

CONFERENCE PAPER

FIBRE TO THE FARM: ISSUES FOR RURAL BROADBAND

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Farming and rural businesses need excellent high speed communications. This need for good quality broadband has been recognised for some time. Most buildings are now served by broadband, but there are still unserved areas, or 'not spots', particularly in the countryside. These areas are not necessarily remote and some contain hundreds of unserved properties. Broadband performance is gradually improving, but ultimately current technologies will not keep up with the developing requirement or meet the needs of unserved areas at an economic cost. There are, therefore, two advances that need to be made in the provision of broadband in rural areas: to extend service to currently unserved areas and to improve performance for subscribers that are located some distance from the local exchange. These improvements will ultimately require a change in technology. The technologies that are most likely to be deployed are fibre-optic cable to the premises and fibre to the cabinet or kerb with copper cabling to the premises. The deployment of such new technology is subject to regulations placed on BT which have yet to be published by Ofcom. It is probable, however, that the regulations will require BT to provide wholesale services to other telecommunications companies associated with these new technologies. These wholesale services will have to be equivalent to the services that it provides to its retail operation. Deployment will also be subject to a commercial justification. BT has indicated that it will deploy fibre in substantial new build projects. However, the business case for copper cable replacement with fibre is more difficult to make since the copper cable still has economic life. It is likely therefore that this asset will be replaced only when a suitable business case can be made in terms of new services. This may mean that large not spots are early candidates for fibre but isolated rural properties will remain unserved by broadband. To ensure deployment of a suitable broadband technology for those properties will require a change in the rules for the provision of the universal service and particularly the definition of functional internet access.

Key words Broadband internet access, fibre, not spots, universal service

The requirement

Farming and rural businesses need excellent high speed communications. Farming today is an information intensive activity. The Rural Payments Agency alone has hundreds of forms and guidance booklets on its website. In addition, the RPA has started to introduce online access to its services and it is now possible to interact online with the Single Payment Scheme and the British Cattle Movement Service. But the RPA is only one of the organisations with whom farms have to exchange information. Increasingly, farmers need to interact with their suppliers and customers online. Such interaction needs excellent quality communications, and because some of the file sizes are big, the communications needs to be fast.

Many farms and villages now house a number of small businesses. These businesses also need good quality telecommunications to work with their

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suppliers and customers, access information and maintain websites. The importance of telecommunications to households and businesses is shown by the take up of broadband services. By the third quarter of 2007, 60% of households and businesses in the UK had broadband access². Nearly all households and businesses with internet access now use broadband. Thus, any household or business without broadband could be disadvantaged relative to its peers.

The need for good quality broadband in rural areas has been recognised for some time. In 2003 the Countryside Agency commissioned Intercai Mondiale to undertake a study into Broadband in Rural Areas. At that time, there were no published plans to provide broadband to many rural communities and it looked as if a major divide was opening up between services to be provided in urban areas and in rural areas. Shortly afterwards, BT developed a programme to implement broadband over all of its exchanges based on the level of demand and subject to technical constraints. This programme has been a major success with more than 95% of premises served by broadband over the telephone network or a cable TV network. More recently, local loop unbundling, which allows other companies to take over the telephone cable from a house or business to the local telephone exchange to run competing broadband services, has led to competition, greater variety of services and far lower prices for broadband.

The current situation

Despite this overall success, the current reality is that there are still households and businesses in some rural locations that do not have a broadband service. Some of the 'not spots', areas without a terrestrial broadband service, are quite large and not particularly remote. In Buckinghamshire, for example, Hambleden Valley, which is only about 8Km from the centre of Henley on Thames, has about 300 properties without broadband. In Kent, Barham Downs, about 12Km from Canterbury, has about 220 properties without broadband.³

The short term reason for the not spots is technical. The performance of the Digital Subscriber Line (DSL) technology used over telephone lines to provide broadband degrades rapidly with distance. This is a consequence of the laws of physics and the possibility of improving performance through further technical innovation is limited. While DSL technology can now deliver more than 50Mbit/s over short distances, beyond six kilometres, little performance improvement has been achieved.

Meanwhile the world moves on. At the time of the Countryside Agency report, the key attributes of broadband were being always on, allowing simultaneous use of the landline and speeds of 0.5 to 2 Mbit/s. Now, broadband services are typically between 1Mbit/s and 6Mbit/s with some users achieving greater speeds. Virgin Media has announced broadband at 10Mbit/s

2. Sources: 14.961 broadband connections: Telecommunications market data tables Q2 2007, Ofcom, 2008; 24.3m households: ONS; 1.16m VAT registered businesses under 250 employees: ONS.

3. Source: Hambleden Valley Ltd

over its network by late summer for mid-range customers and 50Mbit/s by end of the year for high end customers, while BT has announced a maximum speed of 24Mbit/s by 2011. BT's performance will still be distance dependent however, and those receiving less than 2Mbit/s now will see little or no improvement in performance.

Current services, where they are available, largely satisfy the user's requirement for speed. However, the user requirement for 2021, being mapped out by some leading local authorities is for a bandwidth requirement of between 24Mbit/s and 100Mbit/s, driven by multimedia applications and services such as High Definition TV and Video on Demand. This will not be delivered by DSL alone.

So there are two advances that need to be made in the provision of broadband. The first is to fill in the not spots. The second is to improve broadband performance for subscribers that are some distance from exchanges.

The options

There are few technical options for delivering the 2021 bandwidth and these are the same as the options for extending the reach of networks that is so necessary to provide broadband to farms. These are:

- Fibre to the cabinet or kerb. Glass fibre is installed to an intermediate distribution point in the access network, and DSL or similar copper wire based technology is used for delivering services to the premises. Transmission over glass fibre goes many ten's of kilometres without degradation, and therefore such technology can be used to infill not spots and to provide high speed broadband over long distances.
- Fibre to the premises. The copper telephone wire is replaced with fibre all the way to the home or business. This will provide almost limitless capacity over distances of tens of kilometres.
- Cable. Cable will deliver high speed access but this will be shared amongst a number of users and will only cover 50% of houses, all in urban areas. Cable based broadband technologies can already satisfy the 2021 requirement if configured to do so, but will not be deployed in rural areas.
- Wireless. Various wireless technologies are available but all have physical limitations and cannot practically deliver the speeds. Current 3G technologies and WiMax can deliver broadband at 2008 speeds. 3G services have not been widely deployed in rural areas. WiMax could be implemented in not spots but early indications are that it is expensive deploy.
- Satellite. Satellite broadband services are available currently but can be relatively expensive and service is variable. Satellite will not have the capacity for universal delivery of broadband but will continue to be used to provide services to isolated premises.

Majority opinion is currently that the best technology options for future broadband are either fibre to the kerb or fibre to the premises. Both technology options work and both meet the requirement. Choice of technology for particular areas is likely to be based on cost and ease of implementation within that area.

There are essentially three options for delivering services based on one or other of these technologies:

- Deployment of an open broadband access network by Openreach, BT's business in regulated services. The network would be open to any telecommunications company (telco) to offer broadband services based on a regulated wholesale services offer from Openreach. Openreach has indicated that it will be moving to fibre based infrastructure in significant new build and is assuming that this is an open access network.
- Deployment by another telco; this may be either an open network or a closed network, only offering retail services through the owner of the network.
- Deployment of an open broadband access network by a local or regional authority or a public private partnership.

Ofcom, the UK telecommunications market regulator, requires BT to offer wholesale equivalents of some of its services to other telcos so that they can compete with BT in markets where BT is particularly powerful. Ofcom determined that BT's control of the copper cabling in its access network gave it significant market power in broadband access and in line rental services. Ofcom has therefore required BT to open up its copper access network to other telcos, so that they can use it on the same terms as BT's retail operation. It has done this by requiring BT to offer wholesale telephony and broadband services in such a way that BT's retail operation and other telcos have equivalent inputs. These inputs are not only the services themselves but the method of procuring the services and subsequently managing the services. To ensure that this happens, BT, with the agreement of Ofcom, placed its regulated infrastructure business into a separate organisation, Openreach, which is independent from the rest of BT from both financial and management perspectives, although it remains wholly owned by BT.

Openreach would be responsible for any new fibre access network. Ofcom's intention is likely to be to ensure that any fibre access network provided by Openreach is open, that is available for use by any competing telco on equivalent terms to BT. Such regulation has to be fair to all parties, and Ofcom is currently conducting a consultation into Next Generation Access which is intended to ensure such fairness.

There are two consequences from the regulation of Openreach by Ofcom:

1. The wholesale prices for broadband are highly regulated and cost based. Because of its scale and the very high level of take up in the market, it is unlikely that any competing infrastructure could compete with Openreach on cost terms. It can only compete by providing an alternative set of services which are more attractive in the market.
2. Openreach cannot introduce new services without a consensus formed between itself, its customers who are the UK telcos, and Ofcom. This causes some delay in the introduction of services. Nevertheless, Openreach is now working closely with the sector to define services for the fibre based access network at Ebbsfleet.

The opportunity for other telcos to gain advantage by offering higher speed broadband services is therefore limited. It is limited first by BT's stated intention to provide fibre to substantial new build areas, and secondly, by its role as the provider of an open broadband access network on behalf of the whole sector. The window of opportunity for another telco is short in relation to the economic life of a fibre access network. Moreover, the opportunity for higher speed broadband has yet to materialise and may not do so before BT starts to roll out a fibre network. In general terms, therefore, BT has essentially foreclosed the broadband market for other telcos and for profitable delivery of services by a public authority. This means that there are only limited opportunities for other operators and public authorities to intervene and provide fibre based broadband services. These are essentially in enduring not spots.

The way forward

There are currently two major fibre projects in the UK: South Yorkshire and Ebbsfleet. South Yorkshire covers Sheffield City Council, Rotherham Metropolitan Borough Council, Barnsley Metropolitan Borough Council and Doncaster Metropolitan Borough Council. The project will be undertaken by Thales and will provide fibre to the cabinet or kerb.

Ebbsfleet is a development near Blue Water in Kent and will ultimately comprise 9500 homes, commercial, retail, community and leisure facilities on 1000 acres of land. The Ebbsfleet pilot is particularly interesting in that it will test Openreach's ability to deliver fibre to the home in new build areas and will allow Openreach, British Sky Broadcasting, telcos and ISPs to establish a broadband product set that can be delivered over fibre.

Going forward, there are significant differences between new build and replacement of copper infrastructure which impact on deployment priorities. In new build areas, Openreach has to provide an infrastructure, and the current view is that in terms of life time costs, it is more cost effective to provide a fibre network than a copper network. Therefore, it makes sense for Openreach to install fibre rather than copper provided its telco customers have services to offer.

In built areas, there is a copper infrastructure already. Its replacement by fibre would represent an additional cost to Openreach, and this would add very significantly to its cost base. Openreach would need to pass on this cost to all its telco customers who would then have to pay more for their wholesale services. Therefore, it is unlikely that Openreach can move forward with such redevelopment without an industry consensus. Furthermore, Openreach would seek to minimise its exposure in terms of new investment while continuing to meet customer demand. Therefore, Openreach would prioritise fibre replacement based on a return on investment. On this basis, it might consider large not spots and areas where broadband performance is poor as early candidates for fibre, leaving areas closer to exchanges where broadband performance is better until later.

The scale of the investment required by Openreach would mean that the replacement of copper with fibre would be protracted and as a rational investor, it is likely that Openreach would leave isolated farms and communities without broadband unless required to do so, through a redefinition of the universal service obligation and particularly the criterion for 'functional internet access' that was set at 28kbit/s in 2003 and has not been revised since.

It could be asked whether any other investor, including the public sector, would be able to invest in competition with Openreach in isolated not spots. This is unlikely. All would face the same problem of returns on investment, and a public investor would have to make an economic return on its investment to avoid state aid issues unless the investment was below de minimus limits.

In conclusion

While Openreach will inevitably start to provide fibre in the near future, it is likely that isolated settlements will continue to be disadvantaged unless BT is required to provide an infrastructure suitable for broadband through a universal service obligation. There are fundamental economic and social reasons for including broadband in the USO since without its inclusion; we are possibly heading towards a far worse digital divide than was the case in 2003.

About the author

David Hughes, of Intercai Mondiale Ltd (David.Hughes@intercai.co.uk), has a substantial portfolio of public policy, strategy and regulatory projects carried out for governments and telecommunications regulators building on more than twenty-five years experience in telecommunications and IT. His particular focus has been ICT sector policy and strategy, regulation including the provision of broadband services in rural areas and universal service policy, regulation and implementation. David Hughes is a Member of the British Computer Society and a Chartered Information Technology Practitioner.