

ETHERNET AND OTHER NEXT GENERATION ACCESS

LESSONS FROM THE UK EXAMPLE

Towerhouse Consulting LLP

9th March 2009

Contents

SUMMARY 3

1.	INTRODUCTION: THE UK APPROACH IN OUTLINE	4
2.	WHOLESALE ETHERNET REGULATION DESCRIBED	6
2.1	The wholesale ethernet products	6
2.2	Ethernet is an enduring economic bottleneck	7
2.3	Remedies	7
2.4	Service Level Agreements	9
2.5	Geographic regulation	10
3.	UK ACCESS REGULATION – THE BROADER PICTURE	12
3.1	Traditional leased lines (PPCs)	12
3.2	Wholesale DSL and the treatment of cable networks	14
3.3	BT’s FTTC-based services	15
3.4	The role of functional separation	16
4.	THE UK APPROACH HAS BEEN SUCCESSFUL	17
4.1	Significant investment in local access infrastructure is planned	17
4.2	UK success in broadband and network investment – consumer broadband	17
4.3	UK success network investment – business markets	19
4.4	Market developments – the UK in a European context	20
5.	PRACTICAL APPROACHES TO ADDRESS MARKET POWER IN ACCESS NETWORKS	22
ANNEXES 23		
	ANNEX 1 – GLOSSARY	23
	ANNEX 2 THE DEBATE ON CONSUMER BROADBAND	24
	ANNEX 3 PUBLIC SECTOR INTERVENTION CASE STUDIES	26

A note on terminology: terminologies typically used in the UK to describe the services which are the subject of this report differ in some important respects from those used in Canada. (In fact, there is not always even consistency of approach in the UK.) For this reason we have adopted a consistent terminology based *generally* on common UK usage and included a full glossary at the end of the report. The main point to note upfront is that when referring to “wholesale ethernet” services we are typically talking about an ethernet service delivered over fibre, provided by BT to other communications providers, which is suitable for delivering services to businesses but may also be used for “backhauling” traffic from central offices to (or towards) core networks. A full description of the wholesale ethernet services available in the UK is also included in chapter 2.

SUMMARY

- Towerhouse Consulting LLP has been asked to provide a report on the regulation of wholesale ethernet and its wider context in the UK.
- BT has been designated as having significant market power in the wholesale ethernet market in the UK. It therefore has obligations to provide wholesale ethernet services to other communications providers at cost-oriented prices.
- BT's wholesale ethernet services are subject to functional separation and so-called "equivalence of input" obligations.
- It is recognised that in the local access and backhaul segment there is an enduring access bottleneck which prevents alternative providers from deploying their own ethernet services at scale. This necessitates significant regulatory intervention.
- The regulation of wholesale ethernet is part of a coherent regulatory structure which focuses regulation where it is necessary. The approach is adaptable and is applied in relation to other access products such as wholesale leased lines and DSL. The UK approach to these other services supports the approach taken for wholesale ethernet.
- The UK approach is robust and adaptable for other countries; it has been received enthusiastically elsewhere in Europe and the wider world.
- The UK approach has been successful in encouraging investment in access infrastructure and bringing benefits to business and residential end-users. It also allows a measured approach to deregulation and has permitted re-regulation where necessary.
- The UK approach is broadly technology neutral and is driven by the likelihood of and scope for market entry, as well as the current state of competition. Local access tends to be treated as an economic bottleneck whether it consists of copper networks (and services) or fibre-based services.

1. INTRODUCTION: THE UK APPROACH IN OUTLINE

Ofcom's approach to regulation of network access is driven by a wide variety of duties and powers under UK and European law. Taken together, the framework gives Ofcom a wide discretion to regulate as it sees fit. Ofcom has put considerable work into creating a coherent policy structure from the legal framework. This policy approach can be summarised quite neatly in this quotation from Ofcom (2005):

***"Attributes of a well-functioning telecoms market.** Our market research and consultation suggested that businesses and consumers want much more than basic, reliable telecoms services at low prices: they also want choice, and rapid innovation and introduction of new services. Our assessment was that the most effective way of delivering this is through competition at the deepest level of infrastructure where competition will be effective and sustainable."* [emphasis added]¹

This headline approach has driven Ofcom's work ever since. For example, three years after the statement above, Ofcom still applies it as its guiding principle:

*"We continue to believe that competition at the deepest level that is effective and sustainable... is the right approach."*²

Applied in practice, this means that Ofcom identifies where competition is likely to be viable under its own steam; and, where it is not viable, it regulates wholesale inputs from SMP providers - chiefly BT. Ofcom believes that regulated inputs which constitute enduring economic bottlenecks are particularly worthy of attention and are likely to need special treatment.

*"Regulation must support investment by the private sector, while at the same time promoting competition wherever there are potential barriers to competitive delivery of services. This is especially true for fixed next generation access networks that are likely to display the characteristics of enduring economic bottlenecks."*³

In practice, this means that enduring economic bottlenecks benefit from particularly careful regulatory attention and are often regulated heavily.

The UK has adopted a broadly technology neutral approach which recognises that local access in general needs to be regarded as an economic bottleneck. This applies both to copper networks (and services) and to fibre-based services. The approach is driven by the likelihood of and scope for market entry, as well as the current state of competition rather than any consideration of the technology employed. Thus access to unbundled

¹ Final Statement in Ofcom's strategic review of telecoms, 22 September 2005

² Ofcom Consultation, 23 September 2008

³ Ofcom consultation, 23 December 2008

copper pairs is mandated because the copper local access network is not economically replicable. Likewise, access to wholesale ethernet in the local access and backhaul networks is mandated because neither those services, nor the network used to deliver them, are economically replicable.

The UK approach is extremely flexible. It allows for different approaches to different markets and geographies, depending on their characteristics. This means that in some other areas there is progressive de-regulation, and on those occasions where the anticipated competition does not take hold, re-regulation (for example Ofcom's recent decision to impose price controls in the PPC trunk market discussed below). This balanced approach is focussed on regulating where necessary and only where necessary.

In the rest of this report we provide a detailed review of the regulation of wholesale ethernet in the UK; we describe how the UK approach remains consistent across other electronic communications markets but delivers flexible outcomes; we assess whether the approach is successful; we review the robustness of the approach for other markets and set it in an international context; and we analyse the toolkit of remedies used in the UK approach. By way of context we provide, in Annex 2, an overview of the public policy debate which continues to influence the development of regulation.

2. WHOLESALE ETHERNET REGULATION DESCRIBED

This chapter describes the provision of wholesale ethernet products and the approach to their regulation adopted in the UK.

Wholesale ethernet products are provided by BT's Openreach division to other communications providers including BT Retail to allow those companies to provide service to end users. It is recognised that in the local access and backhaul segment there is an enduring access bottleneck which prevents alternative providers deploying their own ethernet services. This necessitates significant regulatory intervention. Access has been mandatory since 2004, on regulated and transparent terms and a cost-oriented, non-discriminatory basis. Having allowed the emerging market to develop over four years, Ofcom found further regulation to be required and consequently broadened the SMP conditions to include related accommodation services and a proposed price control as well as introducing regulatory requirements for wholesale ethernet service level agreements and automatic compensation payments. Further supporting the regulatory regime are BT's voluntary Undertakings which commit it to providing these services to alternative communications providers on the equivalent operational and functional basis as it does for its own downstream businesses.

Ethernet services are increasingly relied upon by UK businesses to fulfil their broadband requirements. A recent survey of businesses undertaken by Ofcom indicates that since the regulation of wholesale ethernet five years ago, there has been a broad sectoral shift to wholesale ethernet in preference to traditional leased lines.⁴ It is notable that this shift is not a simple switch from traditional leased lines to the new wholesale ethernet services, but in many cases businesses have taken on additional connectivity in the form of wholesale ethernet leased lines whilst maintaining their existing traditional analogue or digital services.

2.1 The wholesale ethernet products

Alternative communications providers are able to tailor wholesale ethernet products from the regulated product set to suit their customer requirements, choosing to provide retail services using its own network to a greater or lesser degree. "Wholesale Ethernet Services" connects a customer premises and the communications providers' network with a dedicated, symmetric transmission. The customer's local end is connected by fibre-optic with ethernet transmission and often there will be a dedicated fibre-optic pair connecting the Central Office and the communications provider's network. This service is also

available as an end-to-end product, connecting two of the customer's sites with a dedicated symmetric transmission using ethernet technology. Both products are available at a range of bandwidths. Alternative communications providers can also use "Backhaul Ethernet Services" to connect between themselves and the Central Office to backhaul broadband traffic back onto their networks. These are high-speed, permanently connected data circuits.

2.2 Ethernet is an enduring economic bottleneck

The UK approach is underpinned by an assumption that there are certain elements of the network which constitute a natural monopoly. Placing such monopoly assets into the Openreach division of BT and making available wholesale products, eliminates the need for alternative network operators to try to replicate these natural monopolies. This avoids non viable network replication, and ensures that investment flows to those elements of the network where competition is sustainable and can deliver the maximum economic benefit.

Infrastructure in the access segment (for example ethernet circuits) is generally not economically replicable since it requires large, upfront, sunk investments in fibre and duct. Compared with traditional leased lines, a high proportion of ethernet circuit costs consist of building fibre and duct. Alternative communications providers are worse off in this respect since the incumbent has a significant cost advantage given the ubiquity of its network. The cost to an alternative communications provider of replicating the BT network would be so high that they render full end to end network replication economically non viable.

2.3 Remedies

The classic European SMP remedies have been applied by Ofcom to wholesale ethernet services during the first five years of regulated access. These are designed to enable alternative communications providers to compete in the retail leased lines market. BT has been identified as having SMP in the national market for wholesale ethernet origination and as a consequence is subject to a range of obligations including:

- to provide network access on cost-oriented terms and
- not to discriminate unduly
- access must be on a transparent basis: BT is required to publish a reference offer
- give notification of price changes and technical information
- publish quality of service information

⁴ Business Connectivity Market Review: Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments markets, Statement and Consultation, 8 December 2008

Initially, Ofcom refrained from imposing a price control in order to allow the emerging wholesale market to develop. However, in spite of SMP remedies and the increased popularity of ethernet services, the incumbent's market share has remained persistently high (at around 73% in 2006⁵) and BT's returns have been exceptional (BT's ROCE on wholesale ethernet services was 31% in 2007/08⁶). Consequently, Ofcom concluded in the 2008 market review that not only should the existing remedies be maintained but, in recognition of the continuing obstacles to competition in retail leased lines, a price control should be introduced for services in the wholesale market. Ofcom dismissed concerns from BT that a charge control could discourage investments in alternative infrastructure: during the five years during which these services were not subject to a charge control, BT earned high returns on these services but very limited alternative infrastructure was deployed in the market. This makes it 100% clear that, even in a time of economic boom and with the monopolist pricing excessively - theoretically the perfect conditions for entry - these markets were still uncontestable. Ofcom are similarly unconcerned that a charge control may stifle innovation; on the contrary, they note that, in this respect, a charge control may be preferred to other means of controlling prices as it is a mechanism that encourages efficiency and therefore innovation.⁷

In addition to the existing cost orientation obligation, the proposed price control will take effect from October 2009 and incorporates initial one off price decreases to align charges more closely with costs. This includes upfront price cuts for wholesale ethernet backhaul, which Ofcom anticipates will encourage investment from alternative communications providers in services that in turn support local loop unbundling. The initial price cuts are substantial and the resulting saving to industry is estimated at £80 million per annum in connection and rental fees.⁸ The control itself is based on 'baskets' of wholesale ethernet services; for each basket, prices will be constrained to an inflation-linked control and BT must bring them below the estimated 'Distributed Standalone Cost' ceilings within 12 months⁹. This is a measure intended to further encourage cost-oriented charges from BT.

The largest basket contains the main wholesale ethernet products (including "Wholesale Ethernet Services" and "Backhaul Ethernet Services" described in section 2.1 above). Ofcom are consulting on a price control of between RPI-3.25% and RPI-11.50% for these

⁵ Ofcom Business Connectivity Market Review: Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments markets, Consultation, 17 January 2008

⁶ Ofcom Business Connectivity Market Review: Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments markets, Statement and Consultation, 8 December 2008

⁷ Ofcom Business Connectivity Market Review: Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments markets, Statement and Consultation, 8 December 2008

⁸ Ofcom Leased Lines Charge Control: A new charge control framework for wholesale traditional interface and alternative interface products and services, Consultation, 8 December 2008

products; the final figure will be determined by the final input values for each of the parameters in their costs model such as volume forecasts and anticipated efficiency gains. Sub-caps apply within the basket to limit BT's scope for balancing higher and lower prices. These apply to certain named services as well as connections and rentals, each at a level of RPI-0%.

In addition to the services themselves, accommodation in Central Offices is subject to the proposed price control. Accommodation services enable alternative communications providers to aggregate access and backhaul products in the Central Office and the SMP conditions require that this be done on fair and reasonable terms and conditions. As the revenue from accommodation services is comparatively low and a price control as part of the larger basket would have been ineffective, Ofcom propose to introduce a control of RPI-0% for this basket. Similarly, stand-alone charges that BT levies when construction work is required to provide a new circuit form a basket of their own and will be subject to a price cap of RPI-0%.

2.4 Service Level Agreements

Service level agreements comprise a fundamental element of the contract for each of the wholesale ethernet products; they inform communications providers about the level of performance that they can expect from BT as well as the amount of compensation where that level is not met. BT's wholesale ethernet service level agreements have been regulated since March 2008 under an arrangement designed to incentivise better and more efficient service performance from its Openreach division.¹⁰

Where BT fails to provide the contracted level of service, Ofcom has directed that BT must:

- provide for compensation based on a pre-estimate of an average communications provider's loss. This is intended to provide the right financial incentive on BT to meet the agreed service level;
- ensure that communications providers are not precluded from making a claim for any additional loss suffered above the pre-estimate of loss. In practical terms this means that BT must state explicitly in its wholesale ethernet contracts that communications providers are entitled to bring an additional claim for damages even where they have accepted the pre-estimated compensation payments;

⁹ Ofcom Leased Lines Charge Control: A new charge control framework for wholesale traditional interface and alternative interface products and services, Consultation, 8 December 2008

¹⁰ Ofcom Service level guarantees: incentivising performance, Statement and Directions, 20 March 2008.

- ensure that the structure of compensation payments means that the communications provider is compensated for every additional day a service is late, or hour that a fault continues. Prior to this compensation was calculated on an aggregate level of failure over the communications provider's total usage of each product meaning that longer duration faults received the same rate of compensation as those of a short duration; and
- pay the communications provider any compensation payment pro-actively on failure instead of requiring communications providers to submit a claim.

2.5 Geographic regulation

BT has argued that it faces effective competition in the wholesale ethernet market in certain areas of the UK, but without success. As part of last year's market review of leased line products, Ofcom considered whether geographic regulation (and conversely geographic deregulation) would be appropriate by analysing four elements of the market:

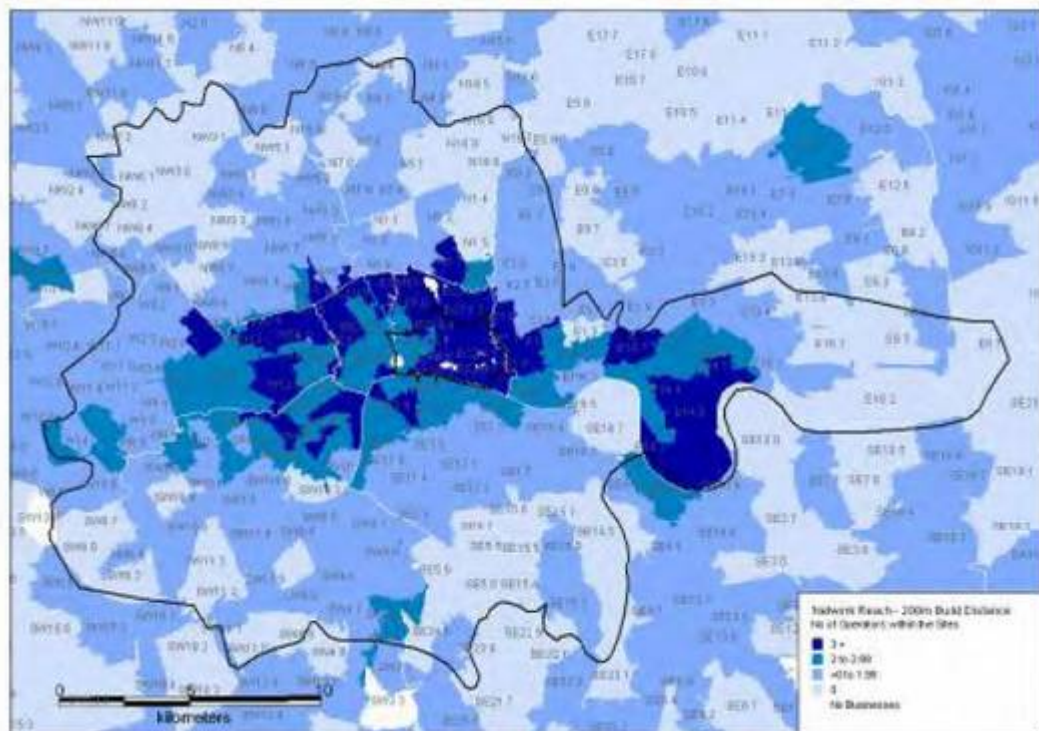
1. An analysis of service shares by operator in each postal sector of the country. This demonstrated only a limited variation in competitive conditions on a geographic basis.
2. An analysis of network reach that did demonstrate a potential for differing competitive conditions. This was based on the number of alternative operators' networks within an economic build distance of each UK business site belonging to a business with over 250 employees, averaged over postal sectors. However, Ofcom noted that the limited variation in network shares across the UK indicated that this potential was not being borne to fruition. Although there has been a significant amount of alternative network deployed across the UK, no one believes that any of those operators will ever be in a position to seriously challenge the ubiquity of BT's network³. An examination of BT's pricing policies which could indicate the extent to which there exists a common pricing constraint across geographic areas and which indeed revealed that BT continues to price services on a uniform basis across the UK.
4. The degree of interconnection between alternative network operators' networks.

In conclusion the analysis pointed clearly towards a national market for wholesale ethernet in the UK and the market definition, analysis and remedies apply accordingly. It is notable that Ofcom reached this conclusion despite the fact that there is a comparatively high number of networks in the UK with the potential to compete with BT in certain geographic areas.

In contrast, Ofcom simultaneously deregulated traditional leased lines in the geographic areas which it found to be insufficiently competitive in the wholesale ethernet market. However, even that decision does not encompass the whole market, either in terms of services or geography; rather, it applies only to high-bandwidth services in a unique urban

pocket as shown in the figure below (that decision is examined in more detail in the following chapter). This map shows the Central London Zone, divided by postcode area and shaded according to the number of network operators (the darkest colour being three and above).

Figure A6.2: Number of operators in the CLZ, assuming 200m build distance



3. UK ACCESS REGULATION - THE BROADER PICTURE

The previous chapter described the UK approach as applied to wholesale ethernet regulation. This chapter analyses how this approach has been applied in other relevant markets. It will become apparent that the approach is flexible and allows different outcomes in different markets.

3.1 Traditional leased lines (PPCs)

The case of the regulation of wholesale leased lines (known as PPCs) is instructive because it demonstrates Ofcom's approach in relation to another access product where there is more (though still limited) competition; and also their approach to markets which were deemed potentially susceptible to competition but where it has not, in fact emerged.

The approach, in outline, is to deregulate in the geographic pockets ("central and east London area" or "CELA") where there is network competition; but in trunk markets, where competition was hoped-for but never actually emerged, Ofcom now plan to recognize this by introducing price controls for the first time.

Ofcom's findings in this review were as follows:

- a) BT was found to have significant market power for traditional interface wholesale lines at low, high and very high bandwidths (subject to point b. below);
- b) Ofcom defined a separate market for a limited area of the London business district, (the CELA) and found that no communications provider has SMP in high- or very high-bandwidth traditional leased lines (34/45 Mbit/s and 155 Mbit/s). The high density of business customers has encouraged extensive network coverage from several companies and a non-BT provider has the largest share of the market. The newly deregulated "central and east London area" was defined by postal sector and encompasses an area where there are at least three network operators within 200 metres of each large business site in the sector.
- c) There will be detailed charge controls for both termination and for trunk segments (which work is now ongoing). This is particularly important because Ofcom had previously expressed the view that the trunk market was prospectively competitive; it was for this reason that prices were not controlled more closely at the last review. It now being clear that competition would not emerge, Ofcom has moved to impose tighter price regulation.
- d) Ofcom's approach is to recognise that they may have to revisit such decisions should they not produce the anticipated outcome in terms of competition. A recent example of this has been Ofcom's decision to re-regulate the PPC trunk market as described above.

Ofcom's approach to wholesale DSL markets (see section 3.2) is another case where Ofcom has deliberately reserved for itself the possibility of re-regulation. In this case Ofcom has not directly regulated the prices of wholesale bitstream even in those geographic areas where BT has been found to have SMP. Ofcom's rationale for this approach is that it is keen to encourage investment upstream (in LLU) by competitive players. Ofcom believed - rightly or wrongly - that aggressive price regulation in downstream markets might change the incentives for this investment. Accordingly, they chose to leave prices in wholesale bitstream unregulated while investment in LLU continued and, eventually, stabilised. Once that process has completed, Ofcom will review regulation of wholesale bitstream in geographic areas where BT has SMP and is likely to impose price regulation.

Another example of Ofcom's openness to a flexible approach is in relation to BT's charges for call termination on non-geographic number ranges. Having originally concluded that these charges should be outside the scope of regulation in 2003, Ofcom were prompted to reconsider their approach by pricing changes introduced by BT in May 2004. Ofcom undertook a consultation on introducing a new finding of significant market power on BT¹¹. Although the price changes of May 2004 were subsequently reversed, Ofcom also opened an investigation into potential breaches of competition law; which resulted in a non-infringement finding on 1 August 2008.

Subsequent to this, BT took action to seek to re-introduce the charges originally complained of. At the time of writing no final result is in place. Ofcom were reluctant to pursue their review of 22 October 2004 while an investigation under competition law was ongoing. However, the reintroduction of the charges makes further regulatory action extremely likely, either by a further consultation or statement following from the October 2004 review, or possibly by the submission of a dispute to Ofcom by one or more interested parties.

It is clear from these examples that Ofcom's approach on PPC trunk is part of a clear pattern of flexibility from Ofcom in relation to re-regulation.

- e) Cost-orientation continues to apply in all wholesale SMP markets. (However, BT's compliance with cost orientation obligations has always been controversial and is subject to an ongoing dispute).
- f) The approach to SLGs that has been implemented for wholesale ethernet will now apply to PPCs - this covers measurement of performance and proactive payment.

¹¹ Ofcom consultation of 22 October 2004

3.2 Wholesale DSL and the treatment of cable networks

Regulation of wholesale DSL is focused on the consumer markets - business connectivity is reviewed separately by Ofcom in its “Business Connectivity Market Review” (discussed above). The position in relation to wholesale DSL is this: in assessing the state of competition in wholesale DSL markets, Ofcom was able to take account of the significant competitive entry at that level which resulted from their aggressive regulatory approach to local loop unbundling. This meant that competing retail ISPs were using unbundled local loops and co-location, losing BT wholesale customers. This meant that BT had lost market share significantly in wholesale DSL to those operators utilising LLU. New entrants using LLU naturally focused their roll-out in the more populous areas and this gave rise to geographic differences in market characteristics. Ofcom ultimately defined four geographic markets:

- Market 1; those areas covered by central offices where BT is the only operator providing broadband services. This market covers 16.4% of UK premises.
- Market 2; those areas covered by central offices where there are 2 or 3 operators (defined as including BT, cable and LLU-based operators) providing broadband services. This market covered 13.7% of UK premises. This was possible because there were more market entrants than just BT and the cable operator Virgin media operating in this market.
- Market 3; those areas covered by central offices where there were 4 or more Operators (defined as above). This market covered 69.2% of UK premises.
- the Hull area (*de minimis* for our purposes).

BT was found to have SMP in Markets 1 and 2 but not in market 3.

This is a very different outcome from the conclusions in wholesale ethernet markets but, crucially, it applies the same basic principle elucidated in Chapter 1 of this report. The purpose of regulation is to encourage competition at the deepest infrastructure level possible. In relation to wholesale DSL, Ofcom was able to achieve that outcome by focussing regulation on the upstream LLU market which resulted in competitive conditions across much of the UK (Market 3). In other areas - Market 2 - it resulted in nascent competition or at least the possibility of competition.

Crucially, when we talk about competitive conditions in this context it means at least four competitors. Arguably this definition is arbitrary; in practice, it seems quite sensible.

Cable networks form part of this analysis. Cable networks are not directly regulated in the UK; there is no finding of market power in relation to the cable network operator, Virgin Media. That said, the treatment of cable in market analysis is instructive. Cable alone is

not deemed a sufficient competitor to BT to undermine the finding of market power in relation to BT's services in the relevant market.

3.3 BT's FTTC-based services

On 15 July 2008 BT announced plans to invest in rolling out fibre to the Remote (in the UK, fibre to the cabinet or "FTTC") in order to provide faster broadband services, primarily to residential users, using VDSL over the sub-loop. This investment will be made via BT's Openreach division, once more avoiding the need for rivals to make wasteful investments in duplicating the natural monopoly in the local access network. As part of their launch of FTTC-based broadband services, Openreach has agreed to provide a wholesale service at the Central Office for other communications providers to connect end users. This service uses VDSL between the remote and the customer and is backhauled by Openreach from the remote to the Central Office, at which point it is picked up by the other communications provider¹².

At the same time BT announced that, for new-build developments, BT would intend to use fibre-to-the-home (FTTH) rather than copper in the local network. BT indicated that they would plan to invest £1.5bn in the period up to 2012. The FTTH roll-out is expected to be comparatively small scale; the FTTC-based roll-out, on the other hand, is expected to extend to something like 40% of the UK population¹³. This section is primarily concerned with the implications of the FTTC roll-out. Further information about the detail of the plans themselves can be found in Annex 3.

This development is interesting for a number of reasons. First, BT has continued apace to productise and launch these FTTC-based products, initiating trials in North London in Spring 2009. Secondly, Ofcom has already opened regulatory consideration in relation to wholesale regulation of these services. Formal regulation cannot be imposed until a true market review and analysis has been carried out; however it is instructive that Ofcom has already begun consideration of the economic characteristics of the markets concerned; the scope for competition; and what regulation will be required.

The indications are that Ofcom will be fairly light-touch in relation to these specific FTTC-based services - but only because they believe that access to the sub-loop, coupled with

¹² The specification for the ethernet handover can be found here:
<http://www.Openreach.co.uk/orpg/products/nga/fttc/downloads/STIN494v1p0.pdf>

¹³ It is worth noting that in the UK the term NGA is often used to refer specifically to these FTTC and FTTP plans (together with Virgin Media's DOCSIS3 roll-out) rather than more broadly to, for example, wholesale ethernet.

cost-oriented wholesale ethernet backhaul from the remote to the CO, will enable competition¹⁴.

Thirdly, BT's FTTC-based services will be provided initially as wholesale services by BT's Openreach division. This has important implications: it means that Openreach will provide the FTTC-based services to all communications providers - including its own downstream divisions - on the same terms. (This is indeed borne out by experience of the trial process so far.)

Finally, the fact that BT has actively chosen to provide these services through Openreach indicates that it is happy for these services to be provided on a wholesale, equivalence of inputs basis; and implies strongly that BT itself believes it will be subject to limited competition (if any) from other providers.

3.4 The role of functional separation

Functional separation is now embedded and supports this structure, and allows for the flexibility required by geographic regulation. There is no move to condemn functional separation or undermine it. In fact considerable effort has been put in to make it work better (see section 2.4 on service level agreements). BT now actively chooses to put new products in the Openreach division (cf BT's FTTC-based services).

¹⁴ On 3 March 2009 Ofcom issued a series of papers on future access networks. This was prompted by BT's proposal to invest in fibre to the remote and VDSL technology between the remote and the customer. It is notable that, while Ofcom does not currently intend to regulate the price of these FTTC-based services, the services will be provided on a so-called "equivalence on inputs" basis. Ofcom also emphasised that their policy was to "to promote passive access [e.g. through sub-loop unbundling] wherever this is economic and sustainable.

4. THE UK APPROACH HAS BEEN SUCCESSFUL

The UK has continued to enjoy investment in the consumer and business markets, and has also seen investment by a number of new, disruptive market entrants. This is despite the predictions of some doom-mongers who claimed the UK approach would discourage investment.

4.1 Significant investment in local access infrastructure is planned

In the last 12 months a number of significant investments in access infrastructure has been announced and commenced:

- BT has announced plans to invest £1.5 billion in rolling out fibre to the cabinet (remote) and delivering faster broadband using VDSL. More detail on these plans can be found in Annex 3
- Virgin Media has commenced its roll-out of DOCSIS3, delivering broadband at up to 50Mb/s (and with the potential to go even faster). More detail on these plans can be found below.

These announcements clearly demonstrate that the regulatory environment is not discouraging investment in network infrastructure. What is evident however is that no one is investing at scale in building alternative local access ethernet networks but this is due to the fact that such access infrastructure represents a natural monopoly rather than any impact of the regulatory regime. BT's rivals in the UK have largely concentrated their investment in the trunk network and have opted to purchase regulated access products from the incumbent.

4.2 UK success in broadband and network investment - consumer broadband

The rollout of broadband has been one of the most significant developments in UK communications in recent years. Having initially lagged behind rival countries, the UK has advanced rapidly up world league tables. Between 2003 and 2007 the UK saw rapid growth in broadband penetration. While this was initially led by cable broadband, the incumbent BT was spurred into action, as a result of which the rate of increase in DSL penetration between 2003 and 2007 was the highest in any comparable country¹⁵. As of October 2008 there were over 16 million broadband lines in the UK.¹⁶ Analysis by Point Topic estimates that the UK will have over 21 million connections by 2012. As at 6th

¹⁵ "The Next Phase of Broadband UK: Action now for long term competitiveness" page 29

¹⁶ "The Next Phase of Broadband UK: Action now for long term competitiveness" page 29

February 2009 the number of LLU enabled lines stood at 5.604 million.¹⁷ A comparison with the latest figures available from the European Commission reveals just how rapidly this progress has been made. According to the Commission's 13th Implementation Report:

"Local loop unbundling (LLU) continued to make strong progress during 2007, with the number of LLU lines approaching 4 million in January 2008 compared to about 1.5 million in January 2007."¹⁸

The same report also noted that BT's 25.8% share of the retail broadband market, though slightly higher than a year previously (23.7%), remained among the lowest of any incumbent in the EU.

Coverage has also increased to the point where 99.6% of homes are connected to an ADSL-enabled central office (5,564 central offices are DSL-enabled from a total of 5,592) and work is under way to implement alternative access solutions for those not yet connected, though this will involve a degree of government-led intervention. Clearly speeds available to end users will vary due to factors such as line quality and length but coverage has now become so close to universal that the latest government report ("Digital Britain") can seriously contemplate imposing a universal broadband service obligation¹⁹.

These figures mean that the UK now ranks 5th in the OECD in terms of coverage. As availability and take-up have increased, the UK has also seen a corresponding drop in prices, to a point where the average UK subscription price is the 5th cheapest in the OECD.

The success of broadband rollout has in turn increased the pressure on operators to offer faster services and this shows no sign of reducing. The issue has captured the imagination of public and politicians alike and assumed a greater importance than anyone had previously imagined. The UK's regulatory regime has taken the country to a point where it is now approaching the next major transformation, the move to 'super-fast' or very high-speed broadband in the consumer market.

In the last twelve months, the two big consumer-facing network providers have each announced significant investments in their access networks. BT signalled its intention to invest £1.5 billion in a programme that will give 10 million homes access to 100Mbps fibre based services by 2012. The announcement was no doubt spurred by a desire not to be seen as having been left behind by Virgin Media which has placed increasing emphasis in its advertising on its use of fibre technology.

¹⁷ <http://www.offta.org.uk>

¹⁸ http://ec.europa.eu/information_society/policy/ecomms/doc/library/annualreports/13th/country_chapters/sec2008_356_dts_uk.pdf

¹⁹ http://www.culture.gov.uk/what_we_do/broadcasting/5631.aspx

Virgin Media has made a series of announcements of increased speeds for its customers, the most recent of which was that maximum speeds will be increased from 20 to 50 Mbps which will be extended to 95% of their network during 2009. It has also stated that the DOCSIS 3 technology used in its network is already capable of running at speeds in excess of 100 Mbps. Virgin Media CEO Neil Berkett has indicated that Virgin Media will increase its speeds further as the competitive nature of the market develops. In addition to the headline speed increase to 50 Mbps, Virgin Media has recognised that not all consumers will need or be prepared to pay for such speeds, and has offered free speed increases (for example from 4 Mbps to 10 Mbps) for customers on its lower priced packages.

4.3 UK success network investment - business markets

While much of the public debate has focussed on consumer markets - and perceived problems - the business market has seen significant progress. In the business market a number of operators such as THUS (now part of Cable & Wireless) have already deployed next generation networks using technologies such as DWDM and MPLS.

The level of alternative network competition in the business market is shown in Ofcom's Business Connectivity Market Review of January 2008. This revealed that although BT was still the dominant operator they did face competition from a range of rivals. Large businesses were more likely to use BT, NTL: Telewest, Cable & Wireless and Thus. Thus was primarily used by companies within Scotland. Companies in the nations (Scotland, Wales and Northern Ireland) were also somewhat more likely to use NTL: Telewest (the business arm of cable company Virgin Media). COLT was almost exclusively used by companies in the South / East of England. Companies in this region were also somewhat more likely to use Verizon and Easynet.²⁰

Targeted government intervention has even allowed such operators to extend their network reach to rural areas which would not otherwise have been served in the foreseeable future.

We have included at Annex 3, details of two public sector schemes funded by the Scottish Government and one by the Welsh Assembly Government demonstrating two different methods by which governments can invest in areas which would not otherwise see fibre investment, and do so in a way which helps promote competition.

The business sector has also seen significant investment by new, disruptive market entrants such as Geo, a company which provides fibre based backbone and backhaul services to corporate and wholesale customers. Interestingly Geo's approach has allowed

²⁰ http://www.ofcom.org.uk/consult/condocs/bcmr/bcmr_research/research.pdf

other retail broadband providers to compete in the core network space with the established networks of BT and Virgin Media.

4.4 Market developments - the UK in a European context

In Europe as a whole, research published by the European Competitive Telecommunications Association (“ECTA”), revealed that whilst new market entrants dominate in offering high broadband speeds, the access lines over which broadband services are provided continue to be controlled predominantly by incumbent operators. This supports the picture that regulation is an essential part of encouraging innovation and ensuring that consumers benefit from the fastest speeds. Only 18% of broadband services across Europe were supplied via an alternative parallel network to the incumbent - usually cable. The remaining competitive services rely on regulated access to the incumbent network. The ability of European consumers to switch to an operator offering faster and better services is largely dependent on regulators enforcing effective access so that competing providers can offer services rather than leaving it solely to the owner of the line. ECTA has also expressed concern that European consumers in some cities or even entire countries “could find that the choice they have today reduces and speeds stagnate because policy-makers decide that access is not needed any longer in some areas or at all.”²¹

Incumbents throughout Europe have been putting pressure on regulators to grant them concessions or “regulatory holidays” in return for making the investments required in order to deliver high speed consumer access networks. The danger is that if regulators accede to these requests, the move to such networks could well re-establish monopolies and dominance lost during the liberalisation implemented over the last 20 years. The pattern is not universal however, with France Telecom, which has considerable experience of the benefits of competition calling for a more open and competitive model to be adopted.

The Commission has repeatedly stated that there will be no regulatory breaks for telecoms operators rolling out high speed consumer access networks. The Competition Directorate of the Commission has stated that the use of new technology in a network does not eliminate the requirements for dominant players to give competitors access to those networks.²² The Commission has conceded that dominance rather than incumbency gives rise to the obligation to provide access to the network since they regard new network build

²¹ ECTA Broadband scorecard Q1 2008 <http://www.ectaportal.com/en/basic650.html>; the ECTA scorecard is compiled from information provided by regulators and is supplemented by information directly from telecoms companies. It is cited by organisation such as the European Commission and OECD

²² Cecilio Madero Villarejo, director, competition directorate speaking at Broadband World Forum Europe on Tuesday 30 September 2008

as augmentation of an incumbent's existing network and therefore as something which must continue to be subject to regulation.

So at a national level, regulators appear to be trying to find ways to be seen to be delivering ever faster consumer access networks, while the European Commission pushes the message that competition is the best thing for the consumer. As Commissioner Reding put it:

*"I want regulation to encourage investment in future networks. Regulatory holidays are not the solution, what we need is "appropriate" regulation that safeguards competition whilst creating new incentives for investment."*²³

National regulators need to take care not to overstep the mark and implement measures which are in breach of European Community law (which is binding on member states). Already the European Commission has issued warnings to both Germany²⁴ and Spain²⁵ that their domestic proposals are non-compliant. In the case of Germany, the Commission has gone so far as to take legal action to overturn domestic legislation.

In essence, the Commission's stance is that investment incentives must be right, but for both the incumbent and alternative communications providers. A delicate balance has to be struck between the needs of those making the investments and those seeking wholesale access to new networks. If the correct balance is not struck, the regulators risk setting competition back twenty years and recreating the monopolies which they have spent so long trying to dismantle.

The market depends not just on investment by incumbents and it is vital that regulators grasp this point. Just as incumbents worry about the impact of regulation on their rate of return, new entrants need consistent and effective regulation focussed on the real bottlenecks in the market in order to allow them to plan their continued investment.

Without certainty that they will continue to enjoy access to facilities controlled by dominant operators on fair terms throughout the investment cycle, the new investments made to date by new entrants in network infrastructure are undermined. In the longer term this restricts consumer choice, innovation and possibly even the take up of higher speed services themselves.

²³ <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/07/755>

²⁴ <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/889&format=HTML&aged=1&language=EN&guiLanguage=en>

²⁵ <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1704&format=HTML&aged=0&language=EN&guiLanguage=en>

5. PRACTICAL APPROACHES TO ADDRESS MARKET POWER IN ACCESS NETWORKS

Based on the UK experience, we recommend a series of remedies in relation to wholesale ethernet including:

- Cost orientation
- Detailed price control measures
- Equivalence of input
- Functional separation
- A mix of ex ante regulation and competition law
- Detailed rules on service level agreements
- willing willingness on the part of the regulator to revisit decisions and take corrective action if required even where it becomes obvious that competition has not emerged in markets where it had been anticipated
- As competition evolves, the boundaries of functional separation can be re-drawn.

Conclusions

In short, as will be apparent from the foregoing, the UK example has shown that it is possible - indeed essential - to adopt a coherent, flexible approach to regulation which is likely to involve tough wholesale regulation of bottleneck markets including wholesale ethernet, in order to encourage competition. To suggest that this discourages investment is wrong; the UK example proves that the contrary is in fact true. The UK approach is flexible enough to apply to non-UK jurisdictions and also to enable re-regulation of markets where the expectation of competition does not in fact transpire in reality.

ANNEXES

ANNEX 1 - GLOSSARY

“CO” or “Central Office” means a BT local exchange.

“DOCSIS3” means the cable technology used for Virgin Media’s new superfast consumer broadband services.

“FTTC-based services” means BT’s new superfast consumer broadband services delivered over fibre as far as the remote.

“PPC” means a partial private circuit - a traditional interface wholesale leased line product, provided by BT

“Remote” means a street cabinet.

“Wholesale DSL” means asymmetric broadband access and backhaul and includes BT’s Datastream and IPStream products.

“Wholesale ethernet service” means an ethernet service delivered over fibre, provided by BT to other communications providers, which is suitable for delivering services to businesses but may also be used for backhauling traffic from central offices to (or towards) core networks. For details of BT’s current wholesale ethernet products, see chapter 2.1.

ANNEX 2 THE DEBATE ON CONSUMER BROADBAND

In reviewing the regulation of wholesale ethernet (and indeed any other business connectivity product or technology) it is important to bear in mind that most of the public and press debate in this area is concerned with the provision of consumer broadband, with the interests of business oriented communications providers and their customers receiving only marginal consideration. So public statements about the regulation of “next generation access” in the UK are primarily concerned with that consumer market. This section analyses some of these statements and, likewise, deals primarily with consumer broadband.

First generation consumer broadband services had no sooner begun rolling out than theories about a potential digital divide between the digital haves and have-nots began to take hold. These theories gained fresh momentum as awareness of still faster speeds has grown. Politicians of all political hues have vied with each other to be seen to be helping to deliver faster broadband in order to ensure that their constituents are not left behind. The UK is not unique in this regard and similar patterns of behaviour have been seen worldwide. Indeed the global aspect of the discussion is important since politicians and policy makers often use international comparators to support their case. Since no one wants to see their country languishing at the foot of such league tables the calls for something to be done continue.

The consistent public policy message has been that universal broadband availability is now regarded as being almost as vital to the modern consumer as water, electricity and gas. The interim Digital Britain report has turned universal broadband availability into the latest high profile topic but it is perhaps worth pointing out that the concept is not new, and in fact both the Northern Ireland Executive and the Scottish Government have pushed ahead with their own plans which have delivered, or are on the cusp of delivering, 100% broadband coverage at the 2 Mbit/s level proposed by Lord Carter. Most recently, on 3 March 2009, Ofcom issued a series of papers on future access networks. This was prompted by BT’s proposal to invest in fibre to the remote and VDSL technology between the remote and the customer. It is notable that, while Ofcom does not currently intend to regulate the price of these FTTC-based services, the services will be provided on a so-called “equivalence on inputs” basis. Ofcom also emphasised that their policy was to “to promote passive access [e.g. through sub-loop unbundling] wherever this is economic and sustainable.

Different arms of Government have also launched successive initiatives seeking to deliver the ultimate consumer high speed broadband solution. In the last year alone there have been reports and / or initiatives from: The Broadband Stakeholder Group, the Government commissioned “Caio Review”, Lord Carter’s Digital Britain report, a report by Ofcom’s

Consumer Panel²⁶, as well as broadband initiatives by the Scottish Government²⁷, the Northern Ireland Executive²⁸ and the Welsh Assembly Government²⁹.

The Broadband Stakeholders' Group report said the market could probably justify investing in dedicated fibre to about two thirds of the UK population who live in densely populated urban areas but that it would cost almost £29bn to deploy a 1Gbit/s new fibre optic line to every home and business in the UK; this caused renewed anxiety that a new digital divide would emerge, harming rural consumers.

The Caio review, commissioned by the Department for Business Enterprise and Regulatory Reform concluded that the UK is **not** lagging behind competitor nations. Caio came out against state subsidies for fibre, suggesting rural areas might be better served by wireless technologies. Perhaps because the review suggested that there was no need for radical public sector intervention (heresy among those who regularly call for something to be done), it has not received as much attention as for example the Digital Britain report, even in interim form. In recent months, the Government has increasingly been seen to be turning to investment in communications infrastructure as one of the key tools to help pull the country out of the current economic troubles. For example the Prime Minister has stated that

*"We have looked at how, just as many years ago investment in road and rail and infrastructure was a powerful stimulus to the economies then, so too in this new age we can invest in the digital infrastructure for the future."*³⁰

One factor which both the Caio and Carter reviews agreed upon is that much of the cost of new broadband networks will stem from digging up roads and other civil engineering costs. Ironically in the last five years the motoring lobby has successfully persuaded Government to push through legislation which makes it more bureaucratic and expensive for companies to dig up the roads in order to install fibre, and this despite extensive lobbying efforts by the industry warning of the risks to future broadband deployments.

So the public policy debate has generated much heat and light, but little of any real substance in a business context. The fact that the most frequently cited need for investment in high speed networks is the need to deliver high definition TV speaks volumes. To date, official debate on policy has concentrated almost exclusively on the consumer market and is therefore of limited importance in any analysis of the wholesale

²⁶ <http://www.communicationsconsumerpanel.org.uk/smartweb/news-releases/consumer-panel-calls-for-communities-excluded-from-current-broadband-to-leapfrog-to-fast-next-genera>

²⁷ <http://www.scotland.gov.uk/Topics/People/BroadbandforScotland/SEBroadbandInitiatives/LatestNewsAnnouncements>

²⁸ <http://www.northernireland.gov.uk/news-deti-130109-high-speed-broadband>

²⁹ <http://wales.gov.uk/topics/businessandconomy/broadbandandict/initiatives/ribs/?lang=en>

³⁰ http://news.bbc.co.uk/1/hi/uk_politics/7770701.stm

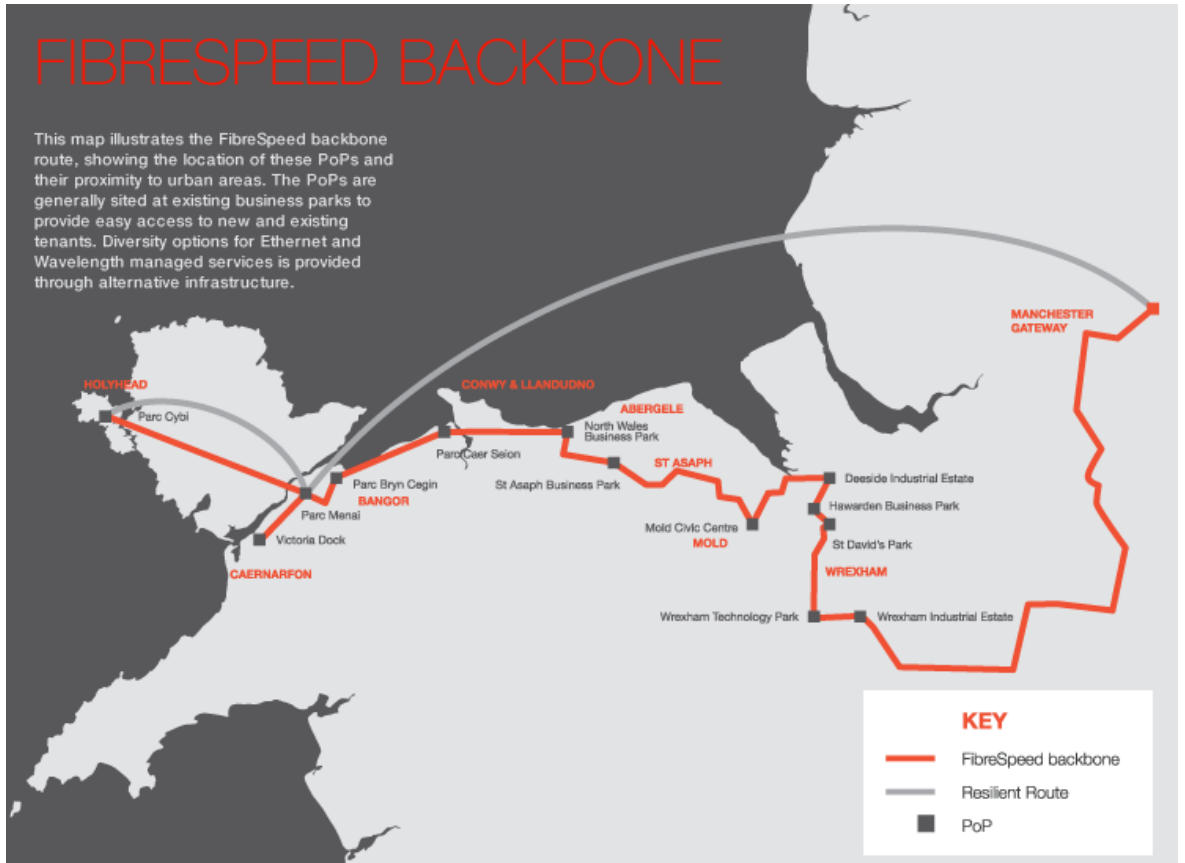
ethernet market. This consumer debate is largely irrelevant to the debate on business ethernet.

ANNEX 3 PUBLIC SECTOR INTERVENTION CASE STUDIES

Case Study 1: FibreSpeed Project - North Wales

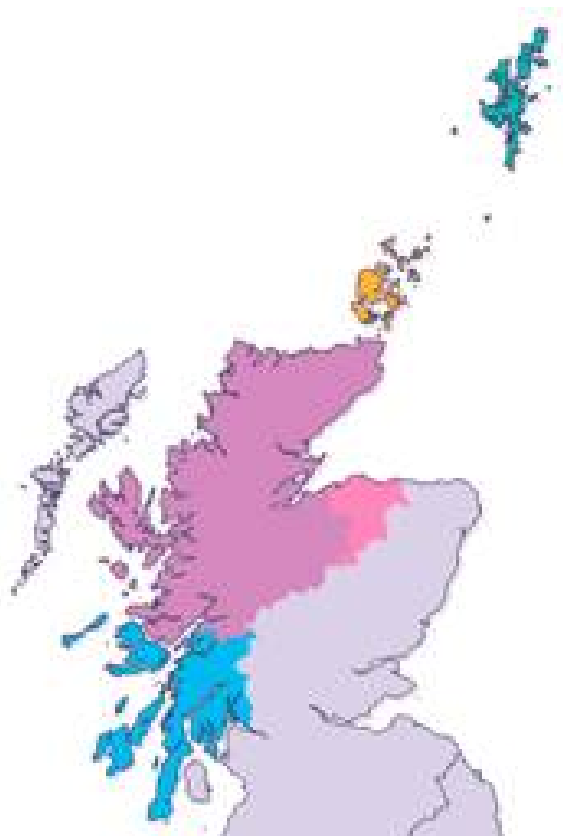
The FibreSpeed project is a truly innovative collaboration between the public and private sectors that will enable world-class business communications services to be delivered to businesses across Wales. Geo Networks Limited won the competitive tender to build and operate a new 270km optical fibre network serving North Wales, linking into Manchester, and will deliver modern broadband communications. The £30million contract is funded by the European Regional Development Fund and the Welsh Assembly Government. The network will link 14 strategic business parks in North Wales, potentially expanding to incorporate approximately 50 locations across Wales by 2010 (see illustrative map below). FibreSpeed is an open access network, available on a wholesale basis to service providers, ISPs and telcos, who are able to treat it as an extension of their own networks. The operating business will sell to service providers on a wholly transparent and equivalent basis, including access to passive network components. These service providers in turn use FibreSpeed's services and their own to engage the end-user community and sell network-based services and solutions.

The network has recently been launched by the Deputy First Minister of Wales and early indications are for high market demand in an area which to date has been poorly served by competitive broadband infrastructure. The FibreSpeed project is expected to have a positive impact on the telecoms market by making available an alternative infrastructure that could be used by other network operators, such as local loop unbundlers, fixed network operators, system integrators and wireless and mobile network operators. In the longer term it will have a transformational impact on Wales, helping economic growth through development of the Information and Communications Technologies industry, increased foreign investment, new firm creation, increased productivity, formation of new industry clusters and the promotion of new ways of working.



Case Study 2 - Pathfinder North Project, North of Scotland

Pathfinder North is a project to implement a high-speed future-proof broadband network across the Highlands and Islands local authorities, largely funded by the Scottish Government.



Pathfinder North is a partnership of five local authorities:

Argyll and Bute Council

Highland Council

Moray Council

Orkney Islands Council

Shetland Islands Council

There are two aspects to the project: first and foremost it is about providing service to a public sector customer. But it is also very much a network extension by the telecoms company providing it. In essence, the public sector intervention allowed the private sector to justify a high-speed network rollout where the market alone could never have done so. The project involves the establishment of MPLS PoPs in eighteen locations from Lerwick in Shetland to Campbeltown in Argyll. The PoPs are connected by new or upgraded fibre or microwave links. Connections to council sites will be either fibre, microwave or 5.8GHz radio. The network extension means that businesses within the area served will also be able to access the benefits of a modern fibre network should they require it.

The project is designed to connect 806 local authority sites such as schools, libraries, social work offices and other council buildings across the Highlands and Islands. It will also provide the authorities with high bandwidth internet access, inter-VPN connections between the authorities and Remote Access Services (RAS) for the authorities' end-users. The high-speed broadband that Pathfinder North is implementing will allow the authorities to run advanced computer software applications such as real-time video conferencing, interactive service provision to the public and multimedia rich education applications to enhance the traditional learning environment in schools.

More specifically for education, it will allow all schools across the region to connect to GLOW, the national schools intranet (www.glowscotland.org.uk for more details), which is set to transform the way education is delivered in Scotland. It will also allow connection to other internet services, as well as, for example, allow teachers in one school to deliver lessons remotely via video conferencing.

Councils will also be able to modernise service delivery, improve efficiency as well as boost the provision of services to the public across the region.

The procurement went out to tender between March 2004 and May 2006 and THUS plc was appointed the preferred supplier in July 2006. A contract was signed between THUS plc and the Pathfinder North Partners on 21st March 2007. The project is one of the largest telecoms build projects in Europe, with THUS plc extending their core network infrastructure across the Highlands and Islands, and connecting 806 end-user sites.

Case Study 3 - Pathfinder South Project - South of Scotland

See attached pdf case study:



PATHFINDER CASE
STUDY.pdf