CASE STUDY – B4RN
SMARTOPTICS HELPS BRING HIGH-SPEED INTERNET TO RURAL COMMUNITIES

THE CUSTOMER

B4RN is a not-for-profit community scheme for the provision of high-speed broadband in the rural North of England. The organisation was launched in December 2011 to ensure that the residents of villages and farms in Lancashire get a super-fast broadband service at speeds which are faster than most commercial ISPs can offer anywhere in the UK.

In order to best serve these remote areas B4RN brought together the knowledge, technology, people and funding to provide a 520km fibre optic network infrastructure that will meet the digital entertainment needs of nearly 3,500 homes across an area of 243Km^2 for the next 30 years.

The network that the B4RN community project wanted to design had to be a highly secure and reliable infrastructure that would be always available to its customers in a very sparsely populated area.

THE NEED FOR BROADBAND

Broadband is vital for modern life and it is as essential for farmers and businesses in rural areas as it is for businesses in towns. Farmers have to submit forms to Defra online. Online banking and even social media are essential for families today. Without high speed broadband availability in the countryside, villages could be deserted as jobs would migrate to towns.

THE CHALLENGES

Prof. Barry Forde, Chief Executive at B4RN, explains the challenge "In rural areas broadband service is very poor. This is because there are very few telephone exchanges in low population areas. End users in villages and on farms are a long distance from these exchanges and if they can get a service at all it will generally only be a 2Mbs service over a standard phone line. This type of limited dial up service is not good enough for even basic internet service. Our aim was to build a 1Gigabit per second service to every household in the area for this we needed state-of-the-art technology."

The UK government defines super-fast broadband as 25Mbs and this speed of service would never be delivered to a rural area by any of the primary network service providers because such a service would not give a return on investment. So a 1Gbs (1,000Mbs) service is a connection speed that would make most city dwellers envious. In order to ensure a super- fast service B4RN aimed from launch to provide this much higher broadband speed via fibre to the home (FTTH).

THE NETWORK

The B4RN network started rolling out in 2012 and 2013 and continues to be built and rolled out in phases - the core network consisting of five network nodes has now been built (via a mix of private funding and community involvement). It currently connects 8 parishes between Quernmore and the head-end in Arkolme in the Lower Lune Valley. This core network is connected to the internet via a leased dark fibre to a peering point in Manchester 128Kms away.

B4RN offers offer a single service which is 1Gbs symmetrical, i.e. upload and download speeds both at 1Gbs. "As a community project we needed the most cost-effective and reliable transmission network possible." said Forde.

SOLUTION

The design of B4RN's network took over three years to refine. The core network is a resilient ring with the 10 Gigabit feeds at both ends. It is from one of these core nodes that the leased fibre connects B4RN to Telecity in Manchester. This link is critically important and needed to utilise DWDM (Dense Wave Division Multiplexing) and the equipment needed to provide this transmission was crucial to the success of the project.

B4RN chose Smartoptics transmission equipment as it could support all current and future circuit requirements no matter of traffic speed in any combination. Initially it only needed two x 10G circuits: one to link to the peering point and one to the service provider.

Peering is the arrangement of traffic exchange between Internet service providers. Larger ISPs with their own backbone networks agree to allow traffic from other ISPs in exchange for traffic on their backbones. They also exchange traffic with smaller ISPs so that they can reach regional end points.

This peering requires the exchange and updating of router information between the peered ISPs in B4RN's case the peering point presented the need for a highly reliable switching point and was the crucial part of the network. In order to ensure that each home and business connected to the network would get 1Gps service the network points of presence (or POPs) had to be scalable and be able to backhaul 10Gbs or 100Gbs. These super-fast speeds are more common on a campus network than in the WAN and unheard of in a rural context. The Smartoptics solution more often used on campuses was an ideal fit.

With the use of Smartoptics equipment transmitting data over DWDM, it was possible for B4RN to have a peering policy enabling them to avoid the hefty costs associated with sending data out to the internet, for which they would otherwise pay on a usage basis. Instead have a static cost of running a simple link to the peering router.

"Smartoptics met our brief in every way. Its products are at the heart of our success and have delivered everything they promised and more. Because of the complexities of the symmetrical service we wished to deliver, Smartoptics both helped in the design of the solution that provide our customers and the speed of network" said Forde. "The Smartoptics solution has made connectivity for our community project simple but affordable."

As the BBC and Google have peering connections to the same peering platform in Manchester it means that traffic from iPlayer @bbc.co.uk, Google and YouTube are all enabled down the peering link. B4RN benefits from these and other "peering" organisations such as JANET11 which provides the connections to the education networks such as CLEO12 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 rural home internet links to get very high speed connections to their school networks whilst their parents can access local government services equally easily.

B4RN will in future be able to offer additional TV channels as well as subscription channels and pay per view services. It will also be offering a Video on Demand service and a full range of High Definition and 3D channels. Users on the B4RN network accessing these will get superb quality as there is more than enough capacity in the peering channel backhaul to support every user pulling a 3D/HD video at the same time without any congestion. B4RN will be the first production service able to support such services.

CASE STUDY

The strength of the project is that the technical planning has been second to none. If the core network were damaged in any way, the traffic would be routed via the failover path. Standard network operating procedures apply so network outages would be responded to in a timely manner.

Every customer on the B4RN network will have more speed than they can use or measure with today's computers. A computer downloading a film in 32 seconds will run out of storage before it runs out of bandwidth.

SUMMARY

B4RN has now dug a 520km of fibre optic cable ducts and connected over 350 premises. Over 100 local landowners have given network access to the community project and 65% of all potential customers have signed up – in some areas over 90%. It has gained network access across 100 landowners land and delivers a high speed service to many villages and remote areas alike.

The ability of Smartoptics to help in the provision of reliable super-fast broadband in the rural north will allow B4RN's customers to add other services such as alarm system monitoring, remote CCTV, high quality VoIP telephone services (ceasing existing land line charges whilst retaining existing numbers) and also to receive HD television which will change substantially over the coming years with the enlargement of Freeview services, TV on Demand and of course 3-D etc.

As an example of what can now be achieved by a B4RN customer wishing to download a full length DVD movie (4.7GB) with 2Mbs link it takes 5 hours 13 minutes, but with 1000Mbs fibre link it takes just 38 seconds. Sending 200 pictures (600MB) can take 40 minutes with a 2Mbs service but only 5 seconds with 1000Mbs.

Sean Davies Head of Sales at Smartoptics said "We are delighted to have been able to help B4RN bring unmatched broadband speeds to such a rural area and have the residents of rural villages benefitting from such a reliable and flexible high-capacity service. Smartoptics has been the market leader for embedded wdm solutions nearly a decade and our solutions enable customers such as B4RN to build the most cost effective and reliable networks regardless possible"

The success of the project is partially because the locals have helped build the network in return for shares which creates both interest and trust. But the most important key to success is having a reliable 1Gps line speed enabled by Smartoptics when previously there was no connection.

CHALLENGES
- Major need to bring high capacity IP services to a rural area
- Need to maximize flexibility and scalability for future growth
- Need for a simple and cost effective physical layer implementation
- Remove need for expensive Opex and maintenance contracts

SOLUTION
- Embedded WDM network removing the need for expensive and complicated traditional DWDM equipment
- Long distance connectivity between sites with minimal complexity
- Standards Based optical transceivers and low loss multiplexers optimised for maximum channel density and reach
- Up to 80 Channel DWDM system supporting all protocol types with distances up to 200km between sites

BENEFITS
- Proven high quality and reliable WDM solutions
- Dramatic broadband capacity over links to peering point
- Increased level of control and management
- Trouble free networking infrastructure and ease of use
- Low power consumption resulting in ultimate Green Data Centre solution

ABOUT B4RN

B4RN is a community fiber network to every home in its region. B4RN provides 1000 megabit (1 gigabit) future-proofed connection to each home. As a community network it has been designed and built by its users. For more information see http://b4rn.org.uk/about-b4rn.

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