 9NX	LA6 1BG	LA6 2NU	LA6 2RQ	
LA2 0HR	LA2 0RE	LA2 8LG	LA2 8NX	LA2 8QN	LA2 9AN	LA2 9DB	LA2 9EU	LA2 9JW	LA2 9NY	LA6 1RA	LA6 2NX	LA6 2RR	
LA2 0HS	LA2 0RF	LA2 8LH	LA2 8NY	LA2 8QP	LA2 9AP	LA2 9DD	LA2 9EW	LA2 9JX	LA2 9PA	LA6 2DG	LA6 2NY	LA6 2RT	
LA2 0HW	LA2 0RG	LA2 8LJ	LA2 8NZ	LA2 8QQ	LA2 9AQ	LA2 9DF	LA2 9EX	LA2 9JY	LA2 9PB	LA6 2HP	LA6 2NZ	LA6 3LA	
LA2 0HY	LA2 0RQ	LA2 8LL	LA2 8PA	LA2 8QR	LA2 9AR	LA2 9DG	LA2 9EY	LA2 9JZ	LA2 9PD	LA6 2HR	LA6 2PA	LA6 3LB	
LA2 0HZ	LA2 2HT	LA2 8LN	LA2 8PB	LA2 8QS	LA2 9AS	LA2 9DH	LA2 9EZ	LA2 9L	LA2 9PE	LA6 2HS	LA6 2PB	LA6 3LU	
LA2 0JA	LA2 6PD	LA2 8LP	LA2 8PD	LA2 8QT	LA2 9AT	LA2 9DJ	LA2 9HA	LA2 9LA	LA2 9PF	LA6 2HT	LA6 2PD	LA6 3LW	
LA2 0JB	LA2 6PE	LA2 8LQ	LA2 8PE	LA2 8QU	LA2 9AU	LA2 9DL	LA2 9HB	LA2 9LB	LA2 9PN	LA6 2HU	LA6 2PE	LA6 3LX	
LA2 0JD	LA2 6PG	LA2 8LR	LA2 8PF	LA2 8QW	LA2 9AW	LA2 9DN	LA2 9HD	LA2 9LD	LA2 9PP	LA6 2HX	LA6 2QF	PR3 1BP	
LA2 0JF	LA2 6PQ	LA2 8LS	LA2 8PG	LA2 8QX	LA2 9AX	LA2 9DP	LA2 9HF	LA2 9LE	LA2 9PR	LA6 2HY	LA6 2QN	PR3 1TB	
LA2 0PL	LA2 7DE	LA2 8LT	LA2 8PH	LA2 8QY	LA2 9AY	LA2 9DQ	LA2 9HG	LA2 9LF	LA2 9PS	LA6 2HZ	LA6 2QP	PR3 1UJ	
LA2 0PX	LA2 7DL	LA2 8LU	LA2 8PJ	LA2 8QZ	LA2 9AZ	LA2 9DR	LA2 9HH	LA2 9LG	LA2 9PW	LA6 2JA	LA6 2QQ	PR3 1UL	
LA2 0PY	LA2 7DN	LA2 8LW	LA2 8PL	LA2 8RA	LA2 9BA	LA2 9DS	LA2 9HL	LA2 9LH	LA2 9QA	LA6 2JB	LA6 2QR	PR3 1UN	

