



## RTT TECHNOLOGY TOPIC March 2012

### Making Telecoms Work in Rural areas

This month's technology topic is about bridging *the digital divide*.

*The digital divide* is either the gap between rich and poor people and or the gap between people living in rural and urban areas. People in rural areas tend to be poorer so bridging the digital divide normally implies servicing customers who are expensive to access and have the least money to spend.

In the US, the FCC is planning a [\\$300 million reverse auction](#) in September as a mechanism for getting mobile broadband coverage to rural America. A second stage auction is planned which would take the available subsidy to \$500 million linked to the release of 500 MHz of additional spectrum. A reverse auction is where the winning bidder is the entity who accepts the smallest subsidy in return for taking on a service obligation normally defined in terms of geographic and or population coverage.

The assumption is that the economics of deployment will be more favourable using wireless (unguided media) rather than guided media (cable, copper or fibre). In practice any build out plan is going to be dependent on several or all of these delivery technologies.

Getting communications to deep rural areas or out at sea or on deserted mountain tops or in the middle of the desert or deep underground can be technically challenging and economically problematic even for geographically compact countries like the UK .

In November 2011 the [Department for Culture, Media and Support](#) produced a report on the lessons learnt from the pilot schemes established to test the technical and economic viability of establishing a superfast broadband network that would include deep rural coverage. The rural pilot projects were in Cumbria, Herefordshire, the Gloucester Borders, North Yorkshire and the Highlands and Islands in Scotland. Digital Rutland was added in September. Any mix of technology could be proposed.

£530 million was allocated within the lifetime of the present parliament with the money allocated and administered by a team of people within the Department known as Broadband Delivery UK. BDUK is tasked to work with local bodies defined as any public sector organisation able to demonstrate a capability to deliver local broadband connectivity with an ability to match any BDUK funding allocation. These are expected to be either specific local authorities or groups of authorities working together in Local Enterprise Partnerships.

The theory is that it will be possible to demonstrate that there will be enough potential demand to justify private sector investment. Three of the four pilots adopted an investment gap funding model in which BDUK agree a public contribution which would be sufficient to make the supplier's investment viable. The fourth pilot adopted a public sector owned supplier model though this was considered to imply additional risk which would be hard to quantify.

Each pilot had different coverage and service aspirations. Connecting Cumbria aimed for 100% geographic coverage at a minimum speed of 2 Mbps.

The Highlands and Islands had a plan to build out next generation broadband from 50 towns extending initially to a 20 km radius.

North Yorkshire had a plan for 250 high speed digital hubs that would provide interconnection to community based service providers.

Borders Broadband aimed to bring universal standard broadband to deeply rural areas and Rutland aimed for 99% county coverage by 2013.

Similar projects are on-going with county councils in Norfolk, Wiltshire, Devon and Somerset and Suffolk with similar coverage and service ambitions. (Think Iowa though much smaller but almost as flat).

Most of the projects could demonstrate financial, economic and or community benefits with North Yorkshire including the police, fire, health service and national parks as co-partners. Cumbria has proposed a Public Sector Network which would also support joint working with the police.

There is some available funding from the European Regional Development Fund for 'last mile' connectivity and some identified potential to impose a community infrastructure levy on developers.

The concept of localisation is sensible in terms of shaping local solutions to local requirements but the problem is that any potential supplier has to engage with multiple 'authorities' which increases cost. Any locally specific requirements will be difficult to meet due to all of these markets being significantly sub scale.

Nationally based initiatives are however also making slow progress.

On the 7<sup>th</sup> April 2009 the Australian Government announced it would establish a new company to design build and operate a new high-speed [National Broadband Network \(NBN\)](#) with a mission to deliver 100 Mbit fibre to 90% of the population within eight years at a cost of \$43 billion, the nation's largest ever infrastructure project. The proposed funding consisted of an initial government investment of 4.7 billion dollars with the balance as a mix of 51% government bonds and 49% private funding. It was calculated that the scheme would generate 37,000 jobs. The cost equated to a public funding investment per household of 1650 euros. New Zealand has a similar programme that equates to 600 euros per household. The equivalent UK national commitment at the time was three euros.

A private sector group started work in Brisbane in early 2011 with a plan to use the underground sewer system as a delivery network but the company became involved in an investigation by the serious fraud office following a failure to deliver on a similar project in the UK.

On the 12<sup>th</sup> November the Australian Minister for Broadband Communication announced it had reached agreement with a nominated vendor to start the [national roll out](#). The contract was worth \$141 million for an initial period of two years with a potential value of \$341 million if extended for a further two years – a tad short of \$43 billion.

In January 2009 the Obama administration announced a \$30 billion dollar 'broadband for all' investment with the amount of tax credit linked to the service delivery speed, a broadband bond issue was also proposed.

[In February 2011](#) the President promised a \$5 billion investment on rural broadband and a \$10.7 billion investment in a public safety broadband wireless network at 700 MHz. This was to be paid for from the \$27.8 billion to be raised from the auction of the 500 MHz of spectrum, except that as per our opening paragraph this has now become a reverse auction in which the money flows in the opposite direction. The rhetoric of political promise rarely matches practical reality.

Of course not all countries are the same. In September 2010, internet service providers in Singapore started providing 1 Gbps broadband over fibre at a similar price to ADSL and cable. 75% of the population had access to the service by August 2011 with 95% coverage promised by June this year but this is a country the size of the Isle of Wight with 5 million people, lots of money and an autocratic government that decides what to do and does it.

And that is part of the problem. Democracy is a fine and wonderful institution but it comes with a cost attached. Governments that have four of five year election cycles are not well positioned to realize multi-billion dollar infrastructure investment particularly with the present levels of public debt but so far alternative financing initiatives have proved problematic, the PFI (Private Finance Initiative) schemes in the British health service being a recent example.

In a previous technology topic ([July 2011](#)) we have written about the wonders of the Victorian sewerage system, a massive undertaking that resulted in an infrastructure that has remained serviceable for 150 years. This was only possible because it was extravagantly over dimensioned and paid for by

government funds.

This was not the case with either the railways or the telegraph system both of which relied on private sector investment. Many of the railway companies and most of the telegraph companies went bankrupt. One of the longest private sector survivors was the National Telephone Company whose trunk telephone service was taken over by the GPO in 1896 and by 1912 the GPO had become virtually a monopoly supplier of telephone services in the UK with only some local authority based providers as competition – the City telephone department in Kingston upon Hull being one example.

In 1932 the idea was put forward that the GPO should become nationalised but that didn't happen until 1965 when the GPO was split into two divisions, Post and Telecommunications. Telecommunications became British Telecom in 1980 but then everything changed again with the British Telecommunications Act of 1981 introducing the concept of competition. One difficulty is that the principle of competition has never sat particularly happily with the aims and objectives of the Universal Service Obligation.

The Universal Service Obligation was established by Rowland Hill in 1840 and was linked to payment using an adhesive stamp, the penny black. The profit from delivering mail in urban areas subsidized rural deliveries.

This translated across into telecommunications though without the stamps and meant that users could get telephone service in areas where it was not economically justifiable. Actually it probably was justifiable if you took into account that telegraph poles and twisted pair could survive for many years with minimal maintenance. The twisted pair into our house is at least 30 years old as are the telegraph poles and it's a miracle that ADSL works as well as it does.

But shareholders and in particular most institutional shareholders are looking for returns on something rather shorter than a thirty year investment cycle. The practical consequence of this is clear if we consider the announcement by BT of the C21 programme in the summer of 2004.

Billed as *the world's most ambitious and radical next generation network transformation* it promised to transform the communication infrastructure of the UK by 2010 *Using internet protocol technology to replace the existing networks and enable converged multimedia communications- from any device to any device.*

Actually BT is doing well with its broadband offer. The company is Britain's biggest broadband operator with a £2 billion investment programme to build a high speed network to reach 15 million homes by 2015 but that's still a 5 year slippage on the 2004 plan and the government's exhortation that BT should deliver broadband to rural areas has minimal collateral given that the company's first duty is to its shareholders. It can also be argued that the investment gap funding model does not fully accommodate the opportunity cost of servicing sub scale markets. Getting dividends out of bridging the digital divide seems an unlikely prospect.

This is illustrated by BT's latest financial results where profit before tax was up by 48% for the last quarter of 2011 with much of that profit coming from their domestic broadband customer base where they have 56% of the market. Virgin Media also posted its first annual profit with operating income up 134% for the same period based on 'Strong demand for superfast (30 Mb) broadband'.

These are profits from cable, copper and fibre urban connectivity **not** wireless rural connectivity.

As for the argument that wireless is cheaper on a per bit basis, that depends on how many bits you have to deliver and how far they have to go. The lowest cost way of getting gigabytes of data to your elderly aunt in Audley End is probably to post her a memory stick though the latency may be a bit of a problem (but you could include a letter and she would really like that).

All of the above explains why vendors are not presently volunteering to bridge the digital divide.

The UK is a tiny market in global terms and by the time the market is divided to local council level it is tinier still. There are also other priority spending areas where urban needs have had a gravitational effect on telecoms infrastructure investment, the Olympics being a present example.

These factors together suggest that Broadband Britain or certainly Rural Broadband Britain is not going to happen without public funding at a level which is presently unaffordable and it is hard to see how other countries with similar political systems and similar levels of debt will do any better.

Except that we are moving into an era where fixed broadband delivered to urban customers is likely to make large amounts of money. The re imposition of the universal service obligation might just be the best solution and a merger between postal and telecommunication services might also work as well.

## Ends

More detail on this topic can be found in our new book 'Making Telecoms Work – from technical innovation to commercial success.' Chapter 1 is available as a [free download](#) from the John Wiley web site but the best bits are in the other twenty chapters and you can buy the whole book on Amazon by going to the [RTT book shop](#)

One of the challenges of delivering mobile broadband into rural areas is that the networks are uplink limited. This problem can be compounded if the maximum power output capability of user equipment is reduced in order to meet linearity requirements. Two short studies are available on this topic, ***Improving the consumer experience in LTE*** quantifies the opportunities for realising customer value by improving the RF efficiency and linearity of RF power amplifiers in user equipment.

***The Impact of User Equipment Uplink Performance on LTE Network Economics*** analyses the related impact of these efficiency improvements on network costs and network value.

Both reports can be requested via the [Making Telecoms Work web site](#)

If you have a specific interest in the delivery economics of mobile broadband in rural areas there is a workshop in London on March 8<sup>th</sup> organised by Cambridge Wireless which can be booked via [this link](#).

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## Contact RTT

[RTT](#), the Jane Zweig Group and [The Mobile World](#) are presently working on a number of research and forecasting projects in the mobile broadband, two way radio, satellite and broadcasting industry. If you would like more information on this work then please contact [geoff@rttonline.com](mailto:geoff@rttonline.com)

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