

Response by B4RDS (Broadband for Rural Devon & Somerset) to the OFCOM Consultation on:

“Designing the Broadband Universal Service Obligation”

June 23, 2016

This response has been prepared by Graham Long, Chairman of B4RDS (Broadband for Rural Devon & Somerset), a lobby group with members across the two counties and representing the interests of rural residents, communities and businesses in Devon & Somerset.

This response is in three parts, as requested in the Consultation Document:

- (a) Concerns about the current proposed approach (Page 1)
- (b) The specification of speed (Page 6)
- (c) The role of OFCOM and the DCMS Secretary of State (Page 7)

(a) Concerns about the current proposed approach.

B4RDS members and rural residents across the UK have major concerns with what is being proposed by DCMS and OFCOM.

Our concerns are the same as the concerns we have had with the UK Government “superfast” broadband programme since its inception – namely a **lack of ambition, foresight and commitment** to provide the necessary digital infrastructure that ours, our children’s and our grandchildren’s future will depend upon.

The current state aided BDUK programmes, Phase 1, 2 and the various voucher based schemes are the UK’s response to the EU’s Digital Agenda for Europe. Despite having a reputation for “gold plating” EU legislation, DCMS and BDUK have in this case enacted the minimum that the UK can get away with whilst meeting the EU edict. This started at BDUK’s inception, when the UE called for a 30Mbps service to be implemented by 2015. Not only was that target missed, but, DCMS/BDUK negotiated a 20% reduction in the 2015 target with Brussels to 24Mbps, believed to be at BT’s insistence, because of BT’s historic lack of investment in the Openreach infrastructure since privatisation and the fear that BT could not deliver the required bandwidth to provide all UK landlines with 30Mbps broadband download speeds.

At the same time, and as required by the EU, BDUK devolved negotiation and management of Phase 1 contracts to County Councils who have previously had no experience of contracting and managing telecoms networks. The EU State Aid umbrella agreement mandated a contracting procedure which all but guaranteed that the vast majority of contracts would go to BT and allowed BT to deliver the lowered 24Mbps target via copper to properties, terminating fibre cables in street cabinets. BT much preferred this approach because it maximises Openreach’s profit margin whilst reducing bandwidth demand. The fact that all the copper will need to be replaced sooner rather than later was it seems never understood by DCMS/BDUK. Similarly, the fact that while this copper dependant FTTC approach may provide adequate speeds for properties in dense urban areas less than 1.2Km

from a DSLAM street cabinet, the fact that it is a completely inadequate deployment approach in rural areas has it seems never been a concern of the program.

No matter what DCMS/BDUK or OFCOM may assume, broadband is a pull market and not a push market. I.e. The need for bandwidth is driven by consumer and business needs to connect to the trade routes of the 21st Century. Whilst the profit motives of individual network companies, like the de facto owner of the UK telecoms infrastructure, BT, means that they will never want to provide a universal broadband service, rural residents and businesses will still need access to those “trade routes” and the EU and the UK Government have both accepted that the state has an important role to play in making that happen via state aid and goal setting.



Trade Routes of the 21st Century: Current Undersea Fibre Communications Cables which carry all of the worlds Internet traffic. (NB. Today, only in exceptional cases does internet data traffic travel via satellite because signal latency via satellite slows internet traffic more than is acceptable)

To date, broadband state aid amounts to £1.7B, most of which has gone to BT through Phase 1 and now some Phase 2 contracts, but to those looking at the situation from rural shire parishes, state aid delivers less than the minimum required and the current 2Mbps USO and the proposed 2020, 10Mbps USO are just that - less than the minimum required.

In his evidence to the CMS Select Committee, Prof Dieter Helm outlined the need for a flat “utility levy” to be charged by all broadband service providers for all broadband connections, urban and rural, in the same way as water, electricity and gas utilities charge a monthly fee on top of usage charges. Adding this levy to the government subsidy is the only way to ensure that ALL rural properties get connected to the same level of broadband service that is currently enjoyed by those living in towns and cities.

The current failure of Government to implement such a scheme re-enforces the current disparity between urban and rural broadband and is fundamental to BT’s preferred FTTC deployment methodology. FTTC ensures that rural residents and businesses will always get an inferior service compared to their urban neighbours simply because distances between properties in rural areas are

always greater than the distance between properties in urban areas. The fact that this is happening by design with FTTC as the BDUK/BT preferred deployment methodology, means that a conscious decision has been taken to disadvantage rural versus urban residents and businesses – in short it is **digital rural apartheid**.

How can this be corrected by a USO?

Rather than plucking numbers out of the air, that are a few Mbps above what most people seem to be able to operate at today, as DCMS seem to be doing, it is important to first understand the (pull) drivers that determine current need and will determine future broadband requirements:

In 1968, Gordon Moore, one of the founders of Intel, postulated that “computer power” would double every two years. Moore defined Computer Power to be an amalgam of all the parameters that determine the speed and efficiency of computers – memory size, processor speed, bus speed, I/O speed, etc. Moore’s law has been followed for the last 48 years and industry watchers speculate that the growth in computer power will follow Moore’s Law for at least another 10 or more years.

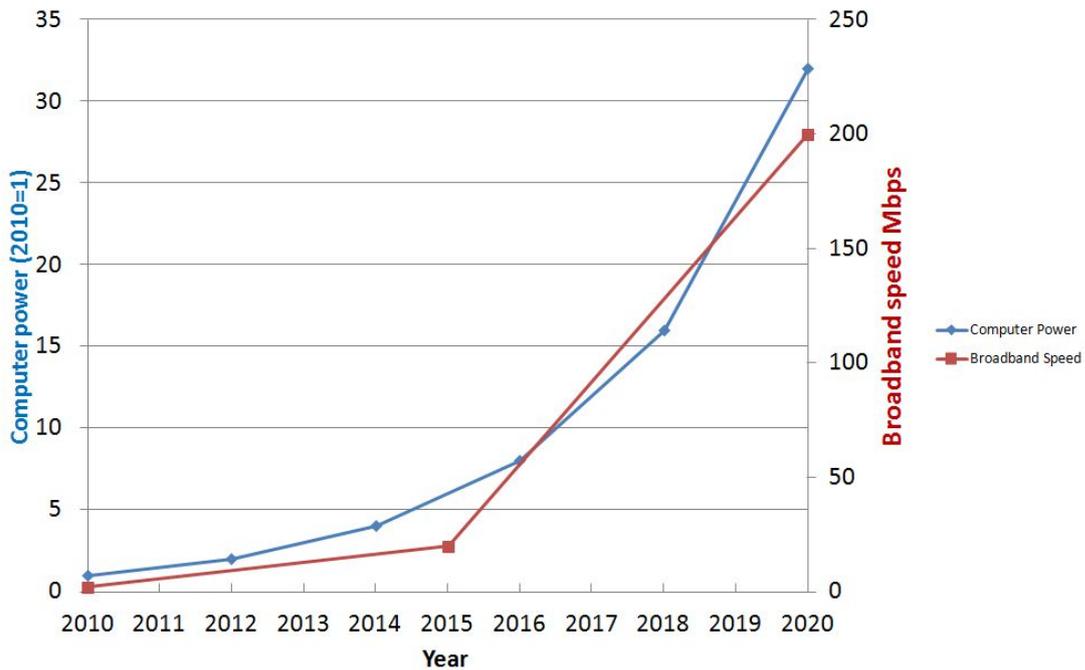
The best way to appreciate Moore’s law is to go into PC World two years after you bought your last PC or laptop. You will find that you can buy a PC or laptop with the same specification for half the price you paid two years ago, or what you are more likely to do, is buy a PC or laptop with twice the performance for the same price you bought one two years ago!

PC’s and laptops did not exist when Moore made his prediction. Neither did the Internet, but for the last ten years, it is Moore’s Law that has been driving the demand for internet bandwidth. It is therefore highly likely that there is another law, which Moore’s Law drives and sits alongside Moore’s Law, driving the demand for internet access and thus broadband bandwidth.

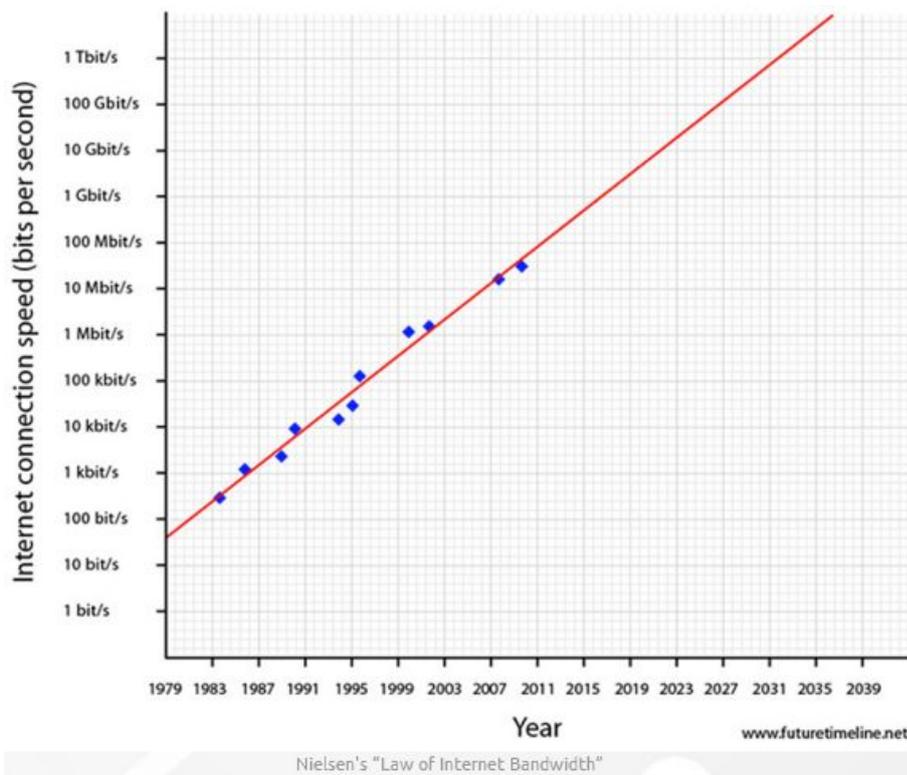
Looking back over the last five years, most users would have been very happy with a broadband speed of 20Mbps in 2015. This is close to the original DCMS/BDUK goal of 24Mbps in 2015, although it would have been only two thirds of the EU Digital Agenda for Europe goal of 30Mbps in 2015. Looking further back, 2Mbps would have been adequate for most users in 2010 and I still have advertising emails from BT marketing a broadband speed of 512Kbps in 2006 and offering what BT called “ultrafast” broadband at 1Mbps!

Taking 2Mbps in 2010 and 20Mbps in 2015 as data points provides an empirical broadband bandwidth curve which increases by one order of magnitude every 5 years. When plotted with Moore’s Law the two curves match surprisingly closely and would seem to predict acceptable broadband speeds for 2020 and beyond:

Moore's Law drives Broadband Speed



In the USA, Jakob Nielsen, a Danish IT consultant plotted the internet speeds he found during his travels between 1998 and 2013 and concluded that internet speed needs to increase by 50% every year.



Nielsen's graph predicts bandwidth demand to be over 1000Mbps in 2020 whilst the graph based on an order of magnitude growth in bandwidth demand every 5 years predicts the need for 200Mbps in

2020. Whether 200Mbps or 1000Mbps will be an adequate broadband speed in 2020 remains to be seen, but both of these are well in excess of the 10Mbps USO proposed by DCMS, who also suggest 8.1Mbps (surprisingly precise) for 2025 or the pitifully low 2Mbps USC of today.

As a rural broadband user suffering a 2 to 2.5Mbps connection at present, I can tell you why 2, 8.1 and 10 Mbps will be inadequate in 2020: 2Mbps may have been adequate in 2010, but if you think back to those times, websites were a lot simpler, text based and with relatively few links. Today, website designers are told that everyone has 24Mbps and they probably live in cities where such speeds are common, so in order to attract customers, websites are now loaded with video, graphics, audio and links which all take time to download. Operating at a broadband speed of 2Mbps for the last 5 years, I have noticed a clear increase in the time it takes webpages to load, despite having upgraded my computer during this period.

It is also the case now that banks, insurance companies, HMRC and DCMS itself, specify web based and online as the only way you are expected to interact with these organisations and as their websites get "jazzier" (which is great for those with 24Mbps), for 2Mbps users, the experience is like being back in dial-up days!.....rural users on slow connections are being discriminated against - **Rural digital apartheid!**

Moore's law will continue to drive broadband bandwidth: A recent report states that the average UK home already has 8.5 internet connected devices. Recently, a university team demonstrated the first Quantum Computing Chip. In the same way that Gordon Moore could not have articulated the Internet or the WiFi tablet in 1968, so we cannot clearly envisage what the "Internet of Things" or Quantum Computing will do to data traffic in 2025/2030. In the same way as the Victorians laid the rail tracks and developed international ocean trade routes that today's economy depends on, so must we set the foundations for the information revolution of the next decade that only light waveguides (fibre cable) will be able to deliver.

2Mbps or 10Mbps broadband users will be further excluded as applications become more and more network dependent: Cloud computing is still in its infancy, but will demand more and more bandwidth as it becomes ever more common. Application and system software updates now have to be done online, as CD options for obtaining updates are removed. At 2Mbps, Windows downloads can exceed 12 hours (if your broadband line remains up for that time and you are not forced to restart the download from the beginning). GP's are experimenting with consultations via Skype. Farmers are being required to claim the Single Farm payment on line. I could cite many more examples.

A USO must not simply define speed. It is also essential that Symmetry and Latency be mandated.

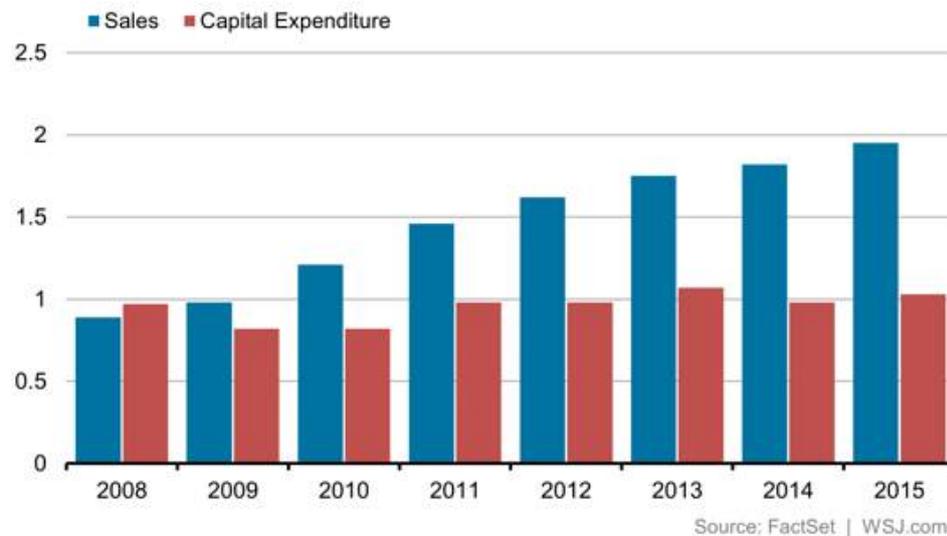
Your keyboard is a QWERTY keyboard because typewriter manufacturers, 100 years ago, found that typewriter keys would not jam if the keyboard layout placed keys that are frequently pressed one after the other, are placed far apart on the keyboard, thereby slowing the typist down!. This is a legacy that all keyboard manufacturers have institutionalised ever since, despite other layouts being more efficient for typists and the QWERTY layout being completely irrelevant for electronic keyboards.

In the same way, today's ADSL protocol has perpetuated asymmetric data transfer with upload speed being approximately 10% of download speed because in the early days of "teletype" current loop terminals, it was assumed that all uploads would be manually typed data at ~50 words/minute. Again this is completely irrelevant for modern software applications where client and server

programmes, working simultaneously with multiple users, can optimise resources between them by uploading and downloading large quantities of data and programme files in both directions. All broadband connections need to be symmetric in order that the user experience is optimised. Asymmetric ADSL is however liked by BT because of the totally artificial limit that it puts on upload speeds thereby reducing BT's bandwidth utilisation and enabling them to continue to "sweat" their copper assets and avoid increasing their investment in the Openreach network for the last 8 years:

Fixed Costs

Openreach's sales and capital expenditure for fiscal years to March, in pounds billion



Latency must also be mandated in any USO specification because speed and symmetry are not the only determinants of broadband usability. Latency, the time that a bit takes to do the round trip between client and server, determines the responsiveness of a user application operating over the internet. For an ADSL or VDSL connection using copper and/or fibre, ping latency will be between 10 and 50 milliseconds, too fast to affect most user applications. Fixed wireless broadband connections will have a higher ping latency and satellite broadband connections will be much higher.

Satellite latency is determined by the distance to the satellite and is often of the order of 1200 milliseconds. Recently launched near earth orbit satellites can deliver 600 to 900 milliseconds latency, but this will still make interactive applications like VoiP and Skype almost unusable.

Fixed wireless latency can be variable since it is often determined by modem error correcting algorithms which accommodate for interference caused by rain, fog, mist or trees. Experience indicates that to use interactive applications latency should be below 200 milliseconds and preferably below 50 milliseconds.

(b) The specification of speed.

DCMS suggest that the Secretary of State would introduce primary legislation "to provide for functional internet access for today's needs". **To do this will ensure failure.** This is because tomorrow's needs are what the legislation should ensure is delivered, not just today's needs (which are currently not being delivered anyway). The above graphs show that the need is increasing exponentially with time, so targeting on today's needs (as the current state aided programme has)

will ensure that future needs are not delivered. Primary legislation must ensure that a series of USO's are met for **speed, symmetry and latency** – say at 5 year intervals:

| Year | USO Download speed | USO Symmetry | USO Ping Latency |
|------|--------------------|----------------------------------|-------------------|
| 2015 | 2Mbps | Unspecified | Unspecified |
| 2020 | 100Mbps | Upload speed >50% Download speed | <200 milliseconds |
| 2025 | 1000Mbps (1Gbps) | Symmetrical | <100 milliseconds |
| 2030 | 10Gbps | Symmetrical | <50 milliseconds |

Relying on secondary legislation to enact what is delivered by a USO would seem to reduce the urgency of getting a useable broadband service to everyone in the UK and therefore a clear definition of the USO goals/targets should be built into primary legislation.

Secondary legislation would be more appropriate for legislating how some of these targets may be delivered rather than the targets themselves. For instance, the latency targets suggested above would rule out satellite as a broadband delivery vehicle from 2020. This is already being discussed in the USA by the Federal Communications Commission who are currently considering banning satellite companies from describing their product as “satellite broadband”. Such services would continue to be delivered but they would be described as “satellite communications”, delivering streaming services such as Netflix and other on-demand services, but the latency USO would prevent satellite companies from suggesting they can deliver interactive broadband services that the laws of physics prohibit.

BDUK often state that the state aided BDUK programme is technology agnostic. That remains the case should a USO specifying Symmetry and Latency along with Speed be adopted. As stated, satellite broadband could not deliver the 2020, <200milliseconds latency suggested above. Similarly the suggested 2020, 100Mbps minimum download speed could not be delivered by copper. In this way, a USO which specifies all three parameters will focus all providers towards providing light wave guide (fibre optic) broadband services. (NB: BT's suggestion that copper G.Fast technology can compete with fibre is valid only over distances of ten's of metres and requires investment equal to or greater than installing fibre over the same distance. To suggest that G.Fast can compete with fibre over greater distances is disingenuous.)

(c) The role of OFCOM and the DCMS Secretary of State.

It is essential that the Secretary of State maintains a continuing role in the USO as the elected representative of UK taxpayers, particularly since it is recognised that state aid is appropriate in rural areas where market competition has failed. The legislature must therefore understand the needs of the electorate and the Secretary of State as the representative of the people has the responsibility to enact legislation (primary and secondary) to ensure that those needs are met.

OFCOM has a very important role to play in monitoring the industry that delivers the needs of the electorate via licensing and audits of the activities of providers. It is also appropriate that the Secretary of State consult with OFCOM on legislation and the monitoring of the performance of the industry in compliance with legislation, but OFCOM is an unelected regulator and must not have responsibility for determining USO goals/targets. If DCMS did take this retrograde step, OFCOM would be at the mercy of lobbying from the industry and that would ensure maximum profits for the telecoms companies and reduced services to the electorate. - A legacy that BT, the monopoly owner of the UK's telecoms infrastructure, has left us with today.

One of the drivers of the current DCMS/BDUK state aided broadband programme is use of the term NGA (Next Generation Access), as the delivery standard for state aided broadband. As originally used in the EU Digital Agenda for Europe publication it is generally understood to mean a step change in broadband speed and quality of service. It is also so poorly defined that although it is used in all UK state aided broadband procurements, no one knows exactly how big a step is required and no one knows what an acceptable level of quality is, both of which are increasing daily in the eyes of the consumer. Potentially, OFCOM has a major role to play here if it sets out a clear NGA definition in terms of **speed, symmetry and latency** (as described above) and if it continuously reviews and publishes this definition at relatively short intervals (e.g. quarterly), consistent with the rate at which telecoms technology is currently evolving.

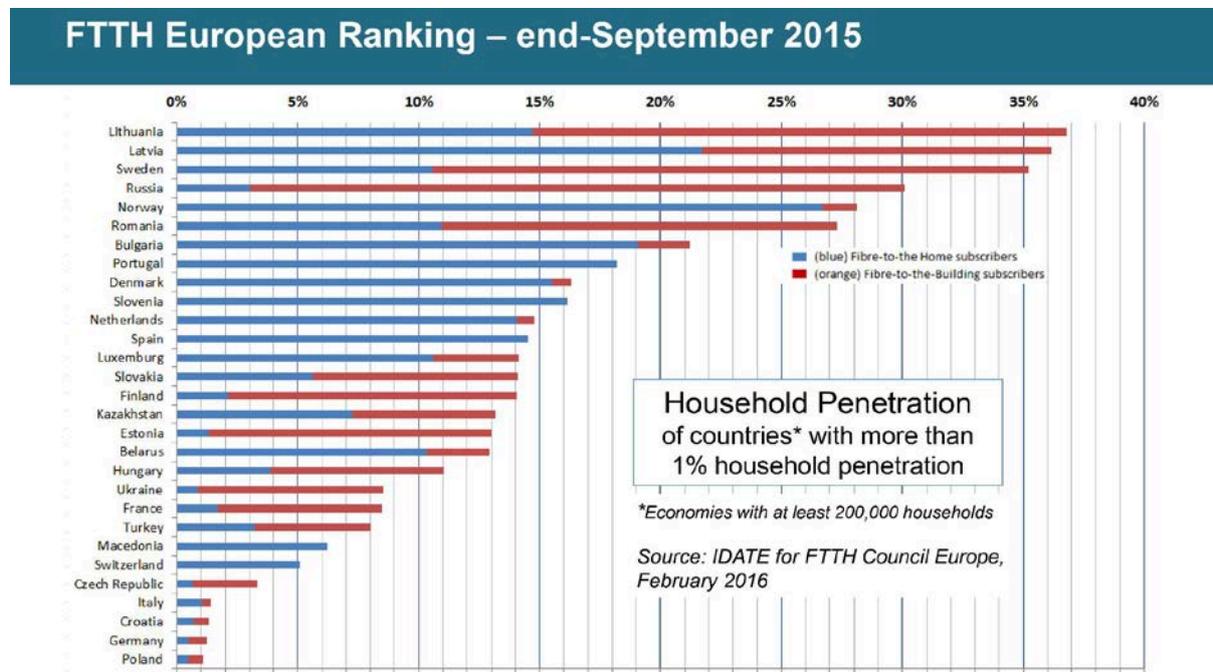
The OFCOM consultation call asks for inputs on funding of the USO and potential market distortions. With all due respect I suggest that this is not an area for the regulator, OFCOM to be concerned about. It is the responsibility of the elected government via DCMS and BDUK to provide a state aided USO that is fair, meaningful and universal as meets the will of the people. OFCOM would then have the responsibility to regulate that provision as set out in legislation. DCMS have already carried their own consultation on the USO and that should be the consultation that informs funding and the management of market distortion. It is most regrettable that whilst DCMS have published the findings of their consultation, they have refused to publish all their sources (individual consultation submissions). At the same time, DCMS are being selective in how they have summarised this data which means that their conclusions are worth no more than the paper they are written on. I trust OFCOM will publish all the source data for this consultation.

Concern about market distortion implies that we currently have an undistorted broadband market. Nothing could be further from the truth since we have one of the most distorted telecoms markets in the world with one private company, BT Openreach having a de facto monopoly of the UK telecoms infrastructure. OFCOM's review, earlier this year, of whether BT Openreach should be separated from BT Group was a golden opportunity for OFCOM to correct one of the largest distortions of this market. Sadly OFCOM saw fit to take no action other than threatening that it may take action in future. Provision of a meaningful USO would be more successful if Openreach were an independent telecommunications company and not a vehicle that the BT media company use to ensure their value added services are carried on the Openreach infrastructure at the most advantageous terms.

Only FTTP (Fibre To The Property) and FTTH (Fibre To The Home) provides a future proof NGA solution, but BT Openreach's determination to sweat their existing copper assets thus far has meant that deployment of FTTH in the UK is less than 1%, so low that the UK does not even appear on the chart below, of FTTH Penetration in Europe, produced in February 2016. It is appalling that the UK is so far behind most other European countries on this chart and it represents a serious future bottleneck for the expansion of internet use in the UK. NB: In their latest projection of IP (internet Protocol) traffic by manufacturer Cisco, it is estimated that the worldwide volume of IP traffic will grow threefold between 2016 and 2019. Existing FTTC broadband connections dependent on copper local loops will not be able to accommodate this growth.

The deference to the status quo demonstrated by OFCOM's decision not to take action on BT Openreach is also demonstrated by OFCOM's fellow regulator, the Advertising Standards Agency (ASA) who have recently refused to take action on the BT Openreach advertising definition of FTTC as "fibre optic broadband". The speed and performance of FTTC broadband is entirely dependant on the copper local loop, no matter how much fibre is used to connect a consumer. To describe this as "fibre optic broadband" is an immense deceit on the British public which the ASA appear happy to

allow BT Openreach to continue perpetrating. Consumer understanding of what “fibre optic broadband” actually is in this country is now so bad that 60% of 1000 BT broadband customers recently surveyed by cable.co.uk stated that since they used BT FTTC “fibre optic broadband”, they thought that the BT copper local loop that entered their property had now magically metamorphosed to fibre from copper, despite the fact that no one had replaced the cable!



Graham Long
June 23, 2016.