

**MAKING BROADBAND
INVESTMENT MARKETS WORK
SUMMARY**

27 January 2011

The Information
Society Alliance
EURIM



Society and business communications is increasingly reliant on investment for rolling out Next Generation Access (NGA) networks. EURIM has commissioned this paper - by Bob Franklin an international telecoms finance expert in his own time, working closely with Philip Virgo EURIM Secretary - to help stimulate discussion on the need for greater UK infrastructure investment and to seek to encourage more innovative financing. The attached 17 page paper concentrates on some commercial and financial issues of NGA and provides further detail and data reference sources.

The key points are:

1. Customer demand is changing the market and the business models

- There are some concerns on coverage and speeds in the current broadband market
- Major increases in network usage are changing retail revenues and business models
- Wholesale markets and regulation will change, and will affect the margins of the operators and new entrants
- Retail competition (prices and market shares) may be good for consumers but has it seriously discouraged new NGA local network investment for the future

2. NGA network roll out, coverage and technologies present cost opportunities and risks

- 'Other' new players/investors can enter the local network infrastructure business
- Fibre rollout may be the predominant technology but all alternative technology solutions will have a role such as wireless and satellite
- More capital and operating cost information would help decision makers
- Government policy and regulation should work harder to overcome barriers for new entrants such as backhaul capacity, infrastructure sharing and business rates
- improved public access to existing infrastructure data such as maps of cabinets and of blackspots and not spots will help the public see progress of their investment in their local communities.

3. Profitability is there and innovative private sector funding offers a dividend to help bridge the divide

- Telecoms access networks, like utilities will make money over time
- Improved cooperation between Government, the industry and institutions will help build confidence and innovation in NGA technology and products and services
- Greater funding must come from the private sector, recognising the opportunities for returns by investing in modern local communications infrastructure.

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The full paper follows.....

Introduction and Scope

This paper focuses on some of the key commercial and financial issues which arise in developing business cases for private or public funding and how we might improve matters when rolling out Next Generation Access (“**NGA**”) networks. These are the local fibre (or wireless or satellite) distribution systems which are strategic and fundamental to delivering broadband for online information and services to the nation if we wish to aspire to a modern 21c Digital Britain.

A summary is at page 1 and the paper highlights three main aspects 1. **Customer demand is changing the market and the business models** 2. **NGA network roll out, coverage and technologies present cost saving opportunities and risks** 3. **Commercial viability is there and innovative private sector funding is needed and offers a return.**

The main information sources are public domain and given in footnotes and more detailed sources can be provided if required. This paper also focuses on the fixed local network business rather than on; engineering technical aspects, regulatory policy and practice or spectrum, broadband via wireless/mobile networks and satellites (which will be a separate EURIM paper). This paper is a follow up of the EURIM briefing paper¹ of March 2010.

Customer Demand is Growing and Changing

Preparing business cases for investments will require business plans and a key element will be forecasts of current and future demand which in turn requires volumes (such as connections) , prices (for service levels) and market shares (nationally or for a local geographical community).

Is history a guide? Not long ago it our industry believed that “Demand for Faster Broadband was uncertain and that investment in local fibre networks was not commercially feasible.” Since the birth of the telephone, when the Post Office Engineer in Chief said, “the possible use of the telephone was very limited”, the telecoms industry has regularly got it wrong and underestimated demand, typically with the result of capital investment in infrastructure lagging behind. For growth, witness the massive take up in residential and Small and Medium Enterprises (SME) broadband connections, now 19.2 million from nothing 10 years ago or the phenomenal growth in “usage” such as social media networks (not to mention mobile growth or SMS text) as usage often develops in ways no one expected.

The interdependence of infrastructure and services is a tricky matter with many business issues including economies of scale but an earlier House of Commons Committee in 1994² got it right “ we recommend that government policy in this area (...Optical Fibre Networks) be based on a recognition that the networks and services need to be developed together”. That has not happened generally.

Access is the key enabler as the Access networks carry “all the first collection and final delivery” of our worldwide communications services to our homes and business premises for telephones, broadband and cable TV, in the UK and internationally. Access is really the first mile not the last mile as it is often called – access gives us the connectivity. Mobile networks

¹ <http://www.eurim.org.uk/activities/commopol/1003-LocalBroadbandAccessBriefing.pdf>

²House of Commons Trade and Industry Committee Third Report OPTICAL FIBRE NETWORKS 19 July 1994

warrant a separate paper, but certain mobile devices make no distinction as they hand-off between Wi-Fi and Mobile depending on available connectivity and fixed and mobile network sharing is likely to develop.

The UK Communications industry is very big business. It generates revenues of £52 billion³ of which broadband is a growing share within telecommunications. The distinctions between the fixed access and calls market (revenues £8.8 billion) and mobile markets (revenues £14.4 billion) and terrestrial/satellite broadcast/IP-TV/Radio transmission markets are increasingly blurred. Demand and supply of our existing local fixed (and mobile networks) infrastructure is fundamental for this country and even more so as NGA is rolled out (or not) to communities and businesses. .

The current level UK Broadband demand is reasonably well documented elsewhere and is typically analysed in terms of say: connection, usage, geographical availability and speeds. There are issues with service marketing, coverage and delivery and a few key points are set out in Annex A.

The **Government strategy** is to be the best in Europe. The **target** is for everywhere in the UK to have broadband access at 2 Mbps by 2015. Also it was recently announced that there will be digital hubs in each area of the UK. In October 2010 That is perhaps modest target compared with other European countries. In Belgium for example, the average is apparently already 10 Mbps. In October 2010, Finland became the first country to enshrine broadband access as a fundamental 'human right' when the Finnish Ministry of Transport and Communications promised that all its 5.5 million inhabitants would have access to a 100 Mbps connection by 2015.

Broadband access comes with a price tag. **Prices** have fallen for broadband, by approx 30% or more in the past few years. There is considerable 'retail' competition at the basic service level. Pricing is typically **flat rate** monthly charges, excluding those for traffic above a given volume (commonly exceeded, for example, by families using broadband to time-shift TV programmes). Payment for broadband usage has been debated for years but not generally adopted. One of the lowest current price offers is from Plus Net at £6.49 per month (advertised as; "There's broadband, then there's Yorkshire broadband, good, honest and reliable"). This is in fact a BT subsidiary company and the price quoted excludes the cost of the BT line that is also needed. It highlights the importance of branding in the market including more local and regional 'flavours'. A number of smaller regional or local new entrant and community networks are springing up, all reflecting the demand for better local coverage and connection availability.

Retail Market shares have changed. BT has 27% of the market for broadband connections with Virgin Media at 22%, Talk Talk 22% and BSkyB at 14%, with Talk Talk and BSkyB using BT's access network via fixed line rental. Operators and investors look at the 'top line' growth as one metric, namely the revenues from customers in the broadband **retail market**. The quoted revenues mainly come from number of connections multiplied by prices. On this measure the residential broadband retail market revenue is £3.4 billion with equivalent current average revenue per connection (ARPC) at £14.50 per month or £174 per annum per connection. Measurements are complicated as services are bundled together, e.g. with

³ http://stakeholders.ofcom.org.uk/binaries/research/cmr/753567/CMR_2010_FINAL.pdf

free calls or other offers, sometimes including line rental costs. There are various online sites that provide comparisons and more detail⁴.

Business to business (B2B) and **business to consumer (B2C)** broadband demand of corporates and SMEs (some 4.7 million enterprises) and by the public sector is consistently overlooked in debates about NGA. The large business spend on telecoms (approx £13 billion) includes (fibre based) leased line products. The total number of user connections for broadband business, non-profit sector, central and local government (including health and education) are not easily available; but could be 6 to 8 million. In a CMA survey⁵, 70% of those who responded said they were unaware of industry's NGA roll out plans and some 43% said they would pay more for NGA. Both business and the public sector generate very significant traffic for operators and, importantly, this load largely shares the same common local access network facilities (as well as backhaul and national traffic links) as retail

Statistics about current Internet usage are not that easy to find making future forecasting difficult and caution is clearly advisable. Nevertheless a very useful report⁶ estimates that the Internet contributes £100 billion or 7.2% of GDP and that is forecast to grow to 10% by 2015. Further:

- UK internet users (browsing, shopping and sending many more messages) are estimated at 30 million a day, compared to half this only four years ago.
- Internet advertising estimates seem to vary greatly. One estimate puts the total UK advertising spend at £11.5 billion⁷
- Social networks have vastly increased in popularity. Facebook is now the world's most visited website, with 500 million users of whom 50% visit more than once a day – it started in 2004.
- The growth in 'cloud' services such as online data storage, music and video streaming has already and will increasingly impact data traffic levels in the coming years.
- Mobile broadband is outside the scope of this paper but is showing massive growth, mobile broadband connections, through smart phone take-up, are estimated at 4.3m but are probably much higher.

Traditional telephone revenues are static or have even fallen (or been rebalanced more but sometimes less than was probably necessary) partly as the old technologies are abandoned for more alternative solutions such as VOIP calls, therefore prices have moved lower, although not always. Telco operators therefore need to generate **new service revenue** streams from additional services via bundled packages and this is the challenge for operators and service providers. One broad brush measure is the Average Revenue per user (ARPU). To provide the full package of services including TV pushes up the revenues. For example the ARPC of a triple play service (voice, broadband, TV) operator is much

⁴ <http://www.broadbandgenie.co.uk/broadband/deals>

⁵ http://www.thecma.com/content_pdf/survey/Executive_Summary.pdf

⁶ <http://www.connectedkingdom.co.uk/the-report/>

⁷ <http://www.google.co.uk/intl/en/landing/internetstats/>

higher - BSkyB is currently £508 and for Virgin approx £550 p.a. BT is £309 and BT is now offering BT vision which will generate further revenues. It seems likely that the future pricing for a 'total communications' package (**TC/ARPC**) including broadband will be higher, while recognising that competition typically pushes some prices down over time. Presumably any new entrants and local community schemes will be looking to get the full package of services from content providers to help pay their way.

The current **telecoms business model** will change (and revenues with it) for a number of reasons, including:

- So far, customers paying for Internet connections have been charged a flat rate while advertising pays for much on-line content; this may change;
- From video conferencing to gaming, greater up-load demand with more consumer to consumer (C2C) traffic is likely. The once niche massively multiple online role-playing games (MMORGS), such as Second Life is now a worldwide phenomenon, with users numbering in the tens of millions.
- Increased home office work, well illustrated during the recent severe weather in December 2010 drastically increased remote working from home.
- 'Multiple plays' and 'Total Communications' bundles for all different communications services.

It is not just the telecoms business model that is changing. Many other sectors are being affected by internet usage and growth. For example the decline in the postal letter delivery business, partly offset by the growth in parcel deliveries as online shopping increases. Government business moving online will also generate a dramatic increase in traffic.

Trying to answer the inevitable questions: e.g. "What would you do with 100 Mbps?" (Probably the wrong question) or perhaps, "How much would you pay for 100 Mbps?" There are no easy answers and nobody can forecast the future. It seems probable that:

- Growth of online video services will continue. The success of the BBC iPlayer and other services is already fuelling the demand for greater bandwidth and straining the current infrastructure.
- The demand for high definition (HD) video services is likely to go mainstream through HD VOIP communication, HD TV and even 3D TV streaming could be possible;
- Following Government's push to get public services information online, e-health, tele-medicine and on line e-learning will become significant;
- Entertainment just keeps growing as does social media networking with for example in throughput and new services such as 'YouView', set-top boxes and TV's with Ethernet or wireless connections and the ability to run browsers will drive up throughput further.
- Business user traffic is growing, with large organisations or conference centres demanding Gigabit links to remain globally competitive. In the current economic climate, central Government stress the importance of SMEs to growth. SMEs such as rural independent hotels should be able to offer suitably high bandwidth to cater for their guests and their children want to go online via WiFi, when it is raining!

In practice there will be a variety of types of user at work and at home, working with and paying for the speeds they need at prices they are willing to pay. It is clear that network operators, and service providers (particularly any new entrants and local players), not to mention content providers, will have to develop different business models to meet these major market opportunities and threats. The fact that this is happening around the world is

leading to massive growth in both demand and revenues and competition; whether or not it is constrained by dominant players, regulators or government.

The concept of **net neutrality**, which is broadly described as a principle that user access networks participating in the Internet that advocates no restrictions by Internet service providers and governments on content, sites, platforms and the modes of communication⁸ goes beyond this paper. However, the questions of who pays for using the network and how demand/supply is rationed when the network cannot cope shows the importance of a multi-faceted telecoms business revenue model. While business models in many other sectors are changing dramatically too, not always as expected.

A distinction needs to be made between the retail market drivers of demand and **wholesale market provision**. The latter reflects regulatory developments such as the unbundling of local line and the provision of a wholesale line rental. Market players such as Talk Talk and BSkyB purchase wholesale services from BT largely at prices regulated by Ofcom and said to be reflective of costs. These charges are a key input cost for all other market players or new entrants. BT Wholesale business revenues are £4.4 billion which mean that BT still has 70-80% of the value chain in broadband access supply after nearly two decades of retail competition. Ofcom is currently consulting on the Wholesale Market. The development of Next Generation Networks means Super Fast Broadband wholesale services will be available to other operators and service providers/resellers. Indications are that BT's wholesale share of the value chain may not decrease significantly and a draft reference offer has recently been announced.

The UK has significant competition in the retail broadband market (given current prices and market shares perhaps) at the residential level. However there is also the question of why has there been so very little investment (until BT recent commitments) in infrastructure, particularly by any new players. Is this due to uncertain demand, fierce competition, fear of the incumbent power, no money available or no returns expected, regulatory uncertainty, high investment cost or what? Some will take the view that the current market and regulatory environment (including in particular unbundling of local loops) with low retail prices has **discouraged new investment** in access infrastructure investment. Particularly given that very few new players making relatively small scale investments, have emerged and or stopped in the past five years. .

Local Access Networks, Costs and NGA roll out

The next part of any business case requires us to consider operating and capital costs of access networks. How much do the current **local access networks cost** to build and run and does anyone make a profit on broadband? How much will NGA fibre roll-out cost? Trying to understand the cost drivers and measure the costs is not easy in very complex telecoms networks. (In theory it should be cheaper for an operator to re-use their own assets or share another's rather than have to build new networks). To add further complexity there are almost as many cost concepts and measures of cost as there are accountants, economists, engineers and business modellers. This paper briefly considers the actual

⁸ http://en.wikipedia.org/wiki/Network_neutrality

physical networks first and some aspects of more access competition as it is important to understand what the access networks are before trying to calculate costs.

Ofcom are proposing to publish data on the **state of the networks** shortly and this should help inform any business plans.

BT has a huge local access network, much of the residential coverage is 'Post Office Telephones' or even earlier and is 30 to 50 years old or more. Copper pair wires (either underground or overhead feed {approx 20%}) are connected via Exchange side (E-side) cables to some 5,000 exchanges and Distribution side (D-side) to the home via some 90,000 green cabinets and some 4 million poles. The D side always has much greater capacity than the E side. BT has quite rightly now committed to a very large access investment programme and this is a major contribution to the country. The BT Infinity programme for Super Fast Broadband will target areas with a roll out of mainly fibre to the (green) cabinet (FTTC) to cover 4 million premises by end 2010 and 40% by end 2012.

BT has around 75% of the residential and SME access network supply on a wholesale basis whether serving its own retail business or others (such as BSkyB) for broadband (as well as voice). Effectively the UK has a virtual (BT/Virgin) duopoly of broadband provision plus a few smaller players providing niche or regional services

The **Virgin Media network** includes hybrid fibre/coaxial cable, with optical fibre deployed to a large number of street cabinets; and a twinned cable (consisting of both high-capacity coaxial cable and twisted copper-pair elements) extending from the street cabinet to the customer's home. Virgin Media of course offer TV, voice, broadband (and mobile) and penetration is approximately 20% to 25% of homes passed. Virgin has announced a programme of 500,000 additional homes passed by 2012.

The geographical coverage of access competition is uneven and does not fit neatly on to a map of the UK or of its many local areas – because one street may have both BT and Virgin networks to choose from while the next street has (effectively) only BT (for whichever retail service provider the end customer chooses). This will obviously affect costs to maintain as well as any new build costs. Further level playing field issues are not easy in practice. Sports analogies are maybe not right (as each competitor's team does not have the same number of players) – but it seems like team BT wants to play on the whole pitch but team VM wants to play in certain parts (approx 50% coverage). Both teams want to play where the best opportunities are and a new entrant player team has to decide where and when to join the fray, never mind trying to work out whether the field is level (they rarely are). If there are abuses on the pitch we have referee Ofcom or competition authorities to sort things out.

Local access networks (which are the principal concern of this paper) are in turn linked to **national communication networks** (the pipes and core network with massive capacity or 'bandwidth'). While BT has by far the greatest national core and local coverage there are others with many points of presence, mainly focussed on business markets. These other networks could potentially "aggregate" traffic and or extend their networks to reach out into new local markets geographically. These networks include:

- Mobile Operators: Vodafone, Orange, O2 and 3 who mainly use BT for fixed broadband
- Cable & Wireless;

- National Grid and local Gas, Electricity and Water utilities
- MoD (not all contracted to BT);
- Government owned networks such as PDS and NIRTS (alongside the motorways);
- Janet, the academic network for universities;
- The Railways;
- Regional and Local Authority (including Health) networks
- Major business such as Banks, Supermarkets, Royal Mail/Post Office who all have local offices or facilities which could be extended to more local access networks
- Local/Regional operators some with national routes, for example:
 - Verizon
 - Colt
 - KCOM (Kingston upon Hull)
 - Smallworld Cable
 - A variety of smaller private companies and new entrants such as GEO, i3 Group H2OFibreCity, Vtesse, Rutland Telecom and NextGenUs
 - A growing number of Community broadband projects (some are described separately ⁹)

Infrastructure competition can benefit local users as for example networks built in the mid 1990s, in the City of London where say Lombard Street has four separate access infrastructure providers competing for financial institutions business. These networks still exist today and are no doubt profitable.

Another variation of access competition is vertical integration of the incumbent. So called 'functional' separation with BT Openreach has been in operation since the strategic review of telecoms five years ago. There is always an option which is clearly a matter only BT can decide of 'structural separation' with a separate market floatation. It is understood that a form of this approach is apparently being considered in Australia,

However we define costs we can firstly say that one thing is certain. Utilities make money by customers using their networks and some returns may not be particularly 'exciting'. However, these are long term sustainable businesses that operate for profit. Furthermore, telecoms networks (the holes and poles departments) make money too, with or without fair or unfair cross subsidies between services such as calls and rentals. A further feature of telecoms networks is that once the customer is connected, the incremental cost of handling traffic is relative low – save obviously when capacity has to be increased by large steps. This feature clearly flows through to margins.

Regulatory financial Information is available for BT given its significant market power ¹⁰. Openreach (the BT unit operating access and backhaul) delivers a number of services, not just broadband. These accounts include transfer charges to other BT units Wholesale and Retail as well as to external operators. As a guide, it shows mean capital employed of £13.2 billion (Current Cost Accounting basis) with revenues of £5.1 billion to give a return £3.6

⁹ <http://www.inca.coop/>

¹⁰

<http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2010/CurrentCostFinancialStatements2010.pdf>

billion or 27.6% margin. This is high but does include a very large holding gain (on paper) presumably for copper prices. On a more conventional historic cost basis the return is £1.1 billion. With depreciation added back this implies a possible cash flow of £2.7 billion recognising there are internal transfers too. Capital expenditure (capex) for Openreach was £907 million, (broadband is not shown separately) slightly down on the previous two years. With 2.5 billion to spend on Superfast Broadband this should show a very significant increase in capital spend.

Operating costs are not separable for retail Broadband. As a rough guide for any operator the incumbent BT used to publish financial results for Narrowband Access (line rentals and connections) which arguably give a guide “before broadband” subsequent investment has impacted. For 2002 residential average operating costs per line was £142 while for a business line £173. These costs include everything for the access network (at CCA replacement cost) and retail expenses and residential showed a loss while business made a profit. The principal cost drivers are numbers of connections, distance, faults and support activities.

Capital costs of new network connections which are crucial for new entrants are not easily identifiable with BT for comparisons etc. The current wholesale exchange line service is published and shows one key measure - a return on capital (ROCE) of 28.5% with revaluation or 13.9% excluding revaluation adjustment.

Network Cost models can and are developed with a “top down” approach using average costs or long run incremental costs from operator accounts or “bottom up” using more engineering planning and provisioning rules plus estimated prices. The BD UK unit has recently published some theoretical exercise conclusions but great care is needed in developing cost models assumptions which must reflect experience, proper understanding of the network and business reality.

Broadband is not easily separated out in any annual accounts but overall **communications players’ business results** include (noting that comparisons are never easy in the sector):

- Virgin Media ¹¹ has a national core and local networks, built by various different cable franchisees over a period of 10 -15 years mainly up to around 2000 when the dot com bubble burst. Broadband or local access results are not separated but total revenues are £3.8 billion with operating income of £142 million (before interest of £573 million but after depreciation of £0.9 billion) with fixed assets of £5 billion and capex of £569 million;
- KCOM¹² group (mainly serves Kingston Upon Hull but also has other interests) has revenues of £412 million with an operating profit of £26 million;
- BSkyB ¹³ has revenues of £5.9 billion and operating profit of £1.1 billion and capex of £261 million;
- Cable & Wireless Worldwide ¹⁴ with UK revenues of £1.7 billion.

¹¹ http://media.corporate-ir.net/media_files/IROL/13/135485/Virgin_Media_Annual_Report2009.pdf

¹² <http://www.kcom.com/about-us/>

¹³ http://annualreview2010.sky.com/assets/pdf/Sky_Annual_Review_2010.pdf

Costs for new entrants are clearly affected by challenges or barriers which will impact heavily on their own input costs. There are some significant issues where Government policy and the Regulator could work harder to resolve. Space here precludes further consideration and these could be the subject of a separate paper. The key points to note include:

- Backhaul capacity (beyond the local switch) is claimed to be an issue although not all seem to agree, the matter warrants further investigation and discussion;
- Government¹⁵ has been considering infrastructure sharing of ducts and poles in order to share access – and BT has recently provided details of its proposed charges for this service. In principle sharing will allow competitors to gain access direct to customers and will offer a new solution for operators that is cheaper than building their own. In its announcement BT implies that Virgin and others should also offer to share infrastructure. Of course as with issues of spare capacity it is not always where you want it and ducts may be full. This has implications for margins of operators paying duct rentals rather than retail margins from their investments. There are also the infrastructures (including underground ducts, poles and wayleaves) of the other utilities such as electricity and sewerage and a variety of central and local government bodies with infrastructure to serve our roads (and rail networks) which could be used;
- Business rates are a particular thorny issue for new entrants who have complained for years. The Valuation Office applies a particular method to assessing BT's rates. There are also valuation proposals for new network sites which could impose additional significant charges;
- BT excess charges apply where so called 'normal' tariffs cannot be applied. These can result in very high charges. One aspect of BT's excess charges for access is that apparently the same cost is charged for fibre and copper, namely £4 per metre (duct charges will be in addition);
- The question of internal "transfer charges" within BT divisions is always a concern for competitors and the need for transparency and fair treatment is an issue – the regulatory accounts are complex and could be presented in a more informative way.
- The definition of Universal Service Obligations is always problematic. Is it just "uneconomic areas" or to include "uneconomic customers". Is it just rural (however defined) or might include some struggling inner city areas.
- Interoperability between the various local networks including standard terms and conditions and commercial issues could be an issue. (The COTs project is reviewing this point.¹⁶)

The key issue is the likely **capital cost of NGA roll-out** and where roll-out will take place. Current information includes:

¹⁴ <http://www.cw.com/reports/>

¹⁵ <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/b/10-1046-broadband-deployment-discussion-paper.pdf>

¹⁶ <http://www.itpro.co.uk/blogs-archive/bsg/2009/08/07/the-cots-project-launch/>

- Public telecoms investment worldwide according to OECD is running at around USD 200 billion (approx £133 billion) per annum (with 46% in North America to place this trend in context);
- For the whole of the UK cost estimates have been somewhat illustrative and vary because of the scale and scope of the solutions (fibre to cabinet {"**FTTC**"}) or fibre to home {"**FTTH**"}) as well as a whole range of factors and assumptions including topology, distances, surfaces, overhead or underground, customer take up, technology (including copper upgrade, fibre, some wireless or satellite options) and prices. The lowest seems to be around £5 to £7 billion with the highest at some £29 billion for a full roll-out of FTTH. We really need a better "range" of options and technologies. In short, no one really knows;
- BT first announced a £1 billion programme, then a further £1.5 billion, so £2.5 billion in total - subject to the normal commercial considerations;
- Virgin have announced that their local network will be extended to serve an additional 500,000 homes;
- The Government has recently announced the programme to commit some £800 million for Broadband over the next seven years for Universal Service commitment.

Currently announced plans concentrate on providing FTTC for between half and two-thirds of the UK for which the capital expenditure looks to be around £3 billion. (So presumably a similar amount might be needed for the rest). All the announced plans seem to be long way from delivering 'fibre to the home' on any large scale.

The **Government programme** being led by the BD UK unit of BIS just announced the Broadband Strategy¹⁷ recently with public funds of £530 million (amount to be confirmed for this paper) over the next few years. A first step is to pilot trials in four trial areas followed by further pilot trials in rural areas. Some estimates of theoretical costs and possible resources have been published. The process for allocating funds will be a key issue to be tackled. **Which parts of Britain will attract private and which will get public investment and in what order of priority?** Where will the investment be made in terms of specific local access networks? What criteria are used? What happens to those who miss out? BT Infinity is conducting a post code survey to try to ascertain customer interest in Super Fast broadband. Presumably BT and Virgin will both tend to focus on areas where they can either compete in retail markets and/or supply wholesale services, perhaps with an emphasis on urban areas. There will also be greater emphasis on public/private sector partnerships, for example Cornwall has announced co-operation with BT on a £132 million project supported by EU funding and there is a major public/private scheme for Northern Ireland.

Optical fibre is the generally preferred technology option for NGA and it can also offer significant operating cost savings, including on maintenance. A **local access site mapping** exercise will be needed to identify exactly where the investment is going (and where not). That implies greater transparency and presumably accountability so that everyone can see what is happening. Local exchange locations are known and (depending on security concerns) a map of green cabinets (enabled or not) might be the next task for Government or the regulator. A number of smaller new entrants such GEO (using the sewer network),

¹⁷ <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/b/10-1320-britains-superfast-broadband-future.pdf>

Vtesse, H2O, plus several community broadband schemes are investing. Local communities are taking a DIY approach to providing fibre, often using hybrid solutions involving a variety of wireless technologies (including fixed wireless and Wimax). Avanti has just put up another Satellite to serve UK and EU communications markets, including rural broadband. Mobile operator plans could have a significant impact.

Next Generation Access Funding

Given the BT commitment, the Government new funding and increased interest in NGA it seems the UK has at last **begun to discover a viable business case**. Comparisons with other countries are always tricky but South Korea, Singapore, Australia and many in Europe have more ambitious plans than the UK. Returns have not been published but at a recent conference one speaker said they expected payback in 11 years. This seems a long time but utility returns are commonly low but predictable and attractive to long term investors, such as pension funds. A public/private project has been reported as projecting payback over 7 years.

More research and **financial modelling** plus understanding the viability of local and regional markets is needed both for the Government (our money) schemes and to develop business cases. A very simple illustrative Access Model can estimate revenues over time (with volumes rising and prices falling); the capital cost; options per home; operating costs (typically below those for copper based networks). Some sort of leasing deal (as for say the earlier railway rolling stock schemes) might work based on payback of between 6 to 8 years depending on the cost of capital. More detailed evaluation and a cost model (plus discounted cash flow (DCF) numbers) is needed; but the rough guide economics might stack up.

Key variables are the revenue stream and projected “take up” by customers (and any competition effects). Providers might target 20% initial adoption of new Super Fast Broadband and would no doubt be seeking much higher penetration over time. As noted cable take-up rates are around 20-25% of homes passed, although interestingly some of the new Community Broadband schemes are reporting very much higher take-up. The key issue for any new operator is arguably a marketing challenge or achieving a good take-up.

Given the investment announcements there seems to be a potential gap in funding for (the excluded) “one third” of the UK. No estimates have yet been made for that third but given the scale of funding commitments so far a similar sum - **a broad brush estimate of another £2 to 3 billion** - might cover the third for something roughly equivalent to the BT FTTC approach.

Who would be interested in building local additional access infrastructure capacity and where? Could the funding be raised – and by whom? It seems there is a need for something like £500m capital expenditure over the next five years and certain local authorities are looking at their current network provision to see what could be done and where the money might come from - the raising of finance is of course market led too. The situation will clearly be different in individual parts of the country. A community enterprise model may have a role to play because the indirect benefits from reducing the cost of public services, improving quality of life and employment prospects and increasing local property values could significantly exceed the likely direct revenues, let alone profits, to the

communications operator. It should be remembered that similar “community” benefits underpinned much of the railway investment, especially in the rural networks, that transformed the United Kingdom in the 19th century. Equally as with Victorian sewers some over engineering might be appropriate.

As with any investment opportunities there are **risks**. These will include market risks and operational, regulatory uncertainty, credit risks and so on which will need to be evaluated.

Organisations and potential funding sources will need to undertake further evaluations but possible examples include schemes undertaken by existing players with an interest in local infrastructure such as;

- Some of the other current private sector national or regional operators extending out into local end networks, given they have expertise and core networks and potential bandwidth capacity to offer greater aggregation of traffic;
- Public sector networks with again greater aggregation of traffic such as Government owned or using Academic networks to obtain more revenue for them (depending on compliance with State Aid rules);
- Equipment suppliers and civil works contractor companies;
- Other local infrastructure utilities such as electricity distribution or water companies;
- New homes build/Housing Associations and Trust/Property developers;
- Finally but not least - the local community schemes clearly have a vital and increasing role to play and may also be able to scale up their networks and they have the drive and enthusiasm needed.

As the likely returns begin to look more favourable large “**new players**” (possibly non-telecoms firms) such as content providers, search engines or large retailers could decide this is an opportunity to enter the access infrastructure business. Anyone with a good regional or national network of premises or shops might have core networks which provide nodes for end equipment and then local access roll-out (whether by them or provided by others) as resellers of infrastructure and or services.

We really need a much better ‘range of options’ for different NGA technologies, deployments and coverage, for example, what do we get with £10 billion or for £15 billion.

More detailed analysis of financing for NGAs (in addition that already announced), cost of capital and risks is required. NGA investment is in desperate need of some fresh ideas and financial innovation from the City of London and should be firmly on the national agenda.

Funding could come from:

- **Customers:** How many consumers would be willing to pay say £1000 up-front to have Super Fast broadband because it could add value to their property like double glazing or an extension?
- **Businesses**, including property developers, how many would be similarly happy to enhance the value of their premises or in their business parks?
- **Operators** through existing business cash flows and or further new equity, rights issues, warrants or corporate bond issues;
- **Equipment and civil works companies** who may be able to fund in more innovative ways – for example asset leasing as the railway operating companies (RosCos) did some years ago or installing cabling while undertaking other work;

- **Potential EU funding** or other institutional measures;
- **Local authority** loans or municipal bond issues say 7 -10 year terms;
- **A national Broadband Bond** issue or establishment of 'Big Broadband Fibre Fund'.
- Tax breaks for capital investment programmes

An Initial Public Offer (IPO) or some Big Broadband Fibre Fund might be created by matching money in a new **Broadband Private/Public Holding** company (**BPHC**) with the power to award franchise areas for broadband network build. A digital dividend rather than a digital divide is needed and this would be an opportunity for ordinary people to share in some of the broadband wealth. There are a wide variety of ways in which the City could raise funds, with the prospect of short-term high returns from bottleneck removal and lower long-term returns from any regulated services. It is apparent that current economic uncertainties combined with low investment returns mean that large amounts of capital, from personal savings to pension funds are looking for low risk investments with potential. Greater fiscal and regulatory certainty will help.

There is no one single funding solution and a number could be tried in coming years. Small community schemes might flourish and seek funding while much larger programmes could take off. A BPHC company could outsource network build through regional contractors or operators. Although starting with no assets, building next generation access networks would in due course create very long lived assets with solid revenue streams. (In principle no different from utilities such as water, gas or electricity which also pay out a regular dividend stream year in year out). A concession or a franchise for a particular area might exclude another operator from new builds to allow others to get on with the task.

Conclusion and call for Action

Local telecoms infrastructure should be a current priority. Developing NGA's at the local level could create jobs directly and support many more indirectly. Investing makes sense not only for today but also importantly for the country's next generation. There are a number of major business challenges not covered in this paper such as marketing, customer service and very practical operational and technical challenges. Leadership in telecoms organisations, regulators and policy makers and enthusiasm, which is already very much there amongst some local communities, are all needed. Experience from within the industry plus training in new skills are all part of the challenge in implementing such a big changeover to NGA. Digital Britain does have the talent to deliver¹⁸. The issue is not just about the telecoms sector, but needs a cross-sector approach with a mixture of greater public scrutiny and public awareness.

Priority actions required include:

- Further research work by EURIM and other organisations
- Preparation of a paper cover mobile and satellite networks investment for broadband
- Mapping the NGA roll out to give greater transparency – where are the haves and have not spots?

¹⁸ <http://www.convergenceconversation.com/posts/lindsey.annison/has-digital-britain-got-talent>

- Business proposals and cost estimates of alternative schemes and solutions and better evaluations.
- Make of better use of willing institutions such as universities and industry bodies to increase the research base for NGA networks and innovative technologies
- Innovative private funding solutions from the Financial Community and efforts to attract new players

NGA is a very big opportunity and the 'costs of inaction' will increase if not tackled soon. Developing a coherent NGA strategy is a real commitment to future proofing our national infrastructure. Ultimately it will be the customers who decide what they want and how much they can afford to pay. However, properly assessed and targeted additional strategic private sector investment of at least £500 to £1000 million each year for some five years seems needed. Recognising that this is a challenging in these difficult times which needs to be set against the potential movement of capital from the UK for lack of realistic investment opportunities.

We need to give the right messages especially from the telecoms sector to the country to show confidence in our digital future. Building better local infrastructure will undoubtedly create economic growth through new local jobs and subsequent consumption of new NGA delivered services. The alternative is economic decline as the UK ceases to be fully on-line in our global digital world and is out-completed by other knowledge-based economies that are investing.

The future will be better because of broadband and the internet. Investing in NGA networks now and improving online services and opportunities will improve the bottom line for UK plc and benefit everyone in the UK and those we communicate with throughout the world – it will be a good investment for our generation and the next.

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Acknowledgements: These are personal views very much for discussion but considerable further research has been undertaken and is available if required. Very many thanks to Philip Virgo, Anna Coast, Len Hawkes and Leo Todd for their contributions and my family for their kind support and encouragement.

ANNEX A

Demand starts at the network access point with broadband **connections** (this is the fundamental business driver of capacity) to get online at particular speeds (Mbps). Once connected online service usage (or traffic) and content is consumed often in ways not originally anticipated such as for social media networks. The UK market for residential broadband connections is at 19.2 million¹⁹ or 73% of households. For the business market, 70% are estimated broadband users (which seems low but many still use dial up apparently!). Government and public sector data is not easily available but there must be of the order of 6 to 8 million connections. There is still potential in all these markets and geographically great variations in penetration (London 83%, North East 59%). International comparisons are never straightforward but the UK is 9th in household penetrations but in fibre to the home (FTTH) the UK does not seem to be on the graph according to OECD statistics.²⁰

There is **potential demand** for at least another 10-20% new connections in residential and SME markets and more in some geographic areas of the UK. Naturally not every household will take broadband. Reasons for these remaining groups for not taking up broadband vary considerably. For instance, many households have discontinued their fixed phone line in favour of pay as you go (PAYG) mobile. Other socio-economic factors and attitudes are likely to also come into play, rather than connection cost directly.

The number of connections does not correspond to the real number of **internet 'users'**, for example:

- many households have overcome the first online bottleneck – namely the single PC. Additional PCs or laptops (some 7 million sold last year) get online via the home WiFi/router
- all users want to get online “at the flick of a switch” using communication devices as we see the PC, TV and mobile devices starting to merge
- mobile broadband is growing fast, some 3.4 million users with expectations that the number of devices in use may more than double or treble by the 2012 Olympics with data volumes per device increasingly potentially ten fold or more (unless rationed by price or spectrum).

Geographic Availability of broadband should not be taken for granted. The obvious but fundamental feature of demand (as contrasted to mobile) is that it is fixed to a single reference point on the map. Demand comes from each individual point in a local community area, typically served by some 5,000 BT local exchanges, Virgin Media hubs and a few local operators. There is a problem in some locations, often in rural areas getting broadband. Where you live and what you can get is a bit of a post code lottery. This will become even more of concern with Super Fast Broadband roll out. At present the digital divide may be getting worse according to a recent research report²¹.

¹⁹ <http://www.statistics.gov.uk/cci/nugget.asp?id=8>

²⁰ http://www.oecd.org/document/54/0,3343,en_2649_34225_38690102_1_1_1_1,00.html

²¹ <http://point-topic.com/content/dslanalysis/BBAbbi101124.html>

The **average broadband speed** has increased again over recent years. Ofcom reports²² that for UK residential it is now 5.2Mbps. Of course average speeds are not what people actually receive. Operators and service providers are now offering up to 20-24 Mbps all with the famous small print “subject to location or availability.” Good broadband service availability is not universal. Many communities rightly complain of poor quality and low speeds of 1 Mbps or less. Advertised headline speeds are invariably way above actual speeds and the Advertising Standards Authority is looking into this. The focus on headline download speed can hide a bigger problem – that of real throughput, especially when you are streaming content like catch-up TV which can affect suppliers contention ratios in backhaul networks which also requires more capacity with no extra revenue. This problem could get worse.

Super Fast broadband (Ofcom definition is over 24 Mbps) is now being advertised and on offer at BTInfinity²³ up to 40Mbps and by Virgin Media up to 50 Mbps and most recently for some, up to 100Mbps²⁴.

²² <http://consumers.ofcom.org.uk/2010/07/increase-in-uk%E2%80%99s-average-actual-broadband-speed/>

²³ http://www.productsandservices.bt.com/consumerProducts/displayTopic.do?topicId=29017&s_cid=con_ppc_maxus_vidZ59_Broadband&vendorid=Z59

²⁴ <http://shop.virginmedia.com/broadband/up-to-100mb.html>