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Title:	Discussion on Broadband in Wales

Submission[1] by Professor Mike Tedd
Chairman, Welsh Advisory Committee on Telecommunications (WACT)

1 Introduction

The word 'broadband' is now widely misused to cover all 'always-on' data services faster than those available over an ordinary dial-up analogue telephone line. This is an enormous range of services, from those available using DSL technology over analogue lines, to extremely fast services which can only reasonably be delivered over fibre-optic cables.

The lower end of this range, covering bandwidths up to 2 Megabits per second, is important for very many people and businesses in Wales. Most of my submission concentrates on this lower end, and for convenience I will use the term 'broadband' to refer to this end of the range – services such as ADSL, cable modems, point-to-multipoint radio, and shared satellite services.

Very high bandwidths are needed in Wales, but only by the largest and very demanding organisations, and also whenever one is building the backbones of networks to serve many users at lower speeds. High bandwidth services present very different problems, which I cover briefly in section 5 below.

2 The Benefits of Broadband Services

Of course not every individual or every business will benefit from broadband, but many can, and often they are not yet aware of the potential.

Broadband services are *always-on*, with *no call charges*, but just a subscription. Being always-on eliminates the time and hassle of connecting and disconnecting, and makes it natural to communicate more frequently and quickly.

Following BT's wholesale price cuts in early 2002, ADSL subscriptions are now as little as £22.50 a month. Cable modem charges are similar, and can be lower if taken as part of a package with other services. This means that broadband costs no more than dial-up access on a line installed for the purpose.

Applications for broadband have been extensively described elsewhere, so I will say only a little about them. Most come down to improved *communication* and to *ready access to information*.

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[1] This paper is derived from the submission I made to the Welsh Affairs Select Committee in March 2002, updated in the light of the rapid developments since then.

Communication through email and form-filling of Web pages is rapidly taking over the roles of post and fax. The abilities to send documents, place and receive orders, operate bank accounts and so on, within seconds, all transform many of the functions of small businesses or of individuals working from home. These functions become cheaper to perform and more reliable as well as much quicker. With the growing tendency to send quite large documents by email, broadband is needed to avoid irritating delays.

Access to information can be vital for many small businesses. A good example is someone who repairs electrical and electronic equipment and needs access to service manuals. These are available on the Internet, but can take as much as an hour to download on a dial-up (narrowband) line; on broadband this reduces to a very few minutes. Accessing things like catalogues with detailed pictures is uncomfortable without the speed advantages of broadband, and anything that involves moving pictures is too painful to use on narrowband.

Working from home, as I frequently do, has been transformed by having broadband. I can access essentially all the information I need with little hassle. I develop large documents, exchanging drafts with colleagues without delays. Email is now definitely my preferred method of communication.

3   The Take-up of Broadband

By 1st November 2002, over 1,100,000 users had subscribed to broadband services. Take-up has quadrupled compared to a year earlier. It is probably the fastest rate of adoption of any new technology, having been fired by massive promotion budgets, aggressive pricing and special deals.

Some industries have adopted broadband very quickly. For example, commissioning organisations expect media creating companies to use broadband to deliver their products, allowing very fast turnarounds during development – much faster than posting tapes and discs around, which is what used to happen. There are a number of small media creating companies in rural Wales who are suddenly disadvantaged by not having the broadband lines enjoyed by their urban and suburban competitors.

In Wales the picture is encouraging in some respects, discouraging in others. The rate of growth of ADSL users is larger than elsewhere in the UK; in the last 12 months for which I have figures, the total for Wales has increased nine-fold and in the ten Pathway towns it has increased five-fold, compared with a national four-fold increase. However, the absolute level of use (9000 ADSL lines in Wales) is only about 55% of what one might expect from the overall UK total. But then the availability of ADSL in Wales is only half the UK figure.

4   Availability and Costs in Wales

Two broadband technologies, ADSL and cable modems, are already deployed in significant parts of Wales. Two others, terrestrial and satellite radio, are also important.

4.1   ADSL

ADSL uses high frequency signals over the ordinary copper wires from the exchange to the customer premises, without interfering with normal telephony. It is a very cost-effective technology and (for years to come) will be the main way to deliver broadband to users without access to cable.

Only BT Wholesale currently offers ADSL technology in Wales, as far as I am aware. Customers buy the retail service from any one of about 200 Internet Service Providers (ISPs), such as Freeserve and Pipex as well as BT Openworld, all of whom buy the wholesale product on the same basis from BT Wholesale.

For the typical ADSL service[2], BT Openworld now charges £29.99 (inc VAT) a month[3]; AOL and Freeserve charge £27.99; Pipex charges £23.44 (inc VAT) a month. The ISPs pay BT Wholesale £14.75 (ex VAT) per line per month. The one-off costs of installation and customer equipment are £50 to £100. Higher speed lines are available at higher prices.

BT has installed ADSL capability as part of its normal commercial roll-out in the following exchanges: Wrexham, Bridgend, Caerphilly, Kenfig Hill, Porthcawl, Cardiff Central, Llandaff, Llanishen, Roath, Whitchurch, Gorseinon, Morriston, Neath, Port Talbot, Sketty, Swansea Main, Newport (Gwent), Llanelli, Cwmbran, Abergavenny, Pontypridd, Rhyl and Buckley/Bwcle. Merthyr Tydfil will be enabled in February 2003, soon to be followed by Rhiwderin, Chepstow and Caerleon.

As part of the Llwybr•Pathway project, BT has also installed ADSL capability in ten towns in rural Wales. These are the exchanges at Denbigh, Carmarthen, Haverfordwest, Pembroke Dock, Aberystwyth, Bangor, Caernarfon, Holyhead, Llandudno and Newtown. Public funds (WDA and ERDF) provided a 50% subsidy for this extra roll-out.

An interesting experiment using lower-cost equipment that serves fewer customers is underway at a number of UK exchanges, including Corwen and Penrhyndeudraeth in Wales. There is a small element of subsidy from the local authorities involved. This technology has the potential to take ADSL to many more exchanges in Wales.

ADSL has a maximum range of about 5.5 km, less if the line is of poor quality. So not all customers can enjoy ADSL even within the enabled exchange areas; BT quote 90% as a guide to the proportion of customers on a typical enabled exchange who can be served, but it could well be that larger exchange areas and older lines mean that the proportion is less in Wales.

BT's ADSL service is currently available to approximately 63% of UK households. BT estimate that this will rise to 80% in the next year or two. However the current availability figure for Wales is only 31% – easily the worst percentage for any region in the UK.

4.2   Cable Modems

NTL offer broadband, over cable modems, in most places reached by their telephone and cable television services. In Wales this includes Barry, Cardiff, Neath, Newport, Penarth, Port Talbot, Sketty, Swansea and Whitchurch.

For a service of similar speed to basic ADSL, NTL charge £24.99 per month, currently with free installation[4].

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[2] This service gives 512 kbps peak to the customer premises and up to 256 kbps per second from the customer premises. Contention on shared circuits and other constraints mean that the average performance is less, but this speed is sufficient to support 1 to 4 computers in a home or a small business.

[3] This is for a service including email and web space. BT also offer a 'no-frills' service for £27 a month.

[4] This is for a 600kbps service. 128kbps is available for £14.99 a month, and 1Mbps for £34.99 a month.

4.3 Terrestrial Radio

Various systems are available for delivering broadband data services using radio; their characteristics vary with the radio frequencies being used. Frequencies that are or could be used for this purpose include areas at 2.4, 3.4, 4, 10, 28 and 40 Gigahertz (GHz).

In general, the higher frequencies have shorter range and so can only serve a smaller area, but there is more aggregate capacity available. For example, at 3.4 GHz, 800 broadband customers might be served at speeds like basic ADSL up to 25 km from the mast, while at 28 GHz 5000 customers might be served each at significantly greater speeds but only over a radius of 5 km from the mast. Note however that transmission is essentially line-of-sight, so the Welsh terrain is unhelpful.

Overall I believe that lower frequencies, like 3.4 GHz, are most appropriate for rural areas, and could form an important part of the broadband scene in Wales. Note that studies conducted for the Radiocommunications Agency are very pessimistic about the business case for radio services in rural areas without subsidy.

The 2.4 GHz spectrum is 'unlicensed'; anyone can use it so long as they follow rules designed to allow different users to co-exist without swamping one another (rather like citizens' band radio). Typical uses include medical and scientific equipment and small wireless computer networks. There is also great interest in using this spectrum to deliver broadband; for example it is used by the Arwain network in Cardiff. The rules which must be obeyed by a 2.4 GHz network include a strict limit on power levels; this and the impact of other uses will limit both the area covered and the number of users supported.

Spectrum at 28 GHz was auctioned in 1999. It was no surprise to me when no one bid for any of the three licences for Wales. There will be auctions for spectrum at 3.4 GHz and 10 GHz, and I have major concerns about this (see section 6 below).

One example of an existing service provider is Liberty Broadband (previously called Tele 2), which offers a service with performance similar to ADSL using 4 GHz radio in parts of England, including Bristol and Bath. They charge a monthly fee of £39.99, with a one-off installation fee of £149. Following difficulties in 2002, Liberty is now concentrating on business customers.

4.4 Satellites

Broadband can be delivered from satellites using a dish on the customer premises. The up-link return path can be from the dish, or through the ordinary telephone network to a ground station; either way this is relatively slow. The time taken for radio signals to make the round trip is significant and degrades interaction, and so satellite broadband is inadequate for some applications.

Although quite a lot of spectrum is available, this is shared by all users of a satellite; satellites are costly and there are limits to how many satellites can be deployed. This means that satellite services cannot be both fast and cheap.

For a performance similar to ADSL, prices of £100 per month and £1000 for installation and equipment have been mentioned.

Satellites thus offer a potentially very important way for broadband to reach the most inaccessible users, but at a cost that needs to be subsidised before most such users are to be able to afford it.

5   Very High Speed Services

Very high bandwidths are needed in Wales, but only by the largest and very demanding organisations, and also whenever one is building the backbones of networks to serve many users at lower speeds. These services operate at speeds like 34 Mbps, 155 Mbps and above. They are delivered over fibre-optic cables and point-to-point microwave links.

Very high speed services are expensive; the tariffs typically involve charges for each end plus a distance related charge for the link between. As an example, the BT retail charge for a 155 Mbps Metro VPN link from Aberystwyth to Swansea has an installation charge of £42,000 and an annual rental of £89,000 on a 3 year contract.

BT offers a full range of high speed services anywhere in Wales. It is frequently noted that BT's retail prices are substantially greater than one might pay for service in an area like the Thames Valley where many other operators are competing. Distances in Wales are often greater, of course, and the well-publicised troubles of alternative operators may lead to less fierce competition in the future.

The services are often sufficiently lucrative for operators to justify investment in new plant (e.g. new fibre runs, and microwave over longer distances). In addition, BT Wholesale is required by OFTEL to make wholesale services available to other licensed operators, at cost-oriented prices which are much less than BT's retail prices. These two factors mean that other operators can compete with BT's retail offerings by a combination of new plant and leasing capacity from BT Wholesale[5].

6   Radio Licensing

As mentioned above, licences for 3.4 GHz and 10 GHz fixed wireless access may soon be offered by the Radiocommunications Agency. These frequencies are potentially very important for broadband in rural Wales.

There is a real danger that these licences will be auctioned in ways which will discourage use in rural Wales. For example, there could be an all-Wales licence area, with nothing to stop the successful bidder being interested only in serving part of Wales, such as the urban areas. (This is how the 28 GHz licences were offered. Fortunately no one bid, but the licences are still on offer.)

There are a number of ways to avoid such danger. One possibility might be to place coverage obligations with the licences, so that holders must ensure service in rural areas. Another would be to award the licences to a body (the WDA?) allowed and motivated to sublicense to sensible local schemes.

Last year, the Radiocommunications Agency announced that there will be auctions for the 3.4 GHz spectrum. The proposed licence areas are awful for Wales, even worse than an all-Wales area – four of the areas include parts of Wales, but are dominated by larger and more populous areas of England. There is thus a real prospect that one or more of these licences could go licence holder(s) with no interest in serving Wales. Fortunately the process has been frozen for review, and strong representations from Wales are

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[5] This is a growing proportion of BT Wholesale's turnover. In the year to March 2001, 30% came from other operators and 70% from BT Retail. In the year to March 2000, only 20% came from other operators.

feeding into this review. The outcome will be very important for Wales, especially the rural areas.

7 The Broadband Wales Programme

It has been recognised for many years that support from public funds for telecommunications infrastructure will be needed to ensure adequate availability in most of Wales. It is not cost-effective to roll out competing networks throughout Wales, and indeed there could be questions about using public funds to subsidise competition. It is thus likely that BT Wholesale's network will be a major focus for public support, although other operators may be involved to some extent. Other operators and service providers will benefit from such support and may well applaud it – so long as BT Retail receives no cross-subsidies or operational preference.

Addressing the provision of infrastructure is only half the picture. It would be irresponsible to install advanced networks that don't get used, but awareness of the potential of advanced services is low in Wales, and skills are in short supply. This all limits the demand for advanced services. We need to raise demand, both to ensure that Wales gains the maximum benefits from advanced services and to encourage suppliers to invest private funds alongside the public support.

The Broadband Wales programme is thus very necessary and very appropriate. There will be a balance of demand side measures (to raise awareness, and to aggregate and encourage demand) and of supply side measures (to stimulate the provision of broadband itself).

The rapid uptake and widespread availability of broadband throughout the UK are dramatic. Wales is lagging behind, which makes it very important to implement the Broadband Wales programme as quickly as possible.

Some parts of the Broadband Wales programme are up and running, such as the subsidy to SMEs installing satellite broadband where there is no alternative. I understand that a proposal to the Objective One programme for support for local initiatives is nearly ready. But I am concerned that there is no visible progress on supply side initiatives such as support for enabling more exchanges to provide ADSL service.

8 Summary

1. Broadband is important for the social and economic development of Wales.

2. The availability of broadband[6] in Wales, especially rural Wales, is lagging behind that in other regions of the UK. Rectifying this is becoming urgent.

3. No single technology can sensibly deliver this throughout Wales. ADSL, cable modems, terrestrial radio and satellite systems all have roles to play.

4. Fixed wireless access licences should be awarded in a way that meets the needs of all of Wales. The 3.4 GHz situation is an immediate worry.

5. The Broadband Wales programme has a good balance of measures to stimulate both demand for and supply of broadband in Wales. I applaud the programme and would like to see rapid progress with its implementation.

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[6] Apart from satellite services, which are expensive and inadequate for many users.