

Briefing Note 18

Broadband in Kirklees

This Briefing Note focuses on broadband availability in Kirklees. This issue has risen to the top of the political and economic agenda as we increasingly rely on effective information and communication channels to carry out everyday tasks that effect both our communities and the local economy.

The note begins by defining broadband and highlights some of the key functions it enables, for both domestic and commercial users. This is followed by a brief description of the two main broadband technologies available, and their network coverage in Kirklees. The final section reviews alternative technologies that can address the gap in broadband provision in the district.

1. Broadband - definitions and applications

1.1 The term 'broadband' refers to broader digital data channels which are used to transmit signals or to carry internet traffic across a public network. Broadband is technically defined by the rate at which data is transferred across a network, and is measured in kilobits per second (kbps).

The traditional method of accessing the internet and transferring data has been through a standard modem and telephone line. This is referred to as 'narrowband' and has a maximum data transfer rate of 56 kbps. A consensus within the industry places the minimum speed for broadband at around 200 kbps, that is, at least four times faster than narrowband.

An added complication is whether the data transfer speed applies in both directions (downloading and uploading). Currently, most UK broadband suppliers offer download speeds ranging from 512-1000 kbps, with slower upload speeds.

1.2 Applications of broadband

Broadband opens up a number of possibilities, as it enables us to access more sophisticated software and an array of new applications that require greater volumes of data accessed at much higher speeds. Some of the key applications of broadband for domestic or business users are detailed below.

Households

Typically, households using broadband will have one or two computers that require simultaneous access, through a local area network or just a single machine. The priority for such users will be higher download speeds, with relatively less uploading taking place. Key uses and benefits of broadband for this user group include;

- **Web-surfing** – improved efficiency through rapid access to web sites with elaborate graphics and sound, for uses such as banking, shopping on-line and instant messaging..
- **E-Learning** - quicker access to course materials and improved uploading of assignments.
- **VoIP** - the use of a data network to make voice calls. Use of this application is likely to increase greatly in the future as the public becomes more aware that they can make cheaper voice calls using their computer..
- **Video calls** –using web cams to see the caller. This is also likely to become far more widely used as data transfer speeds increase and the quality of web cam products improves.
- **Gaming on-line** – use of gaming environments which are populated with many players, requiring the transfer of data at very high speeds in both directions..
- **Video on demand** – broadband allows you to either download a new film for a hire charge or get the video streamed to your PC as you watch it.
- **Accessing e-Government services** – improved access to government, local authority, health and community services from home.
- **Working or running a business from home** – more efficient downloading and uploading of data to or from a central server, for publishing information on the internet, for example..

Businesses and community groups

This group are likely to be heavy users of on-line services and will require multiple access for their staff. Upload speeds will be very important for this user group, since they will probably be maintaining a website and replying to enquiries. Broadband could be used by businesses and community groups in a number of ways:

- To provide clients with an interactive web experience, which ensures they return to the site.
- To deploy large databases, financial management systems and applications for employees to access from multiple sites.
- To make use of specific applications that facilitate staff training through multimedia services.
- To set up a company intranet for mobile and remote workers to access.
- To provide generic e-commerce services, including on-line catalogues and payment facilities.
- To establish Virtual Private Networks for home workers, allowing them to access all on-line services provided to staff.
- For smaller businesses, broadband is a cost effective alternative to being on-line, as it is a fraction of the cost of other access channels, such as ISDN.

2. Broadband coverage in Kirklees

The first part of this section focuses on the two major types of fixed-wire technology used to deliver broadband to UK homes and businesses; ADSL and Fibre-optic cable. The second part assesses the current coverage of broadband infrastructure in Kirklees, through these two delivery methods, focusing in particular on areas that suffer from limited or no broadband service.

2.1 Broadband via ADSL

Broadband via ADSL is delivered through a standard telephone line. ADSL (Asynchronous Digital Subscriber Line) was designed as a broadband solution for domestic use, since uploading is usually half the speed of downloading, which is fine for most domestic use. All the leading Internet Service Providers offer products for both domestic as well as business users.

Broadband via ADSL can only function where the existing standard telephone exchange has been upgraded to digital, to enable broadband communications. British Telecom (BT) own all the local telephone exchanges in the UK so their investment in upgrading local exchanges is key to the provision of broadband via ADSL across the country. It is for this reason, that BT's strategy for investment in infrastructure has taken on political dimensions in recent years.

BT strategy for the digital upgrading of telephone exchanges, to enable ADSL, has been piecemeal. Their decision is based on attracting enough potential subscribers to make the investment in upgrading the exchange commercially attractive, because the cost of upgrading an exchange can exceed £500k.

However, even when the nearest telephone exchange has been upgraded, broadband communication and high data transfer speeds can not be guaranteed for local residents, since other factors also need to be considered. One of these factors is the distance between the user and the local exchange – since in most instances, the electronic signals will be travelling down

copper wiring between the two. The telephone network in the UK still relies heavily on a copper-wire infrastructure originally designed for analogue voice communication, though it is being gradually replaced by fibre optic cable for digital data transfer. Currently, ADSL requires that users need to be within 6.5 kilometres of their respective digital telephone exchange – which is more likely to be an issue in rural areas where residents can be spread over a larger area. Also, distances greater than 3.5 kilometers from the local exchange are likely to result in the digital signal becoming degraded, reducing both the up and downstream data transfer rates and so compromising the true broadband capability.

The map in appendix 1 identifies the location of BT's digital telephone exchanges in Kirklees - indicated by the circles. Each circle is drawn with a radius of 3 kilometres, the lower range of coverage for ADSL, meaning users within each circle (marked by the tiny flags) will definitely have the option of accessing broadband via ADSL, because they live close enough to the exchange. However, this can not be guaranteed for those beyond this approximate boundary.

The problem is compounded by the prospect that for commercial reasons, BT is unlikely to ever upgrade the copper-wiring infrastructure in rural areas, due to the limited demand and the scale of investment required in such dispersed geographies. New BT telephone wiring, using fibre optic cable, isn't constrained by proximity to the local digital exchange. However, upgrading of BTs network to fibre optic cable is concentrated in new business and housing development areas, where the demand is high and the return on investment is almost guaranteed.

In conclusion, almost all of BT's telephone exchanges that serve Kirklees residents are enabled for broadband via ADSL. However, due to the copper wire infrastructure that delivers the broadband signal, many areas will only ever have limited or no access to scaleable broadband.

2.2 Broadband via cable

Broadband internet access can also be delivered via the cable television network developed by the two leading UK cable companies – NTL and Telewest. Much of the cable infrastructure is based on fibre optic cable, which is ideal for broadband internet - allowing for data transfer speeds well beyond those possible with ADSL. Fibre optic cable removes the need to be close to a digital exchange, but data transfer rates can vary depending upon the number of users accessing the service at any one time.

In Kirklees, NTL have invested in the development of the cable television infrastructure over the past decade. However, cable coverage is still only available in built-up areas, which reinforces the belief that cable has been an urban phenomenon.

Areas covered by NTL's cable infrastructure include Huddersfield and the surrounding areas, parts of Fenay Bridge and Kirkburton, Meltham and parts of Honley, Mirfield, Ravensthorpe, Overthorpe, Thornhill, Dewsbury, Batley and Heckmondwike. The areas shaded in grey on the map in appendix 1 indicate the coverage of cable.

NTL and Telewest (another national cable operator) have traditionally offered their analogue and digital television, telephone and broadband internet services to residential customers. However, both companies have recently been marketing their broadband services to smaller businesses that fall within the coverage area.

Overall, the severe debt levels of these two main cable companies in the UK, will limit their ability to expand their cable coverage and infrastructure significantly in the near future. In fact, both cable companies aim to expand services to existing customers and increase revenue and sales per client, as opposed to expanding their customer base by seeking new subscribers.

Hence, in Kirklees, it is unlikely that fixed wire broadband via cable will provide a solution to the more remote and rural parts of the district, which also lack ADSL coverage, in the foreseeable future.

3. Solutions to the broadband gap

The 'broadband gap' is defined in this context as where either no or only limited broadband coverage exists, through ADSL or cable. The map in appendix 1 shows areas of coverage of broadband compared to address points in Kirklees (used as a proxy for population concentrations by representing residential and business locations). The map indicates that many locations, particularly in the south of the district, are not serviced at all by either broadband option. In contrast, most major urban and semi-urban areas have both options available.

The commercial reality facing both BT and NTL is that any expansion in broadband coverage to reach all households in Kirklees would require heavy investment in improving the infrastructure. This investment is unlikely to generate any return within a commercially acceptable timeframe (e.g. 10 years) and therefore the coverage of fixed wire broadband is unlikely to change via ADSL or cable.

With these financial constraints on the expansion of wired broadband, wireless broadband must be considered as a more cost effective option, in some cases.

3.1 Fixed wireless

Wireless broadband is available through a range of current and new technologies, but essentially, needs to be linked to a wired infrastructure, at some point. Nevertheless, this type of technology is seen as a solution to expanding broadband coverage to areas the wired infrastructure does not reach.

However, fixed wireless can be limited by physical geographical obstructions, such as hills. It may require a line of sight connection, with any temporary physical obstruction degrading or halting the link. Nevertheless, this technology has been successfully deployed by community groups in rural areas to create a broadband internet service provision for local rural businesses and residents, where no ADSL or cable option exists.

Fixed wireless broadband could be a solution for the areas identified as having no viable broadband option in the rural parts of Kirklees. It could be delivered by using and extending the wired network of BT, NTL, cable or even Kirklees Council's Managed Data Network, by using mesh radio or longer range wireless technologies detailed in the box below.

Using the Kirklees Managed Data Network to extend broadband

The Managed Data Network (MDN) of Kirklees Council is spread across the district. It offers a potential solution to patchy broadband coverage in the district. The MDN's original purpose was to link all council offices across the district, including public facilities like libraries and schools.. Kirklees Council is unique in owning such a well developed and geographically diverse digital data network.

The map in appendix 1 highlights the location and reach of KMC network points. It also demonstrates the relatively high degree of correlation between these network points and the dispersed address points, particularly in the more rural south of the district.

Recently, Kirklees Council has undertaken a technology trial, using wireless (mesh radio) technology. Several local businesses in the Marsden area have been offered low cost broadband access using the KMC network and via wireless access points. The aim of the trial has been to determine both the viability of the technology as well as the impact on the KMC network of distributing bandwidth in this way. If the trial is successful, then this type of solution may be rolled out to other parts of the district, where there is limited or no broadband coverage.

In addition, Kirklees Council is working with ADIT (the regional broadband procurement agency) and neighbouring local authorities, to develop a different project to tackle the broadband gap in many rural parts of the West Yorkshire.

3.2 Satellite broadband

Several companies offer both domestic and business users the option of broadband via satellite, using similar technology to satellite television. The cheaper broadband satellite service operates by using a one-way satellite dish to receive data (downstream) and a traditional telephone line for the upstream link (for uploading data) – costing a little more than ADSL/cable broadband. However, two-way satellite broadband can cost a lot more. Another drawback is that satellite broadband can be seriously affected by weather conditions.

Despite this, new services are being launched all the time, such as one offered by Aramiska, known as ARC 2000+. It is a broadband satellite solution for both businesses and rural communities, with data transfer speeds similar to ADSL. However, with charges for business users ranging from £300 per month on top of an installation charge exceeding £500, and community groups facing a total fixed cost of £5000, it may still be regarded as prohibitive for smaller businesses or community groups with only a handful of users.

3.3 Other alternatives and new technologies that deliver broadband to parts of Kirklees

- WIMAX is a new technology that is being developed which could bring down the cost of longer range broadband. It uses the radio frequency 802.11a wireless standard, to transmit the digital signals. The potential of this wireless technology is massive, as it could offer bandwidth or data transfer rates approaching 70 mbps (mega bits per second) to a location that is 30 miles away, from just one base station, compared to standard Wifi which offers bandwidth ranging from 10-50 mbps within a range of a few hundred metres. Trials

are underway in both the USA and the UK. However, the conclusion of such trials and the deployment of the technology is likely to be a few years away.

- Mesh Radio Networks for small geographies.

This is the favoured solution of community networks within a small area – a way of sharing bandwidth, which may be delivered using traditional methods. Typically, a wired broadband connection using ADSL, cable, ISDN, satellite or long-range radio will be piped to a location such as a business, residence or community facility. From there the bandwidth will be relayed around the area using small antennae.

Community groups like Consume.net have promoted this technology and aim to offer a community broadband solution to areas. A typical monthly subscription to this service costs around £10 to £15 more than ADSL, with the cost of the antennae being additional.

- ADSL Signal Boosting – BT are currently evaluating this new technology in several locations across the UK, which may be able to boost the signal travelling down a traditional copper wiring. If this technology does prove to be successful, then it could resolve the key constraint of broadband via ADSL – the need to be close to the local telephone exchange.
- Community broadband networks – These are run by a small community of users, who work together to share broadband bandwidth in an isolated but compact geography, like a small hamlet or village. Typically, the main broadband signal is delivered to a location using a wired connection (ADSL, Cable or ISDN lines). The community network will disperse the bandwidth by cable, for users in the same building, and by mesh radio wireless for other users in the local area.
- 3G or third generation mobile networks – The main mobile telephone operators have invested heavily in the creation of 3G data networks across the UK, which have been designed to offer data and voice communications at a higher quality and bandwidth to mobile phone subscribers. These new networks could be used to deliver broadband, offering data transfer rates of up to 380 kbps to mobile devices and to fixed locations, such as a home or office. The two main constraints on using 3G for fixed location broadband would be the high charges likely to be levied by the network operator and a lack of coverage. Coverage may be more patchy in rural areas particularly, where there are likely to be fewer masts.

Summary and conclusions

- Broadband and the applications that will drive its demand are growing in significance for both businesses and domestic users. Both households and businesses that are unable to access broadband will become increasingly isolated and economically disadvantaged.
- The lack of any major investment to bridge the gaps in provision in broadband has major consequences for local communities in less populated parts of Kirklees and the UK. Traditional ways of accessing broadband are either limited or non-existent in many parts of the district, particularly in rural areas with dispersed communities.
- There is no single source of funding to help local authorities tackle broadband gaps in their areas. EU funding, (which exceeds £100k), can not be used for developing network

infrastructure by public sector agencies, as this would contravene State Aid rules. Similarly, each Regional Development Agency in the UK has pursued a different strategy in tackling broadband provision.

- The new regional aggregation boards, called ADITs, have been set up to try and better coordinate the purchase of broadband bandwidth from the private sector. Kirklees Council is working closely with the Yorkshire & Humberside ADIT to complete a feasibility study on extending broadband coverage in Kirklees and other rural-urban fringe areas across West Yorkshire.
- New technologies are being looked all the time to increase network coverage. However, the deployment of these solutions will require additional investment by either Internet Service Providers, network infrastructure companies or by public agencies seeking to tackle economic and social exclusion.
- Various wireless solutions exist or are in development to increase broadband coverage. However, the real challenge for network operators will be to offer a cost effective and affordable network access solution to attract new users and subscribers to broadband services.
- Kirklees Council has been very proactive in trying to tackle the issue of broadband gaps in the district. It has been working both independently and in partnership with a range of organisations in seeking solutions. The Council's own network is fairly unique in its coverage of the district and could be used as part of the solution to the lack of coverage.

This is one of a series of Briefing Notes produced by the Economic Development Service on key policy and research issues. For further information please contact:

**Muz Mumtaz, Economic Development Service,
Kirklees Council, Civic Centre 3, Huddersfield HD1 2EY
Tel: 01484 221656
Fax: 01484 221655
email: muz.mumtaz@kirklees.gov.uk**

Appendix 1

