



StarOverIP

All solutions over IP
www.staroverip.net

The Real Digital Britain

Graham Pope

Principal Consultant

graham@staroverip.net

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1. Introduction

The UK is in the middle of a communications boom, with widespread access to Digital TV and nearly everyone owning a mobile phone. With new applications arriving daily to take advantage of these technologies nothing could be better. Except this is largely dependent on copper wire that was originally designed for analogue voice calls, connecting every house to its local telephone exchange. This is often referred to as the “Last Mile” Now this same cable is required to handle voice and high speed data at speed never dreamed of when it was first installed. Now technology is advancing at pace with the Internet, TV on demand and Voice over IP, but the last mile has never changed.

As communications have moved from analogue to digital, internet access has moved from Dial-up to Broadband. Mobile phone have done the similar, move from analogue to digital (2G) then to 3G with mobile Internet taking up more of the bandwidth. The operators have squeezed more and more bandwidth out of the existing spectrum. If ten years ago you were told that aDSL would be running at 8Mbps not the 56Kbps dial-up that we had then, no one would believe you. But at some point there will be a limit to how much bandwidth it is possible to get out of a pair of copper strands loosely twisted together.

When broadband was first made available domestic customers had little reason to move to it. It was quite expensive and with only web pages to look at there was little content that needed such bandwidth. This is now different with iPlayer and YouTube to name just two.

2. The Digital Revolution

In the last few years there has been a digital revolution, analogue terrestrial TV is being replaced by digital. Sky has replaced its analogue services with digital services same with the cable companies. These services are now adding High Definition TV that requires even more bandwidth. The video recorder has also been replaced by the Personnel Video Recorder and On Demand services. These services are also making their way on to portable handsets and mobile phones. All of these services are exploding across all these platforms. The data requirements for 3G are now taking off with iPhone and other smart handsets allowing users to do more than just Internet email and web surfing.

3. Upcoming Issues

With all this expansion there is an increasing trend of content to be linked to platform so from the three Digital Television systems there are some common channels but not all and interactive services are delivered in different ways. There are issues with Digital blocking when environmental conditions are not right. Terrestrial is most affected by wind and rain. BSkyB is mainly affected by rain clouds and Virgin media cable has issues on cold and wet days.

On the data side only cable TV can offer an alternative to aDSL via the telephone wire. Virgin media are offering services up to 50Mbps but this is still share between you and your neighbours. 3G networks are feeling the pinch with flat rate tariffs keeping the revenue streams flat and data requirements increasing on a logarithmic scale. As the 3G data requirements increase the bandwidth to the cell towers must also increase, this give more headaches to the mobile operators.

The mobile service providers have been building new networks from the first digital network all the way to 3G fuelled by the growth in handset ownership. The usual business model is to grow the coverage of the networks and sign up as many customer to subscription packages as you can. A major issue is now that there are more mobile phone in use in the UK than there are people. There are no longer opportunities for large growth in handset ownership to provide revenue to build networks. This market has now matured to one where customers will drift between networks based on price, quality, offers and exclusive handset deals. The flat rate subscription services are no longer work for the service providers. Margins are being reduced on call minutes and texts are bundled in for free. Perhaps most serious of all is the flat rate price for Internet access with the revenues flat and the use going up on a logarithmic curve. Maybe it's time to reconsider the proposition that many utility companies try to get Dotcom performances for their shareholders in the markets, despite the fact that by their nature are slow growth stable revenue.

4. Where is this all leading?

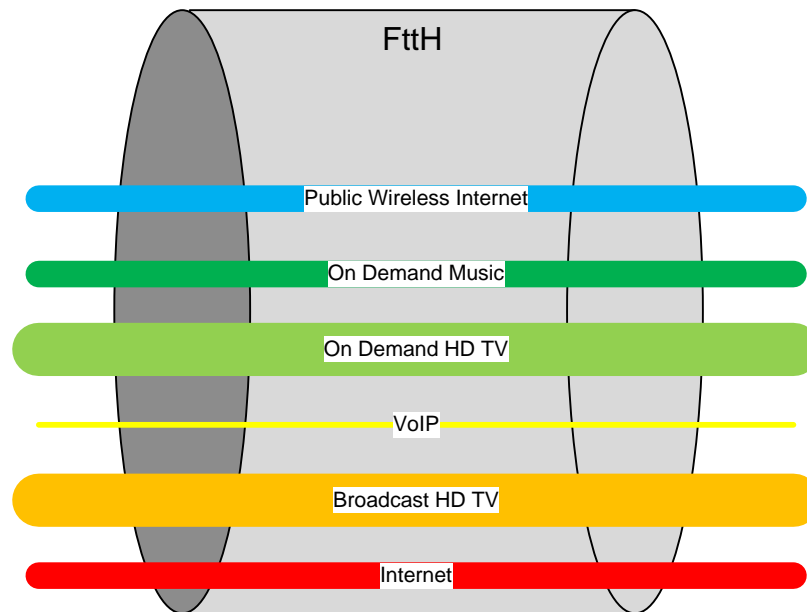
Service Providers should change to become just that, service providers, and let an infrastructure company provide a single open access infrastructure where all Service Providers can compete for consumers of their services. Duplication of infrastructure is inefficient, leading to uneven overprovision in urban areas and patchy and costly service in less populated areas. A single infrastructure provider removes the duplication and encourages the widest spread of compatible technical standards. Service providers would have a strong and stable infrastructure platform on which to compete.

Increasingly in network regulation throughout the developed world, infrastructure providers are prevented from having any financial interest in the content being distributed over the network. This should apply to the infrastructure company which should not be allowed to provide services on its own network, leaving the network carrier natural. Moving forward to 4G the licensing of this Spectrum could be adjusted so that rather than the operators bidding an up from payment for a small number of licenses, only one is issued to the Infrastructure Operator. Government then gets a stream of revenue over the life of the spectrum through a levy on Service Providers for the use of the Spectrum. Service Providers would be required to agree a common frame work for access to the network, then they and other businesses could start using the network to provide additional service. The removal of the need to finance a major up front fee at risk against the future revenue stream should allow much faster mobilisation and provision of the new service.

5. The Solution

To provide all of these services to the home there is only one real means, to install Fibre to the Home (FttH). This is where a Fibre Optic cable is run to every home in the UK to provide all your telecoms services. This would be the total replacement of the Last Mile copper wires with Fibre Optics. This will be a huge task but I think we are now over due for the replacement the one hundred year old copper network with a 21st Century solution. Once the Fibre is installed to the home there will be no bounds to the services that could be provided. To increase the bandwidth all that needs to be done is change the Optical device on both ends of the Fibre. Speeds for up to 10Bbs (Billion bits per second i.e. 10,000Mb/s) are common over such Fibre Optic cable which is 200 times faster than the current fastest current speeds on cable broadband. With the Fibre Optic connection in place, if every home had a standard box connected to multiple services could be provided over this Fibre. With bandwidth set aside for each the different function so they do not interfere with each other. HD Broadcast TV,

Internet access, On Demand TV, Music services and Telephone, would all co-exist on the same cable but separated into their own streams.



If the network was neutral i.e. independent for the existing service providers and was not allowed to provide services across its own infrastructure and the boxes in each home had a published Application Programming Interface (API), it would be possible for existing or new service providers to create new services quickly and cheaply and lower the barriers to market access. This would also lead to increase competition and new services for the consumer.

I see a service where the user has a single box that sits under their TV. It would have connections into the TV, audio output, Internet connection, wireless Ethernet, a telephone connection, a hard disk inside, USB connection and Blue Ray player. In fact you end up with an all singing and all dancing PVR/Telephone/Internet box, a fully integrated 3 play. With this you could watch TV, listen to the radio and watch On Demand programmes and a lot more besides. As you would want the TV to be HD with multiple screens so that other people in the household could watch other channels in another rooms. Along with that you would want high speed internet access and telephone.

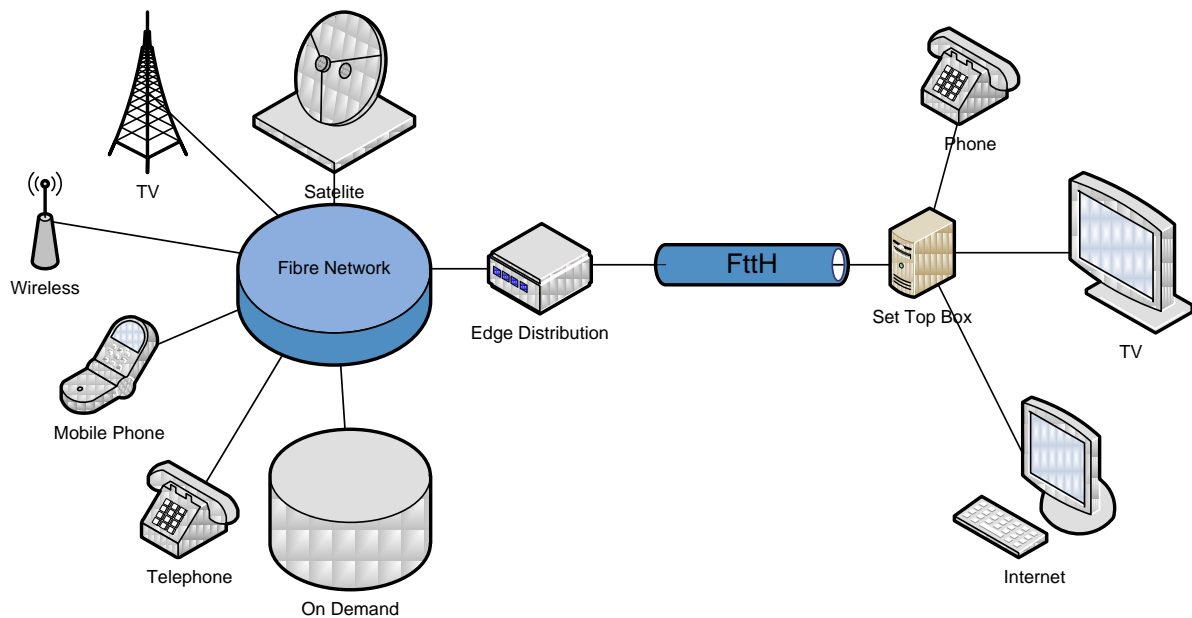
6. What about 4G

4G will be the replacement of 3G on mobile smart phones and has not been licensed in the UK so far. Currently the mobile operators have built 4 separate 3G networks and are competing for coverage across the UK. This means that the level and quality of service a customer receives is dependent on which operator he uses and where he gets 3G coverage in the area that he is in. The operators are struggling to keep their revenues up while being swamped with Internet traffic from all of the 3G handsets. They are upgrading the links each cell towers to their networks to handle this additional traffic. Some of these masts are now being upgraded to fibre connection. 4G is being touted as the solution to the last mile access to the home, offering high bandwidth connections via the radio spectrum. This solution would end up with neighbourhoods sharing 100Mbps to 1Gbps connections. This would not handle universal HD TV streams and high bandwidth Internet. As these masts will require very high bandwidth connections back to the mobile networks this would probably be done by a Fibre network. There is a strong case to build a single 4G network on top of the Fibre to the Home

infrastructure rather than as a replacement for it, this would allow off loading much of the data onto the fixed line network maximising the bandwidth of the mobile users.

7. Possible Services

This is almost limitless but below is a list of the main type of services that would be run over a Fibre to the Home network:



- HD TV Transmission
- HD TV On Demand
- High Speed Internet
- IP VPN Services
- VoIP
- Video Calling
- Wireless Internet Access
- Cellular Phone Access
- High Quality Radio
- Music On Demand
- Networked Backup Services

8. How to build it

This is a very large project to build a network that will affect 30 million homes and countless businesses. The Government would probably not wish fund such a build, but has made subsidies available for connecting remote or vulnerable communities.

A very good model for building the infrastructure might be as a third sector not for profit venture similar to the Network Rail prior to nationalisation. This would be regulated by OffCom, but as it is not for profit, and does not have any financial interest in the traffic, the regulation need only be relatively “light”. The infrastructure would be built out by local contractors financing their section of the build with their own finance, this would be recovered along with maintenance costs over the following 10 years as a rental charge. The rental charge will reflect the availability delivered by the local contractor to provide the appropriate performance incentives.

The infrastructure company would receive revenues from traffic charges to service providers and from up front and ongoing connection charges to end-use customers. The balance should not act as a major disincentive to individual customers to connect. As the network builds, the development could become self financing but there will need to be considerable “seed corn” funding at the start. Given a suitable regulatory regime, the infrastructure company should be able to raise the cash through (say) bonds on the commercial markets.

Once the 10 years rental period is completed, ownership of the fibre would past to the network company and the maintenance could be contracted out competitively. The build will be targeted at key areas for the build strategy and also taking into account other drivers like customers, contractors and service provider demand. The underlying aim is to build out to everyone in the country over as short a time as reasonably practical.

Service providers would have two access models, the first being a single connection to a UK wide distribution network runs by the network company to allow single service or small providers’ access. The second would be access to each concentration point in each neighbourhood so the larger service provides can continue to use their own UK distribution network. The network company would also hold the billing and customer information and would mediate between the service providers and the customers to provide a single seamless service.

9. How to pay for it

To demonstrate how this build could be finance, a cash flow model was constructed. Depending on the assumptions used there are different results but generally the peak financing requirement would be £20Billion but that is in the 8th year of building. This will allow the building out to more than 90% of the population in the first 10 years but not reaching every home for 20 years. The proposal would be to raise the financing from the bond market. This would be in the form of £2 - £4 Billion per year for the first 8 years and paying this back over the following 8 years. To get the project moving, money would have to be raised to fund detailed feasibility studies and prepare the offers for the financial markets.

10. Positives

- Fibre Optic is cheap and easy to use and can handle large volumes of bandwidth over a single pair of fibres

- Need for increased bandwidth to provide new rich services.
- Provide leading services like high definition on demand TV
- Increased competition but lowering the bar to market entry, allowing new ideas and new services to flourish
- Single infrastructure so only single investment, no duplication between competing operators
- Unlimited service possibilities, new services that have not been thought of yet

11.Challenges

- Initial “seed fund” of £10 – £20 Million
- Very large installation cost £20 Billion this would be raised on the bond market
- Fibre maintenance for the last mile, again handled by the installation contractors
- Resistance from incumbents, these changes the business models for all the current mobile and fixed line providers.
- The Government, political support would be required because of the change in spectrum allocation and taxing
- The Regulator, to support a single not for profit network shared by all the providers
- Emergency telephone calling in power failure, support of 999 calling form used end devices