

Next Generation Broadband

High Speed Trials - a Northern Ireland Case Study



Opening Statement



In Northern Ireland government and the telecommunications industry have worked together to ensure we have a world class telecommunications infrastructure. We were the first region in Europe to have a fully fibre optic core network and the first to have 100% first generation broadband availability.

However, we cannot be complacent. First generation broadband is rapidly being overtaken and the debate in the UK and in other countries is increasing about higher speed, next generation broadband. We must look to the future and what has to be done to ensure our businesses continue to have access to world class telecommunications.

The high speed broadband trials outlined in this case study involve two different next generation technologies and were carried out in conjunction with Virgin Media, Bytel and Clanmil Housing Association. These trials have made a valuable contribution to our understanding of next generation broadband access.

This case study outlines the key aspects of the broadband trial. I hope you find it interesting and that it helps inform the debate on next generation broadband.

Nigel Dodds OBE MP MLA

Minister for Enterprise, Trade and Investment

The next generation residential broadband trial was initiated by the Department of Enterprise, Trade and Investment (DETI)

The High-Speed Broadband Trial at a glance

- The next generation residential broadband trial was initiated by the Department of Enterprise, Trade and Investment (DETI), at a total cost of £67k¹, in order to test technical feasibility, cost and adoption of high speed broadband connectivity in a social housing development.
- The trial will allow residents in the new housing development to choose between traditional copper circuit - based telecoms services and next generation high speed connectivity based on both hybrid fibre-coaxial (HFC) and fibre to the home (FTTH).
- Two competing high speed broadband technologies have been successfully installed with operating speeds of 20 megabits per second. The fibre-optic backhaul and hybrid fibre-coaxial solution was provided by Virgin Media. The wireless backhaul and fibre to the home solution was provided by local company Bytel.
- The Bytel solution is based on Cisco exchange and cabinet equipment and can give connected customers access to full Synchronous (uncontended) IP. Ducted fibre to the homes is media converted in a terminal device with a fly-lead provided to an Ethernet port in residents' living areas. Residents can choose to directly connect via a network cable or to attach a wireless router to the Ethernet port.
- The Virgin solution is based on Cisco equipment and provides residents with high speed cable broadband services of 20 megabits per second. Virgin has also announced that it will be offering service of up to 50 megabits per second to subscribers by the end of 2008. In common with Virgin Media's wider offering across the UK, Ormeau trial customers will also be offered both cable TV and phone services - as well as the UK's most comprehensive TV on demand system, and V+, an HD-Ready high specification personal video recorder.
- Both solutions were implemented with little technical difficulties or major challenges. Given the extensive fibre optic networks available in Northern Ireland including Points of Presence (POPs) in most of Northern Ireland's main conurbations there are plenty of opportunities to deploy next generation broadband throughout Northern Ireland.
- The infrastructure for each telecommunications provider is completely separate with each provider using their own cabinets and ducts. All this has been incorporated alongside water, electricity and gas infrastructure.
- Both high speed solutions will allow residents to obtain so-called next generation broadband services such as video on demand, high speed video and TV streaming, Voice over IP services - and more, as new services, purpose-built for high speed IP, are rolled out.
- Completion of the trial has shown that provision of next generation broadband services to the home is now possible and can be delivered at relatively low cost.

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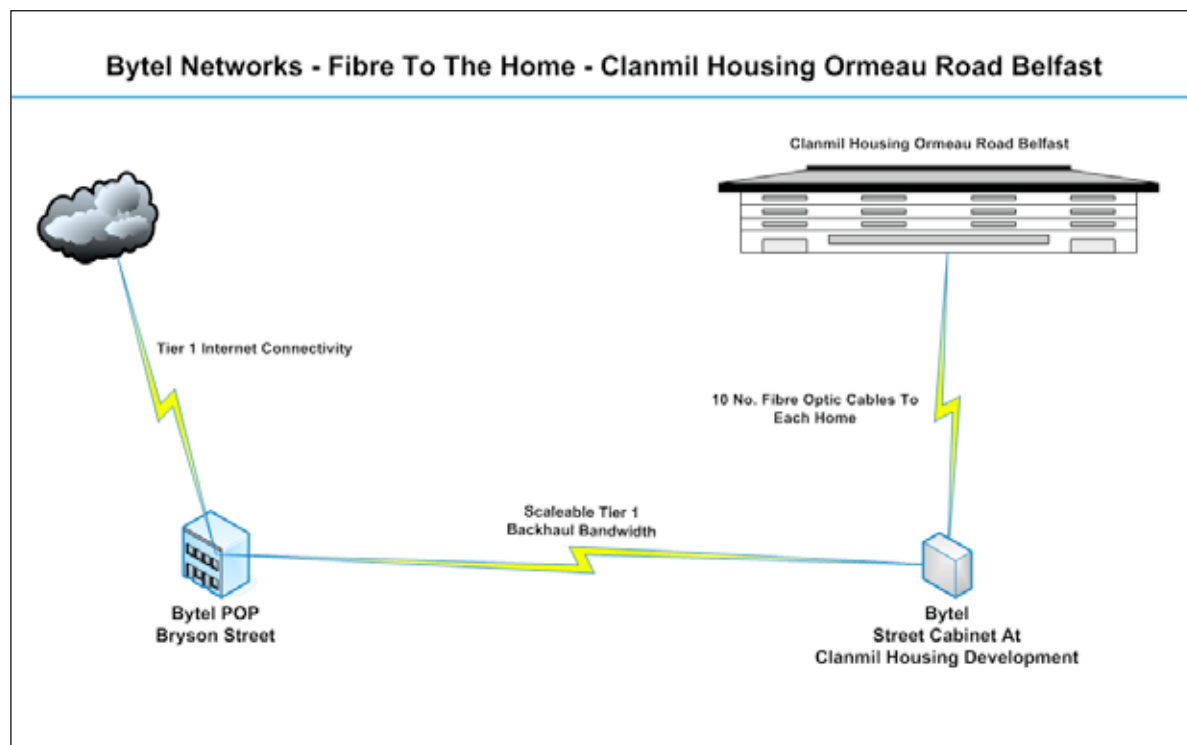
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¹ This includes £33k to dig the trenches for ducting of fibre optics. This cost may be avoided if the developer were to be approached at the design stages of site development.

Fig 1: Diagrammatic of Bytel solution



The Bytel Fibre to the Home Trial

Bytel is a locally owned, Belfast-based Internet and network service company that provides internet services and network access across NI. Bytel provides its business and residential customers with connectivity to Verizon's Tier-1 global internet backbone. Bytel corporate clients include Microsoft, Citigroup, the Northern Ireland Science Park and US film production company Playtone, which was recently in Belfast for the production of the Tom Hanks' film 'City of Ember'.

Bytel provides its own broadband connectivity rather than ADSL. ADSL-based broadband services are 'shared' by users on a circuit. It is for this reason that as more users are added to an ADSL circuit the connectivity speeds can slow because of the 'contention' on the circuit.

For the Belfast high speed residential trial Bytel proposed installing an end-to-end fibre based solution with access to its tier 1 circuits. While initial connection speeds offered to residential subscribers will be 20 megabits per second, the all-fibre implementation to 10 homes could offer gigabit speeds or so-called ultra high-speed broadband based on gigabit Ethernet.

As illustrated at Figure 1 above, the street cabinet distributes individual fibre connections to each home. The street distribution cabinets for this implementation were provided by Cisco. Backhaul connectivity from the cabinet to the Bytel POP in Belfast is provided by scaleable tier 1 fibre connection. The Bytel POP is connected to Verizon's tier 1 circuits.

Bytel encountered no technical difficulties with the implementation and largely standard street ducting arrangements were put in place for the fibre distribution to the homes. Moreover, Bytel claims that there was little material difference in cost in terms of fibre distribution over twisted-pair copper.

Connections into the home terminate under the stairs in each resident's home. A media converter switches the fibre connection to a standard Ethernet connection. A fly-lead is patched from this Ethernet port to a wall socket provided in the living area of the homes. Residents can choose to directly connect to this or can attach a standard WiFi router.

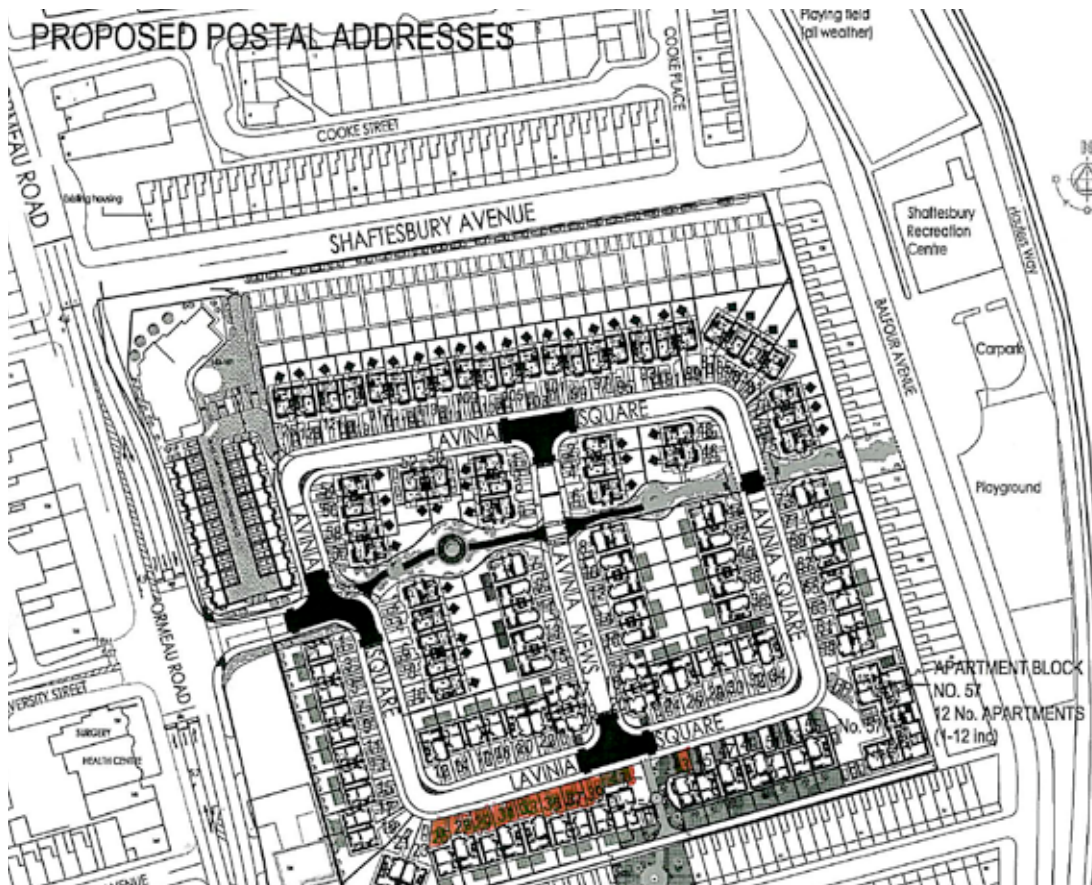
According to Bytel the advantages of the all-fibre solution will be immediately apparent to residents. Uncontended high speed Synchronous connections would allow them to download movies in seconds with full HD quality movies downloadable in just a matter of a few minutes. Bytel will also be able to offer residents VoIP centrex based residential telephone services through third parties.

According to Iain Kay, Network Services Director, Bytel Ltd, "I was delighted to be given the opportunity to show what could be done in terms of high speed connectivity to a social housing project. All strata of society should be included in the digital revolution. These residents will be able to avail of Internet services that won't be possible

for many 'first generation broadband' subscribers for quite some time. However, we have shown that it is very cost effective in new build situations to put fibre in the ground. In the not too distant future homes will be chosen on the basis of the fact that they have high speed connectivity. Developers should take note."

The conclusion of this trial is that provision of next generation broadband services to the home is now possible and may be done at relatively low cost, provided that the telecomms company is approached at the early stages of site development and subject to the availability of a suitable telecomms infrastructure in the area.

Fig 2: Location of Bytel serviced homes (NB: Bytel serviced homes are highlighted in red)



Virgin Media - High Speed Hybrid Fibre-Coaxial Network

Virgin Media is a UK entertainment and communications business.

Virgin Media offers the UK's only quad play of TV, broadband, phone and mobile plus the most advanced TV on demand service available. It also launched the UK's first high definition TV service and V+, a high specification personal video recorder. Virgin Media is the UK's largest residential broadband provider, the largest virtual mobile network operator and the second largest provider of pay TV and home phone services.

Virgin Media in Northern Ireland is committed to further developing its residential network and, for this reason, was keen to be involved in the high speed broadband trial. Virgin Media agreed to provide a high speed fibre connection to its kerbside distribution cabinet with high-quality copper coaxial cable to each home in the development. The illustration opposite (Figure 3) shows a typical Virgin implementation and back-haul link based on fibre.

As per the Bytel implementation, Virgin is offering initial connection speeds of 20 megabits per second. However, the company has made clear that it will offer a higher speed 50 megabits per second service to 9 million homes across the UK by the end of 2008. Trial residents are likely to be able to avail of this higher speed service once it is rolled out.

Virgin Media announced its plans for upgrading customers' broadband systems earlier in the year. From February 2008 customers with a 4 megabits per second service on Virgin Media's 'L' tier package will be upgraded free to a 10 megabits per second service. Completion is expected by late summer.

By the end of the year, Virgin Media will have a range of cable broadband packages available to suit many different needs, including 2 megabits per second, 10 megabits per second and 50 megabits per second, all delivered through Virgin Media's high speed fibre-optic cable network. Neil Berkett, acting CEO of Virgin Media has highlighted that Virgin Media's cable systems perform better than other broadband systems, as connection speeds are not limited by customers' distance from the exchange.

Alan McLeod, New Developments Manager, Scotland, N.Ireland and N.England agrees, "Virgin Media's cable network gives us a natural superiority over other broadband services - and we've barely scratched the surface of what's possible. I'm delighted we have been given the opportunity to further expand our network into the Clanmil social housing project in Belfast. I very much look forward to developing our high speed network even further across Northern Ireland in the near future."

The learning from this trial is that it is now possible to provide next generation broadband services to the home. This may be at relatively low cost provided that the telecomms company is approached at the early stages of site development and subject to the availability of a suitable telecomms infrastructure in the area.

“Virgin Media in Northern Ireland is committed to further developing its residential network...”



Hub Sites

The Regional Headends sometimes deliver to **Hub sites** that are geographically and remotely located as a means of splitting a region into geographical catchment areas. Hub sites are usually housed within one of our Telewest buildings.

Mux's or Nodes

Hub sites deliver to **Mux's or Nodes** that are geographically located as a means of splitting a Hub site area into geographical area's loosely based on parish or housing estate boundaries.

The **Node** is a piece of equipment housed in an above ground street cabinet that changes the optical signals in the fibre optic cables into electrical signals that are transmitted onto the copper coax portion of the network and on to the distribution point.

Trunk Amplifiers (Amps)

Sometimes the distance of the coaxial portion of the network is too great even for the largest of our coax cables. A signal would become so weak at the far end it would become unstable.

To overcome this, **Trunk Amps** are strategically placed to boost the signals before they become weak. More than one Trunk Amp can be used if the distance dictates.

Distribution Point (DP)

Customers are connected to our network via **Distribution Points (DPs)** which can either be housed within a street cabinet or a Slot Box, depending on the regional network architecture.

Within the DP there are banks of connection points known as taps to which each customer is connected.

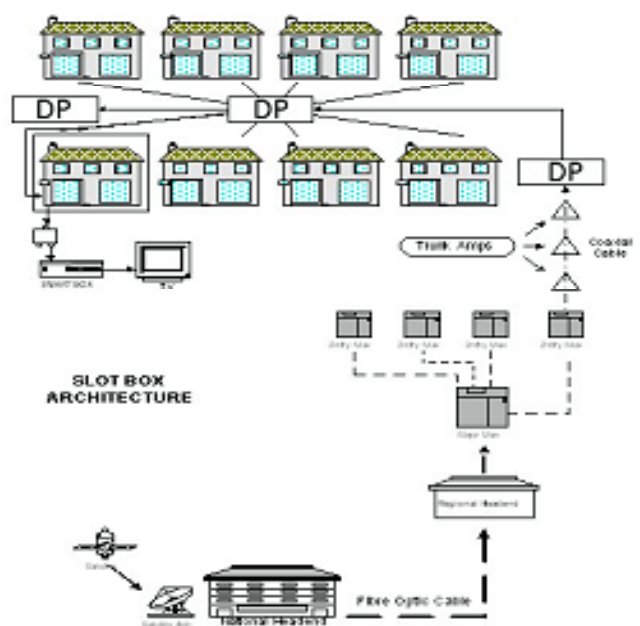


Fig. 3: Diagrammatic of Virgin Media Solution



Fig 4: Location of the Lavinia Square/
Lavinia Mews trial site



Fig 5: Site plan for Clanmil Housing Association
Development, Ormeau Road, Belfast