THE UK'S ENDURING BROADBAND DEFICIT:

A DIVIDED NATION - TIME FOR AN EFFECTIVE PLAN

Digital Business First – March 2014

'We want to achieve a transformation in our broadband access, with everyone in the UK able to access broadband speeds of at least 2 megabits per second (Mbps) and 95% of the UK receiving far greater speeds (at least 24Mbps) by 2017. We are also exploring options to extend the benefits of fast broadband to remaining areas'. UK Government - Department of Culture, Media and Sport website 2014

Versus

'South Korea's Ministry of Science and Technology announced Wednesday that it would invest $1.5 billion (1.6 trillion won) and partner with local telecom operators and smartphone makers to install a 5G wireless network that would become fully operational by December 2020.

The new technology will reportedly enhance current connection speeds by 1,000 times in a country that is already home to the planet's fastest Internet speeds. And, according to reports, the 5G network will be first tested on social-networking sites in 2015, and expand to the speed of 1 gigabit (1000Mbps) per second in 2017, and be introduced as a fully commercial service in 2020'.

International Business Times 22 January 2014

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SUPERFAST BROADBAND INFRASTRUCTURE – WHY IT'S IMPORTANT AND THE PROBLEM

The value we place on broadband and the internet – How we are all different

Most people in the UK now have access to some form of broadband, some have no access. Most people would say that the internet, and the broadband network they use for access to it (be it a wire into the home or a mobile network), are important. Some individuals and businesses value their broadband network highly - it being vital to their livelihoods or their leisure time, some value it far less.

There is one inescapable truth; total broadband use by citizens and businesses in the UK (and globally) is growing enormously and accelerating. Both BT and Virgin Media logged a 60% annual increase in broadband traffic over the 2013 Christmas/New Year period and both migrated tens of thousands of customers to a 'faster' broadband network (above 50Mbps) in 2013.

How much broadband is enough?

Those with an interest in regional competitiveness, who act on behalf of wider groups of citizens/businesses, have a difficult task when they are challenged on regional needs for broadband access, whether fixed or mobile. The key question is: *"Are the citizens and businesses of the region getting the broadband and internet access they need, now and in the future, when compared to other UK areas and EU/global competitor regions? If not, what can be done?".*

Inequality and loss of competiveness – The £1 billion price tag on Government failure and regional decline

There are a large number of superfast broadband 'have nots' in the UK – 10 million UK premises (homes and businesses), spread across the regions, are located outside the combined Virgin Media and commercial BT 'superfast' broadband network footprints. They are left in the *'slow'* lane, or if they are really unlucky, the *'no broadband at all'* lane.

After £1 billion of taxpayer money has been spent by BT (implementing government policy), the 'have nots', if they are lucky, may have 24Mbps (possibly more, possibly less), if unlucky 2 Mbps, via the BT/Openreach network. They may or may not eventually have some 4G mobile coverage (which is likely to replicate the UK's poor mobile voice/3G connectivity coverage).

Citizens in some parts of the Home Counties (less than 50 miles from London) will, at 2Mbps, have the slower speeds than the citizens of Peru and households in rural Utah, USA. Moreover, where public funding delivers BT broadband network, the non-binding target of 24Mbps will look increasingly 'superslow' in competition with 'superfast' broadband availability elsewhere at home and abroad. For example:

- The 19 million premises (the 'haves') that reside in urban/suburban areas of the UK will have access to 150+Mbps Virgin Media broadband, 'up to' 80Mbps on Openreach/BT network or 300+Mbps on residential/business fibre networks.
- Finland (including Lapland) citizens who will, universally, have access to 100Mbps by 2015, or Korea where 90% of the population will have access to 1000Mbps by 2017.

ACTIONS

1. Current government policy and funding is delivering 'superslow' broadband to the 'have nots' (10 million homes and businesses) in the UK. Such areas remain at a severe competitive disadvantage to other parts of the UK and EU/global peers, and this disadvantage will grow if nothing is done. There is a need to manage and address outstanding superfast broadband needs in the context of the incoming 2015 government and to engage in a new framework for addressing the broadband deficit. Therefore;

2. *Define a National Broadband Plan (NBP):* Set against the failure by current government to adopt one, the UK urgently needs a National Broadband Plan (NBP) for 2015 onwards. Stakeholders (notably Local Enterprise Partnerships (LEPs) and other representative groups – national and local) can then specify their needs/solutions such as;

3. Adopt new broadband speed targets and identify future needs for wireless and wired superfast broadband:

   ➢ Adopt new future broadband targets for the UK that go way beyond the current 2Mbps and 24 Mbps targets for state-aid-funded network. Analysis suggests that the 10 million 'have not' premises in the UK should have a realistic prospect of 100 Mbps during 2017 and onwards (mapping EU/global peers).

   ➢ Assess UK mobile wireless *'black holes'* and wider mobile broadband needs. Consider 4G licence amendments for coverage and strength of signal to ensure the UK has adequate mobile broadband connectivity. Ensure that Ofcom/Government spectrum strategy is framed within the context of a coherent and ambitious NBP. In particular, for 5G the UK is significantly behind global peers. It should adopt an ambitious 'can do' approach to 5G technology within the NBP.

   ➢ Consider how commercial enterprise can be incentivised to help bridge the UK broadband deficit (e.g. tax breaks relating to network investment). Assess the prospect/size of second phase state aid and how this could be allocated on a fundamentally different basis from the current Government/BDUK model.

4. Maximise payback from taxpayer/state aid funding of the BT broadband network in the UK: Assess the extent to which state-aid-funded BT broadband network in the UK can be used for the 'next phase' and the extent to which 3rd party access may be needed to/from the same network. *Ofcom/Government* should revise relevant regulation of BT.

5. Stakeholders to target key concerns and *'what next'* messages towards: (a) Current Government, and (b) 2015 general election preparations: Constituency MPs/MEPS (both current and prospective from all contesting parties) plus preparation by political parties - 'issue capture' by party leaders/manifesto development etc.

SECTION A: **"SUPERFAST" BECOMES "SUPERSLOW": THE REALITY OF UK BROADBAND INFRASTRUCTURE COVERAGE AFTER STATE AID INVESTMENT**

Q. What will the results be of the UK Government funding of broadband infrastructure? Will it have made any meaningful difference to the performance and coverage of superfast broadband infrastructure in the UK regions when compared to global peers?

Is there a superfast broadband network deficit in the UK that is leading to a relative and accelerating decline in competitiveness with other global economies? This is the critical question for our political leadership. A close look at the data is nowhere near as reassuring as official government pronouncements would have us believe.

There are two issues to be addressed when looking at the UK Government's use of state aid to extend broadband network:

1. Is the UK Government using a credible, ambitious, equitable, globally competitive, future-proof definition of 'superfast' broadband or, conversely, has it adopted a definition which, while convenient for its policy, is the exact opposite i.e. not credible, not future-proof, not globally competitive, not ambitious and not equitable. In other words, has the UK Government targeted what are, in global terms and indeed compared to urban UK, significantly slow broadband services. In doing so, are the 'have nots' in the UK being offered 'superslow' broadband, via £1 billion of state aid?

2. Using the government's stated target and aims for state aid funded broadband network, how does/will such network compare with global and EU peers, as well as the rest of the UK, and will state aid have made any difference to the relative position of the areas/regions that have received such state aid?

A.1   UK Government funding delivers 'superslow' broadband

Exactly how the UK ended up spending £1 billion of tax payer money/state aid on delivering ´superslow´ broadband is largely dependent on how the UK Government adopted a ´flexible´ approach to determining what speed was ´superfast´.

The UK government has been particularly inconsistent when defining superfast broadband, especially in the context of awarding state aid for broadband network extension.

The 2012 House of Lords Inquiry into UK broadband infrastructure, found that the government had used, at various times, three different definitions/speeds to define 'superfast'. Morever, all of these definitions/speed thresholds were below the EU´s defined 30Mbps threshold target for state aid for broadband network.

Ultimately, outside of the 19 million premises that have 'commercial' superfast broadband the majority of the £1 billion of UK state aid has been awarded to BT to deliver broadband network (based on its existing copper lines) that delivers/will deliver a target of 24Mbps to approximately 25% of UK homes and premises (7 million). The remaining 3 million homes and premises have a government target of 2Mbps for broadband network built with state aid. The UK Government defines 24Mbps as a ´superfast´ broadband. It is a definition without substance and which does not stand UK regional or EU/global comparison, specifically:

1. Urban and sub urban areas of the UK are, via the Virgin Media network which covers 14 million homes, being offered 150Mbps broadband.

2. Parts of the UK are being offered fibre to the home broadband by BT and other service providers which delivers 300+Mbps.

3. The EU definition of superfast broadband is 30Mbps per second.

4. Google is deploying 1Gbps broadband connections in several US cities.

5. There are several providers of 1Gbps connections in Hong Kong and Singapore.

6. The Finnish Government is committed to delivering 150Mbps to all Finnish citizens, even those in Lapland.

7. In South Korea both fibre and 5G wireless/mobile broadband will be delivering 1 Gbps nationally from 2015/onwards.

Whichever way you look at the UK Government´s use of ´24Mbps´ as defining ´superfast´ broadband, points 1 to 7 above show that it is not credible or sustainable in real world terms. In fact the opposite is true; the UK Government is providing state aid to deliver ´superslow´ broadband to a large section of ´have nots´ in the UK.

As a significant aside, it is also clear that the government´s 2Mbps target for 3 million UK homes and businesses is off the scale in terms of lack of comparability to the rest of the UK and global/EU peers. It is a remarkably low speed target which offers no credible gain for those UK citizens at which it is targeted.

A.2   The UK's 'superfast broadband' coverage - Is it really so good?

The UK, according to the government and Ofcom, is performing well in terms of 'superfast' broadband network coverage. On March 12th 2014, Ofcom issued a European scorecard on the UK's performance in broadband network provision.

In the scorecard Ofcom has decided to define ´superfast´ broadband as a speed of 30Mbps or greater and selected five member states (Spain, Germany, France, Italy and the UK). Against these 5 EU states Ofcom ranks the UK first for superfast broadband coverage. For completeness, Ofcom also provided the UK´s ranking for superfast broadband network coverage when compared against all EU member states. The UK achieves tenth out of 27. The question is whether these rankings are either credible or meaningful.

Meaningful rankings?

DBF have consistently highlighted that around the world, and within at least half of the UK, superfast broadband speeds are at 100Mbps and above. In this context, Ofcom's 30Mbps speed level to determine 'superfast broadband' coverage is, arguably, meaningless.

Credible rankings?

In its scorecard of March 2013, Ofcom used a figure for superfast broadband network coverage that was predominantly based on the coverage of Virgin Media's network (of 14 million homes – 48% of all UK premises) with some marginal additional coverage from BT fibre to the cabinet (FTTC) upgrade. As Virgin Media's broadband network could uniformly provide speeds far greater (at 100Mbps) than 30Mbps, then it was a credible assumption that the vast majority of the coverage area quoted by Ofcom in 2013 was 'superfast' broadband. Such an assumption is not credible in 2014 for a wider coverage area.

The figure used by Ofcom in 2014 provides an uplift in superfast broadband coverage in the UK to just over 70% (Ofcom specifies 73% for June 2013 - we note that this is not consistent with BT's announcements as to FTTC upgrade, mentioned later in the paper). That's an additional 25% (approximately) coverage area entirely accounted for by BT/Openreach FTTC upgrade. There is, however, a fundamental difference between this network area and Virgin Media's network area. On BT/Openreach FTTC network, broadband speed varies with line distance from the cabinet. Not all FTTC upgraded network can deliver 30Mbps. Significant numbers of homes cannot receive 30Mbps even when their area has been upgraded to FTTC (see figure 1 in the Annex 1).

Indeed, Ofcom themselves acknowledge the problem with the source data (from Point Topic) they use to rank the UK as 1st in the EU for broadband coverage:

 'Point Topic's figures are, to our knowledge, the only estimates of the proportion of households in EU countries able to access standard and superfast broadband through any of the fixed-line technologies that the study encompasses. However, in our view there are some factors additional to those above that affect how Point Topic measures coverage, of which readers should be aware: …………Equally, access to NGA technologies may not guarantee speeds of 30+Mbit/s. For example FTTC with VDSL over the copper sub loop between the cabinet and household is a technology capable of delivering superfast speeds. However, if the length of the sub loop is too long then it will not achieve 30Mbit/s. '

In addition, within the European Commission report which Ofcom uses for data, Point Topic note:

In the United Kingdom the data provided reported the overall coverage of VDSL with no restriction on the speed delivered. This is expected to have increased the overall figure reported for NGA coverage in the United Kingdom. Page 195- Point Topic / EC, Broadband Coverage in Europe 2012, 2013 @ https://ec.europa.eu/digital-agenda/en/news/study-broadband-coverage-2012

The question is why did Ofcom, despite the significant weaknesses in the assumption that all BT/Openreach FTTC network provides 30Mbps and above, decide to use the same statistics to rank the UK first in the EU in its sample and tenth within the EU27?

A.3   The last 35%: 10 million UK premises – Poor performance post state aid

The actual extent of the UK´s superfast fixed broadband network coverage is heavily skewed by Ofcom´s (and the government's) reliance on the performance of the Virgin and BT networks in just over half of the UK, in terms of households/premises. More specifically, within the footprint of Virgin´s cable network, superfast broadband service availability (whether you define it as 30Mbps and above or, more ambitiously, as 100Mbps and above) is universally available and this may be masking poor current and future speeds in the 10+ million UK premises without access to such cable network.

The Digital Business First papers of September 2012 and March 2013 presented various detailed analyses of the extent of Virgin's broadband network (passing approximately 14 million/53% of UK homes) and the coverage of BT's commercially funded fibre to the cabinet (FTTC) roll out, which has been predominantly targeted to compete within Virgin's coverage area. The detail those papers provided will not be repeated here. However, in September 2013, BT/Openreach announced the last 19 exchanges that would be funded by commercial roll out, a process that will finish by spring 2014. At that time, BT/Openreach will have rolled out 'commercial' FTTC network to the following extent:

- To approximately 19 million out of 29 million UK premises, which represents 65% of UK premises.
- To 1,725 BT exchanges out of a total of 5,500 BT exchanges.
- BT will have spent £2.5 billion on commercial rollout of FTTC.

Previous analysis has questioned whether the UK Government's provision of £500 million will be sufficient to extend FTTC coverage to the remaining 35% of UK homes (or put another way, to the remaining 3,775 exchanges versus 1,725 exchanges already 'commercially' upgraded by BT), and has pointed out that the government does not expect the FTTC network in this last tranche of UK homes to deliver 30Mbps, but rather has stipulated a 'target' (non-binding) of 24Mbps (see March 2013 DBF paper). The Parliamentary Accounts Committee (PAC) also raised questions as to public funding, noting that:

- Central Government would provide £494 million of funding.
- Local councils would have to provide £730 million of funding (£236 million more than forecast).
- BT would only be providing £356 million of funding.

(Paras 10/11/12 of PAC Rural broadband report September 2013)

As the PAC also comments, for BT´s £356 million of funding it will, at the end of the process, be given network assets worth at least £1.2 billion (in public funding) with no public co-ownership or specified future requirements.

DBF's similar doubts, as to whether the funding and processes to extend genuine superfast broadband network (e.g. above 30Mbps speeds) in the remaining 35% are sufficient, have been presented in earlier papers.

Measuring UK performance - Treating the last 35% of the UK as a separate entity

If the 100+Mbps services provided within the Virgin network coverage area of 14 million homes, plus BT's commercial roll out of FTTC network (covering 19 million homes/premises with Virgin's 14 million being within that), are excluded from an assessment of the UK's broadband performance, and we focus only on the remaining 10 million homes/premises, how does the UK perform against other member states?

Taking at face value the government's and BT's assurances on the speeds that will be made available in the remaining 35% post state aid investment:

- The 35% is split into: (a) 25% (7 million premises) provisioned with BT FTTC network to deliver a (non-binding) target of 24Mbps[1] - for the analysis this area is termed UK Sector 1, and (b) the 'last 10%' (3 million premises), for this analysis termed UK Sector 2, where there is a vague intention to provide an average speed of 2Mbps. It should be remembered that UK Sector 2 is not just the highlands and islands of the UK but exists within the home counties and, in some instances (e.g. parts of Buckinghamshire and Oxfordshire), less than 50 miles from London.

The question is: How do UK Sectors 1 and 2 compare, as separate entities, in terms of other European and global economies?

Does state aid for broadband network deliver global competitiveness to the UK regions?

Setting aside the non-trivial point that the government's non-binding target of 24 Mbps for Sector 1 does not even meet the EU's definition of superfast broadband, how does UK Sector 1 compete in terms of speed (if indeed 24Mbps does become universally available in Sector 1) against other countries?

UK Sector 1, even after significant government funding, will be ranked 13th out of 15 against a sample (see Table 1 in Annex 2) of other European countries and will fail to compete against the majority of the European continent when considering the speeds that will be available post BT state aid funded FTTC roll out. We note that other European countries have regional divergences in terms of broadband speed. However, in the global economy the relative broadband competitiveness of the UK regions needs to be measured (after they have received state aid) against all other entities, including countries as a whole. As such, the performance of UK Sector 1 is poor despite state aid investment.

Looking at the performance of UK Sector 2 (after government funding of BT network) against other countries/US states (which have been chosen to set context), the results are very poor (see Table 2 in Annex 2). Some areas of the Home Counties e.g. Buckinghamshire and

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[1] Note that the Government's 24Mbps target is a used as an average peak speed of delivery. It is acknowledged that some premises subject to this target may receive higher speeds. Conversely, some premises subject to the same target may receive slower speeds than the actual target.

Oxfordshire, are in UK Sector 2. The average broadband speeds these areas will receive (following state aid) will be less than those available in Peru and significantly less than in some large and sparsely populated US states e.g. Utah.

Conclusion: State aid will deliver neither superfast broadband nor competitive advantage to the UK regions compared to other countries/states

Although the urge to rank the UK as highly as possible is understandable, it appears as though the manner in which Ofcom ranks UK broadband coverage is not credible, nor indeed realistic,. When the sectors of the UK which will be subject to state aid for broadband network extension (by BT) are considered as separate entities, then post such investment, they are poorly placed against other countries and states across the globe. Moreover, how can 24Mbps for sector 1 of the UK (assuming it is actually delivered) continue to be considered ´superfast´ when compared with the ever-increasing infrastructure capabilities of the global leaders, some of which are heading towards 90% coverage of 1Gbps (e.g. Korea)?

How can a target of 2Mbps for areas in the UK Home Counties (less than 50 miles from London) be considered adequate if it only achieves a ranking less than Peru and less than Utah, for broadband speeds?

SECTION B: **MOBILE SERVICES: THE UK´S POOR LEGACY – ASIA'S GROWING BROADBAND SUPERIORITY**

Q. There is some 'hope' harboured by UK Government (and EU institutions) that some of the broadband deficit that resides in the UK's (and indeed EU's) wired infrastructure will be addressed by mobile/wireless/4G/5G technology. Is this likely given a loss of competitiveness in the UK/EU in this vital area to Asia, the US and Latin America?

Few would argue against the assertion that the wireless delivery of fast broadband services, whether mobile or fixed, will be central to the competitiveness of the EU (and the UK) economy.

Wireless is the arena within which many existing, and new, digital markets, suppliers and consumers come together and need, and use, greater and greater bandwidth at greater and greater speeds. The question is whether the EU and, in the context of this paper the UK, is strategically well positioned to provide superfast wireless broadband connectivity, whether mobile or fixed, when compared to other global economies. Evidence suggests that it is not, despite having historic global leadership in the area of mobile wireless for decades, particularly through the legacy of Groupe Special Mobile/Global System for Mobile Communications(GSM).

B.1   An unambitious agenda for wireless broadband in the UK?

When looking at the nature of the UK, and indeed other EU member states, broadband deficit, it is clear that wired networks of whatever form, cable/coax , partial fibre/copper or full fibre based have geographic limits and constraints, in delivering fast broadband services. The European Commission acknowledged as much when it included wireless networks within the scope of state aid that could be allocated for next generation network/superfast broadband network development (defined by the Commission as 30+Mbps).

Despite the potential of wireless networks to bridge the broadband deficit, from a UK/EU perspective, when looking at wireless broadband, the sole focus is on the roll out of 4G networks by the established EU mobile networks. This is occurring against a backdrop of market consolidation (less operators via mergers) and highly interventionist regulation at the European level in terms of wholesale, and more latterly, retail prices (e.g. roaming rates). In this context, there have been two key themes:

➢ That the 4G mobile networks of the established EU mobile operators may offer 'some' hope that those EU citizens without broadband at all/ or faster broadband from wired networks, particularly in non-urban areas, will receive 'faster' broadband via 4G networks.

➢ That the same mobile networks have been pushing the European Commission to loosen the wholesale and retail price regulation that applies to their operations.

Looking at the UK in particular, just one of the four 4G mobile operators has a speed and coverage licence obligation, which specifies a target of approximately 2Mbps to be provided, ideally indoors, to up to 98% of the UK population. Ofcom hopes that other mobile operators will reach the same coverage voluntarily. It has yet to be seen what type of broadband speeds one or more 4G operators will provide to the wider non–urban UK population, but this

obligation implies that they will be far from superfast broadband speeds (using the Commission's definition).

Arguably, the UK and European focus on mobile/wireless is far too narrow. Looking specifically at the UK, there are four key issues regarding mobile/wireless broadband services:

a) **The poor legacy of 2G/3G and the risks facing 4G coverage:** How can the UK´s appalling record of 3G connectivity be remedied for 4G and future mobile broadband services? What are the risks to 4G coverage?

b) **UK spectrum shortage and strategy:** Does the UK face a spectrum shortage and, if so, what can be done to remedy this?

c) **Is the legacy reliance of UK mobile networks on GSM standards and protocols optimal for faster broadband**? Are global peers adopting other non-GSM technologies more suited to fast broadband?

d) **5G wireless/mobile technology offers the prospect of ultrafast broadband (1,000 Mbps) over wide geographic areas**. Asian economies, particularly Korea and China, lead the world with an ambitious 'can do approach' to developing 5G technology. Why is the UK less ambitious, less 'can do' and, generally, less driven with regards to this market/society-changing technology?

Taking each issue in turn:

a)   THE POOR LEGACY OF 2G/3G AND THE RISKS FACING 4G COVERAGE

In November 2013, Ofcom announced the conclusions of an audit of the coverage of the 3G mobile networks. It found all networks, apart from Vodafone, had met the obligation to provide 90% of the UK population with 3G services.

What is interesting is that 'coverage' is determined by Ofcom via the presence of a 'signal'. *What is far less clear is how strong the 3G signal is in various areas of the UK and whether the signals available are capable of providing a usable 3G data service. (Signal strength has also been a significant issue for 2G services)*. *It is surprising, and of concern, that Ofcom appears to have been so reluctant to attach importance not just to whether coverage obligations have been met but what strength of signal is available*. In essence, for consumers, it is far from clear what type of 3G service they can expect in which region/postcode. Ofcom has indicated it intends to address this information deficit. We would note that the 3G licences were awarded in 2000. Yet 13 years later, UK Citizens still have significant difficulty assessing what strength of 3G signal is available and where.

The advent of 4G mobile services offers some hope that reasonable mobile broadband services will be more widely available in the UK. However, there are two risks:

- Only one 4G operator has a coverage obligation – 98% of the UK population with a target of 2Mbps, ideally indoors. Whether this obligation will actually deliver 2Mbps to

98% of the population remains to be seen. However, if 2Mbps is achieved in some areas it will lag, significantly, the 4G mobile speeds available in urban and sub-urban areas. In effect, a new digital divide is created.

- The mobile operators are threatening reduced 4G mobile coverage, in retaliation against Ofcom's proposed increase in spectrum fees. An article from the Guardian 12th December 2013, states:

´Britain's largest mobile network EE has waded into the cost of living debate, saying if the government continues to raise spectrum fees and clamp down on mobile charges it will have to scale back plans to bring 4G mobile broadband to rural areas. EE has been leading the push into mobile broadband but Chief Executive Olaf Swantee has told the Guardian his company may put further investment on hold. "Something has to give in terms of the investment," he said. "It will be harder for me to maintain the current rollout of 4G. We will be forced to re-evaluate our 98% coverage target for the end of next year, and sparsely populated rural areas are, as we all know, at risk the most."´

b)   UK SPECTRUM SHORTAGE AND STRATEGY

'The UK will face a serious spectrum shortage by the end of the decade if 300MHz of cellular spectrum and 350MHz of wifi spectrum are not made available. The warning came this week from Real Wireless, a consultancy that worked with UK regulator Ofcom on this year's LTE spectrum auctions. It prompted Ofcom's former director of R&D to suggest that traditional spectrum allocation models will not meet the identified demand.'
Source Telecom.com 29 November 2013

While we note recent announcements by both the government and Ofcom, the UK's spectrum strategy lacks clear strength and intent. It is more of an approach to process than a 'strategy' which, with urgency, maximises the use of spectrum to address the superfast broadband deficit. In particular, we note from Ofcom's Spectrum Management Consultation of October 2013:

Para 2.21

'In establishing this spectrum management strategy we are not looking to forecast the future, but highlight potential developments that might raise the need for regulatory action in support of optimal spectrum use. Many trends in spectrum use may have little or no bearing on the need for us to act, whereas others may have a significant impact on the work we may need to do. It is likely that future spectrum use will not develop entirely as we currently expect. Some variations will not affect our strategy, whilst others may have a significant impact and result in a re-evaluation of our priorities. Ofcom will therefore continue to monitor market developments on an ongoing basis so that we are able to adjust our strategic approach to spectrum management should this be necessary.'

The concern is that, combined, the proposed approach by the government and Ofcom to such a vital strategic issue as spectrum lacks ambition, is not cohesive and is weak compared to the

highly ambitious plans of global competitors with regard to the use of spectrum/wireless (e.g. in the US and Asia).

For the UK to embrace spectrum and wireless broadband and its full strategic potential, the UK Government needs to develop an innovative and highly ambitious spectrum agenda that will lead global peers, as well as solve the UK's broadband infrastructure deficit.

c) GSM: THE GREAT EUROPEAN SUCCESS STORY – A LIABILITY OR AN ASSET IN THE BROADBAND AGE?

The ability of European mobile and fixed wireless networks to deliver broadband at faster and accelerating speeds is entirely reliant on the technology they decide to use. With very few exceptions most EU mobile networks use GSM-based technology for 2G/3G and now 4G services. There is growing evidence that both the GSM legacy, and its application to new European mobile 4G networks, is compromising the EU's (and therefore the UK's) ability to deliver truly fast broadband wireless services. This evidence is based on a simple observation. Other world economies, including Asia, the US and countries in Latin America and the Middle East, are increasingly moving from GSM-based networks to new, non-GSM standards. The reason they are doing so is that they believe high bandwidth (and scaleable/upgradeable) mobile/wireless 4G services are better provided on non-GSM based technology.

Asia's wireless broadband technology versus European legacy GSM

In simple terms, it's a 'bandwidth' battle between the GSM-based 'Frequency Division Duplexing' (FDD) and the Asian/China-based 'Time Division Duplexing' (TDD). Cutting the technological differences down to the bare minimum, many global operators believe the TDD protocol is:

- More bandwidth/spectrum efficient i.e. TDD needs less spectrum (it can use 'unpaired' frequency bands), whereas FDD needs 'paired' bands. In other words TDD needs half the spectrum bandwidth needed by GSM-FDD technology to deliver the same broadband services.
- Unlike FDD, high speed broadband uplinks and downlinks via TDD can be provided on a symmetric or asymmetric basis i.e. more bandwidth can be dynamically allocated to up or down link use.
- Due to its level of spectrum efficiency, TDD will, in the medium and long term, be able to be deployed in spectrum bands that may be unsuitable for FDD technology e.g. for 5G/6G technology etc.
- There are migration paths from legacy FDD mobile technology to TDD. There are none in the reverse direction.

Operators around the world see TDD-based wireless technology as not just 'optimal' for high bandwidth mobile services, but also as ideal for future high speed/high bandwidth fixed wireless services (e.g 5G).

The erosion of the GSM supremacy

The popularity of non-GMS standards/technology for new age broadband developments is growing rapidly. Notably:

- The Chinese Government has stipulated that all its 4G mobile wireless licensees must use TDD based technology. In this context, China Mobile has a target of 207,000 mobile 4G - TDD base stations for China's geography (Alcatel Lucent press release September 2013).
- The Brazilian Government's auctions of 4G spectrum specified that licensees should use TDD based mobile and fixed wireless technology. In December 2011, a fixed 4G TDD broadband wireless network (built by Nokia Solutions and Networks) was launched by Sky Telecom in Brazil.
- In Hong Kong, operators have been deploying 'migratory' networks that allow dual FDD/TDD usage, with an apparent intention, over time, to migrate users to TDD based networks.
- In the US, Sprint is deploying 4G LTE TDD ultra high broadband technology (provided by Alcatel Lucent).
- Other countries that have adopted 4G LTE TDD include India and Saudi Arabia.
- In Australia, Ericsson has been commissioned to build a fixed wireless broadband 4G TDD network.

It's notable that while some European hardware/network companies (notably Alcatel Lucent, Nokia and Ericsson) are providing 4G TDD technology in Asia and the US, their home market is still very focused on the legacy GSM FDD technology.

(d) THE UK AND 5G TECHNOLOGY

The UK Government has said little regarding the potential importance of 5G to the UK economy, particularly as a means to provide super/ultrafast broadband to the wider geography of the UK.

Ofcom has announced a joint project with Surrey University to 'develop' 5G technology, although on what basis and with what urgency is far from clear. Indeed, there is every indication that the UK, at an institutional level, sees no urgency to positioning the UK as leaders in the deployment of 5G networks and devices.

Meanwhile, Asian economies, with their usual 'can do' approach, have moved beyond 'maybe' and are, with some urgency, pushing ahead with 5G technology and deployment:

'South Korea's Ministry of Science and Technology announced Wednesday that it would invest $1.5 billion (1.6 trillion won) and partner with local telecom operators and smartphone makers to install a 5G wireless network that would become fully operational by December 2020.

The new technology will reportedly enhance current connection speeds by 1,000 times in a country that is already home to the planet's fastest Internet speeds. And, according to reports,

the 5G network will be first tested on social-networking sites in 2015, and expand to the speed of 1 gigabit per second in 2017, and be introduced as a fully commercial service in 2020'.

From International Business Times, 22 January 2014

Looking at China, Huawei, who are arguably a global leader in wireless technology, notes:

'*5G wireless networks will support 1,000-fold gains in capacity, connections for at least 100 billion devices and a 10 Gbps individual user experience capable of extremely low latency and response times'.*

Huawei, 5G strategy document 2013, '5G – A Technology Vision'.

As Huawei implies in the above document, 5G is a 'game changer' at both the wireless technology and broadband delivery levels. Speeds of 1000+Mbps are seen as entirely realistic.

The reason the Korean Government is investing £1 billion in 5G is not just because of a 'narrow' technology race. As Huawei points out, 5G networks, although based on 2, 3 and 4G networks, take network design, architecture and backhaul to an entirely different level. Furthermore, 5G will be completely connected/interdependent with the development of 'cloud' based services and other remote data/processing service provision. In other words, the 5G 'supply chain' will be complex and entirely new – effectively built from the bottom up. This is something the Korean Government has decided needs adequate investment and resource, so as to ensure the best possible complete 5G solution.

The UK 'pay us now' approach to mobile networks versus the Korean 'let's make it happen'

The UK has long held, in common with other EU member states, a 'revenue' based approach to mobile technology. In simple terms this can be defined as:

- Wait for the mobile networks to get to the point where they need additional spectrum and then make them enter an auction for the spectrum. The ensuing revenues are seen as vital to central Government's finances.
- When the networks have deployed the services based on the 'awarded' spectrum, charge annual spectrum fees which contribute to central Government finances.

There are three obvious weaknesses to this legacy 'ransom' approach to spectrum by UK Government, and indeed the across the EU.

1. Such an approach mitigates against the mobile networks being willing to provide, individually or as a group, universal and deep coverage of their services e.g. for 4G broadband, UK mobile operators will most likely do as little as they possibly can in terms of investing in universal infrastructure, for so long as they incur these type of government charges.

2. The historic approach to spectrum auctions and annual fees mitigates against mobile/wireless companies creating 'incubator' type conditions for new wireless technologies such as 5G.

3. As an approach to new wireless technologies it constrains risk taking and is the opposite of that of Asian competitors such as South Korea. In the latter instance, the Korean Government *invests in* creating a catalyst for new mobile technologies such as 5G rather than *taking out* revenue.

B.2   EU/UK competitiveness in mobile and wireless broadband – Key public policy questions

The EU, including the UK, need wireless 4G (and future 5G) networks to bridge the 'broadband' deficit for those geographic areas that wired networks cannot reach. This need could be met by mobile or fixed wireless networks. In addition, suppliers and consumers in EU economies have growing demands for more bandwidth and greater speed from their mobile networks. Other global economies have the same needs. However, it appears that the EU/UK may be at a significant disadvantage compared to other global economies, due to a legacy of GSM-based technology and various legacy regulatory policy. If indeed, the TDD, non-GSM route for 4G/5G mobile and fixed wireless broadband services is more capable and durable than the GSM FDD route this raises three key public policy questions for the European Commission and member states:

- Should the European Commission, instead of being solely focused on quantitative wholesale and retail price regulation of EU GSM networks, be shifting its focus to creating the conditions whereby EU mobile operators have more incentives to migrate their technology/networks to the non-GSM-based TDD alternatives? In other words, can and should, the diminishing importance of GSM (to the new higher bandwidth world) be recognised and managed by European institutions?

- When considering what spectrum is available for future broadband services at the EU and member state (UK) level, should the European Commission be considering which technology is best suited to deliver the EU's current and future broadband needs, particularly given the number of EU citizens that will remain without decent/superfast broadband post the commercial and state aid funded roll out of wired networks?

- Given 5G technology will be key to superfast broadband provision within, and across the EU, how can current regulatory policy for mobile networks be revised to encourage 5G investment?

SECTION C: **ASSESSING UK GOVERNMENT POLICY ON BROADBAND INFRASTRUCTURE - COMPARISON WITH GLOBAL PEERS**

Q. How has the UK Government performed against global peers in terms of its policy and approach to broadband infrastructure? Has it failed or succeeded in matching the effectiveness of other governments in this vital area?

C.1 The content and depth of national broadband plans from around the world: Did the UK ever have a plan?

The analysis in this section assesses how the UK Government has performed compared to global peers in terms of its policy approach to broadband infrastructure. This can be assessed on the basis of qualitative and subjective criteria:

- Did the UK Government have a national broadband plan which was part of a wider integrated 'digital economy' plan which had/has a longer term and wider vision for the UK economy?
- Did the UK Government seek to prioritise broadband infrastructure by embedding a 'mission' in legislation to guarantee that the citizenry will be the beneficiary of an ambitious and legally binding universal broadband service obligation, with inbuilt scalability aspirations?
- Did the UK Government seek to maximise private investment in world-beating broadband network via policy tools such as tax breaks for fibre build etc.?
- Did the UK Government derive its approach to broadband infrastructure based on the stated needs of industry, business, SMEs and consumers?
- Did the UK Government prioritise competition in the provision of such universal broadband service provision?

Each of the above criteria have been present to varying degrees in the approach of other countries´ governments to what can be termed 'national broadband plans'.

C.2 The nature of national broadband plans

National broadband plans differ in shape, content and purpose, dependent on the country and economy that they are designed for. They span the political spectrum. The US has a comprehensive national broadband plan as does the Republic of China. There is no single template (or 'one size fits all') for a national broadband plan. Indeed, some countries have more of a 'policy' than a plan. However, there are a number of defining features within the national broadband plans of the world's leading economies:

- Some countries, e.g. Finland and Spain, have made basic broadband a legal right of each citizen, with a stated aim of updating and upgrading the definition of 'basic broadband'.
- Countries such as Korea have implemented various national broadband plans as part of a broader 'Informatization' agenda relating to their government's aims for a competitive digital economy.
- They do not necessarily need significant government funding (e.g. South Korea has focused predominantly on private investment to deliver its national broadband plans). The Economist notes: '*that governments are most effective when they avoid such big*

financing commitments, focusing instead on appropriate market regulation and incentives for private-sector investors. Sweden's plan mandates that fibre ducts be laid in parallel whenever any electricity or water networks are expanded or upgraded. Finland offers tax breaks for those hooking up to high-speed, fibre-optic connections'. 9 Feb 2011.

- They may need decrees or legislation (e.g. both the US and Brazil used Presidential Decrees to instigate their national broadband plans).
- In Brazil, prior to scoping its national broadband plan, the consultative committee working for the government consulted widely and deeply with the private and public sector (see below re. case studies).
- National broadband plans can be 'scaled up' i.e. they can have subsequent phases (as in South Korea – see case studies).
- Some of the most ambitious national broadband plans aim to manage 'broadband disparity' between the country's citizens. In France, the national broadband plan, stipulates superfast broadband coverage to 100% of the population within 10 years. In Finland, the Government has set a target of 100% coverage of 100Mbps broadband for its citizens, including those that reside in Lapland.

The question is, within this wider assessment of different countries´ approaches to broadband plans, how does the UK Government perform?

When compared against the key features of each of the above national broadband plan, the UK Government falls well short. Indeed, it could be argued that the UK Government does not have a national broadband plan. Instead, it has a looser 'policy', hallmarks of which are:

- The UK has no 'Digital Economy' strategy or plan akin to those of other leading countries. Indeed, UK Government policy regarding broadband infrastructure exists within a wider policy vacuum, with regard to the 'Digital Economy'.
- There are no government incentives for commercial fibre build in the UK.
- There is no 'scaling up' facility within the UK Government´s policy for broadband subsidy. The Governments 'policy delivery' vehicle, BDUK, and the related funding are 'one offs'.
- Prior to UK Government policy being finalised for broadband infrastructure (in 2010) there was little (if any) consultation with stakeholders.
- There is no legislative obligation for broadband infrastructure or any attendant universal service obligation.
- The UK Government appears to be content to embed broadband disparity within the wider population. The fact that the 'last 10%' of the UK, close to 3 million premises, has been designated a rather loose government target of 2Mbps, while UK citizens in the cities have easy and affordable access to 100+Mbps fixed services and soon to 4G mobile services, suggests that the UK Government, unlike other governments around the world, accepts that growing broadband disparity will be a permanent feature of the UK.

C.3 The UK Government approach to broadband infrastructure versus the national broadband plans of South Korea, China, Brazil and France

This short section provides brief updates on the national broadband plans and performance of China, South Korea and Brazil and provides comments on the UK's general position compared with such plans.

Case study 1: South Korea's national broadband plan and performance

South Korea is the most successful example of a country starting with an ambitious Digital Economy strategy that then sparked an equally ambitious broadband network plan. As the UNESCO/ITU Broadband Commission points out, the genesis of South Korea's world leading broadband network goes back nearly 20 years:

'For example, the Republic of Korea began early with strong State involvement prioritizing the development of 'informatization' and digital industries. The Government introduced the 1995 Framework Act on Informatization Promotion, which was revised several times, including in 1999 and 2006, followed by the First Master Plan for Informatization Promotion and Cyber Korea 21 setting out a vision for the twenty first century'
Page 15 http://www.broadbandcommission.org/documents/reportNBP2013.pdf

In subsequent years, the South Korean Government has come out with various updated phases/targets for broadband infrastructure. *Like Japan, South Korea has a target of 1000Mbps services being available to 90% of its population by 2015.* Interestingly, the South Korean Government focused its efforts on delivering its national broadband plan via fostering private investment and competition in delivering them. Public sector spending on broadband in Korea is just 1% of annual government revenue (ref. The Economist Feb 9th 2011).

In addition, as explained in section B, South Korea is investing $1.6 billion in 5G networks, which will roll out services from 2017.

Case study 2: China – A plan for comprehensive catch up

In August 2013 the Chinese Government announced its national broadband plan. In many aspects the Chinese Government is trying to 'catch up' with Asian peers. Defining features of its plan are:

- National broadband coverage by 2020.

- Fibre to the home connections providing 1gbps speeds in all urban centres by 2015.

- Connections providing 50Mbps in urban areas and 12Mbps in all rural areas by 2020.

- A total state subsidy of $323 billion which works out at approximately $245 per Chinese citizen.

Case study 3: Brazil – Coverage and density of broadband provision

Brazil's National Broadband Plan has had various stages. In 2009, the Brazilian Government targeted tax breaks on broadband network investment, created regulatory 'incentives' for broadband network deployment and identified coverage targets.

In 2010, The Brazilian Government, via Presidential Decree, adopted its final broadband plan. Key aspects of this are:

- Extensive consultation with user groups/businesses and, when adopted, dissemination through local community groups/councils.

- Tax exemptions on broadband network deployment.

- For consumers a tax exempt 'entry level' price plan for mobile and fixed broadband.

- The Brazilian regulatory authority (Anatel) introduced the following measures:

    - Regulatory 'holidays' for fibre optic investments.

    - Promotion of internet exchange points.

    - Auction of mobile broadband licenses in the 450Mhz (for rural) and 2.6 GHz (for urban) spectrum ranges.

As the ITU/ Cisco report on national broadband plans states:

'The private sector has responded by accelerating the deployment of infrastructure. There has been significant uptake in both fixed and mobile broadband services – fixed broadband is now available in all 5,565 municipalities of the 27 states in Brazil. Since 2009, total fixed broadband subscriptions have doubled from 10 million to 20 million lines in service. Mobile 3G services now reach 3,376 municipalities in all states, currently covering 89% of the country´s population. Mobile broadband has exploded from 7 million lines in service in 2009 to 70 million today. Mobile 4G services were recently launched in April 2013 in major State capitals, with extensive coverage targets over the next few years. Twelve thousand community telecentres have now been equipped and provided with broadband Internet access. Two major upcoming sporting events have also helped focus the drive towards meeting broadband deployment targets: the 2014 Football World Cup and 2016 Summer Olympic Games.

The implementation of the Brazilian National Broadband Plan is an ongoing process that will certainly require revisions from time to time. Technological developments offer new solutions to the ever-increasing demand for bandwidth, as video becomes the driving attraction in new applications. Infrastructure – and policy – have to keep pace with these developments.' Page 19

http://www.broadbandcommission.org/documents/reportNBP2013.pdf

Case study 4: France – 100% Superfast broadband network coverage

After the failure of its original national broadband network plan circa 2010, due to a lack of willingness by private operators to extend coverage beyond French cities, the current government re-assessed the plan and, in February 2013, launched a new national broadband plan. Key elements of this are:

- A coverage target of superfast broadband network for 50% of the population by 2017 and for 100% of the population by 2023.

- Total funding of approximately £17 billion; one third of which will be funded by private investment in urban areas, one third of which will be funded by private investors and communities in moderately densely populated areas and one third of which will be funded by the government in the sparsely populated rural areas of France.

C.4   Comparisons with UK Government policy:

There are several key areas where UK performance and the structure of government intervention diverge from South Korea, China, Brazil and France, notably:

- Unlike South Korea, the UK's policy for broadband infrastructure resides within a policy vacuum for the wider digital economy and the UK's global positioning in it.

- China's per capita funding for broadband network by their central government is approximately 10 times greater than the UK´s.

- Brazils 'inclusive' and 'consultative' approach with stakeholders means that even in this vast country, local and regional councils have a committed and strategic stake in the implementation of the national broadband plan.

- Brazil's use of both wireless and wireline technology and its focus on high quality 3G and 4G mobile broadband for the wider population has led to an explosive growth in broadband connectivity.

- France's commitment to deliver superfast broadband to 100% of its population by 2023 implies that the French Government is unwilling to accept 'broadband disparity' for its citizens. The same applies in Finland, where there is a 100% coverage commitment for superfast broadband connectivity.

SECTION D: THE DAMNING CONCLUSIONS OF PARLIAMENTARY INVESTIGATIONS AND HOW IT ALL OCCURRED IN PARALLEL TO EU POLICY AND LEGISLATION

Q. Over 90% of state aid is flowing to the former monopoly, BT, for it to extend the UK's 'superfast' broadband network (even though it will deliver speeds less than the EU's defined threshold for superfast broadband). How did this happen under the auspices of EU policy and legislation?

The purpose of this section is to pose a question that may have no answer, given its context. Given EU policy and legislation regarding broadband speed targets and the award of state aid (to extend broadband networks), how could the events, neatly described in the UK Parliamentary Public Accounts Committee´s (PAC) highly critical Rural Broadband report (of September 2013), have occurred? The PAC narrative is clear as to events and consequences. The PAC report states:

"5. One safeguard intended to ensure value for money was to promote competition between suppliers to deliver the rural broadband infrastructure. However, only three suppliers submitted final tenders for the national framework and only two—BT and Fujitsu— were appointed to the framework. In March 2013, Fujitsu announced it did not intend to submit any further bids for contracts, leaving BT the only active participant. By June 2013, 26 of the 44 local bodies had signed contracts with BT as their supplier. BT is also likely to win all 18 of the remaining contracts. [6] There is scant evidence of any satisfactory competition to enable prices to be driven down taking place.

6. UK Broadband told us that the geographical area covered by each contract was too small to enable small companies to build a viable business, and that, because the contracts were not put out to tender at the same time, companies could not plan to bid for multiple contracts that could give them the scale required to make the operation viable. In addition, witnesses from the industry told us that the complicated procurement process, State aid restrictions over the technical requirements and regulatory access conditions all disadvantaged smaller providers. BT disputes some of these claims. [7]

7. UK Broadband also told us that the Department's target for how much of the UK should be covered by superfast broadband has had an impact on competition. In December 2010 the Department published "Britain's superfast broadband future" which stated that the European Commission's target of 100% access by 2020 was a challenging target but the right one.[8] UK Broadband stated that companies bidding for the North Yorkshire contract were required to submit a bid to reach 100% of the population. However, in May 2011, after modelling the coverage it could achieve within its available funds, the Department announced a target to provide superfast broadband coverage to 90% of premises by 2015.[9] UK Broadband told us that BT would be able to reach 90% of premises relatively cheaply by expanding its existing network, whereas aiming to reach 100% of premises would require innovative approaches to delivering superfast broadband, which would have helped other potential suppliers to produce competitive bids.[10]

8. The effect of designing a programme which only reaches 90% of the target area will make it more expensive at a later stage to cover the final 10%. It will also make it less commercially viable for anyone other than BT to bid, as no-one else will have existing infrastructure to bolt it on to, matters are made worse by the fact that BT is preventing local authorities from publishing plans showing which areas will not be covered which would enable other, often community based consumers from filling the gap and ensuring 100% coverage. The Department has a commitment to meet the EU objective of superfast coverage for all by 2020.[11] In the recent Spending Round covering the period 2015-2019, £250 million of additional funding was allocated to the Department to help it reach more premises. However, the Department does not yet have an estimate of how much it might cost to reach 100% coverage. Witnesses from the broadband industry told us that potential investment by competitors had been lost. For example, UK Broadband has spent none of the £150 million it had allocated for the Programme. Fujitsu had also stated an intention to invest £1.5 billion which has not been invested. In total, INCA estimated that the investment that had been foregone was at least £2.7 billion. The Department responded that its aim was

to achieve the most possible with the given funding, not to lever the maximum amount of private investment.[12]

9. INCA told us it believed that the Secretary of State for Culture, Media and Sport was keen to engage on issues such as competition and transparency of information, but that officials had been less receptive. For example, in January 2013, ministers engaged with the sector over proposals to inject more competition into the Programme, but witnesses told us officials had not acted on the information they had submitted. The Department has agreed to investigate any such comments about its officials. [13]"

In addition, three of the main points made in the DBF March 2013 paper were:

- The Government/BDUK had no clear plan for addressing the lack of superfast broadband network in the 'last 10%' of the UK (a zone that includes areas in the counties of Oxfordshire and Buckinghamshire) and that the 2Mbps target that apparently existed was unambitious and should be upgraded to superfast broadband speeds.

- It was not clear whether the award of state aid to BT to deliver a non-binding target of 24Mbps was occurring in a 'technologically neutral' manner (i.e. as per EU state aid guidelines), nor whether it was an efficient allocation of funding.

- There was/is continuing uncertainty as to whether mobile 4G networks will deliver faster broadband to rural areas. It was noted that, unsurprisingly, the mobile operators appear to be focusing on the roll out of faster broadband services to urban areas/cities.

The PAC investigation made similar points. Specifically;

With regard to the 'last 10%', the PAC report states, "*In addition to the current programme, the Department has allocated a further £250 million to increase coverage of superfast broadband in the 2015-19 spending period, but does not yet have a clear plan for reaching 100% superfast broadband coverage.*" Para 2

The PAC report also recommends that additional state aid be withheld until there is:

- Greater cost transparency from BT.
- Value for money can be assured.
- Account should be taken of the long term value of the assets to the supplier.
- As regards councils, '*The Department should set out how it has assured itself that local authorities will be adequately resourced and supported to carry out adequate checks on BT's costs and take-up rates during the project..*' Para 5

The Parliamentary Environment, Food and Rural Affairs Committee also carried out its own investigation into the state of broadband in the UK's rural communities. Some of the key findings in its July 2013 report were:

- "However, given the delays to the Programme, the Committee is unclear when those currently without any access may benefit. 2Mbps must also be the minimum speed that users receive during periods of peak demand, not a headline 'up to' figure that is rarely achievable. Not that we consider 2Mbps good enough; while it may be sufficient to stream video content for one device, households increasingly have a number of devices that compete for internet

connectivity—this needs to be recognised in future plans to move beyond the USC/Universal Service Commitment." Para 40.

- "In response to this Report the Government should set out how many households and businesses are not going to be covered by the roll-out of 2Mbps broadband under the Rural Broadband Programme, and the reasons for this." Para 44.

- "BDUK and Ofcom should consider requiring BT, where it is in receipt of state aid, to disclose its costs in a way that permits comparison across contracts. Without such transparency it is difficult to see how value for money can be guaranteed, particularly now that the only competitor to BT has effectively ruled itself out of the bidding process." Para 52

- "The lack of mobile coverage in large parts of rural Britain is unacceptable and we welcome the Government's commitment to go some way to addressing this problem through the Mobile Infrastructure Project, although it is disappointing that the ambition of the scheme has been scaled back from that originally announced. We are concerned that in focusing on reducing the number of premises in 'not-spots', which may already have landline access, large parts of the countryside and those who work in it may still be left without access to mobile technology. The Government must set out what improvement in geographical coverage the Government foresees as a result of the £150 million initiative." Para 70

The points the Rural Affairs Committee make above are all consistent with the DBF's concerns, set out in earlier papers.

SECTION E: WHAT NEXT?

Q. On the basis that current Government policy and funding has failed to bridge the superfast broadband infrastructure deficit for 35% of the UK, what next?

In 2010, when the current government determined its ´policy´ for broadband in parallel, it conceived and established Broadband Delivery UK (BDUK). Both actions occurred outside of any national broadband plan. As section C shows such an omission rendered the UK Government´s subsequent actions on broadband Infrastructure far weaker, less cohesive and less productive than they needed to be.

Looking at the National Broadband Plans that have been adopted by global peers there are three defining elements:

1) A ´bottom up´ consultation with regions and communities? This was lacking in the formulation of UK Government policy.

2) Adoption of ambitious service-speed targets and the technological means of delivering the same? The UK has arguably, opted for both the least ambitious targets and technological means of delivering the same.

3) Tax/central Government-inspired financial incentives to deploy genuine ´superfast´ broadband network? No such incentives occurred in the UK. In fact the current argument between Ofcom and mobile networks on spectrum fees, with the latter threatening to reduce 4G coverage unless fees are lowered, points to a far less investment friendly approach in the UK.

While we acknowledge that the UK Government has issued a draft 'Digital Communications Infrastructure Strategy' (February 2014) we note that it:

- Fails to acknowledge any of the significant shortcomings in superfast broadband infrastructure coverage in the UK, with regards to the 10 million premises that are 'have nots'.

- Fails to specify the key role spectrum/wireless will play in rectifying this deficit.

Therefore, for the incoming government in 2015, there is a need for a **National Broadband Plan (NBP)** that addresses each of the failings/deficits above. Integral to such an NBP should be:

- There should be a review of which part of the government should be responsible for the National Broadband Plan and delivery. It seems logical that such an important infrastructure project should reside in the department responsible for business and enterprise.

- As part of the National Broadband Plan, for those areas outside of Virgin Media network/BT commercial broadband roll out, there should be a significant revision upwards of the speeds/bandwidth that all these 10 million homes and businesses (the ´have nots´) should be able to access. Given both the reality of ´superfast´ broadband

network performance in other UK areas (such as those covered by Virgin Media network) and by global/EU peers, any incoming Government in 2015 should be specifying a target of at least 100Mbps for the UK ´have nots´ within two years.

- There should be significant consultation and feedback with regional Local Enterprise Partnerships (LEPs) and other regional bodies to establish the scale of the broadband deficit and potential solutions. It may be that the LEPs identify a serious and significant broadband deficit in their areas for SME/business premises, as well as specific regional ´black holes´ in 4G coverage.

- A review of what regulation is needed for the BT broadband network that has been funded by councils and central Government. This should tie in with what companies/or third parties can provide genuine superfast broadband (in line with the NBP) in various regions and areas.

- The incoming Government of 2015 should consider what incentives can be introduced to stimulate investment in genuine 'superfast' broadband infrastructure.

- Adopting an ambitious 'can do' approach to 5G technology should be central to the National Broadband Plan. 5G networks offer the prospect of universal ultrafast broadband across the UK, at the 1,000 Mbps level. The UK is significantly lagging global peers in its understanding and adoption of this technology.

- Additional, and significant, state aid may need to be allocated to rectify the failure of the current Government in this area. This may need UK Government to negotiate ´2nd phase´ funding with the European Commission.

- Any spectrum consultations by Government or Ofcom should occur within the context of a national broadband plan.
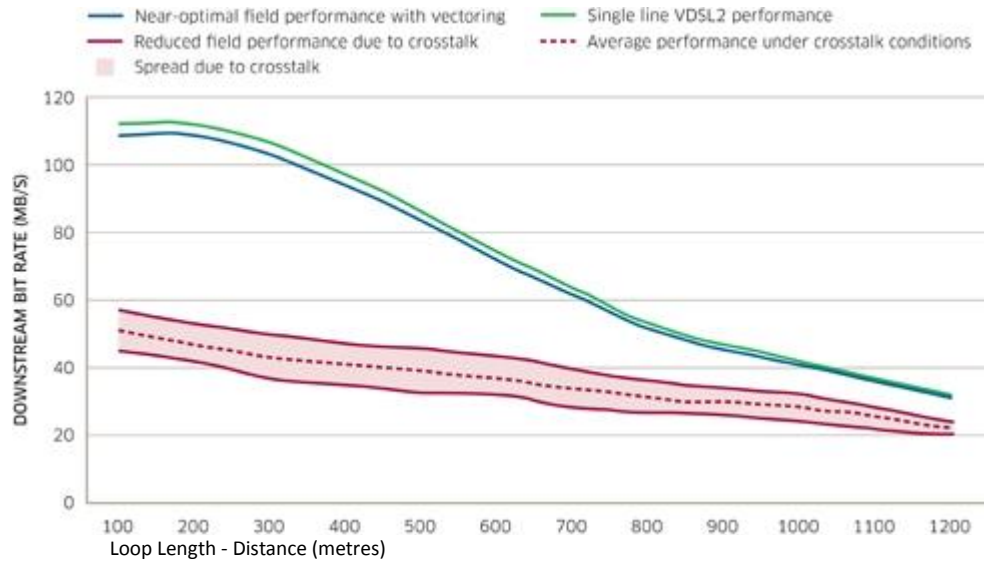
There may also need to be significant amendments to the terms of the 4G mobile licences to ensure:
- That the coverage obligation in the 4G licence for 98% of the population is combined with a 'usability' threshold relating to signal strength i.e. signal strength should be sufficient to deliver 10Mbps within a home for 98% of the UK population, plus a voice service.
- That more than one 4G mobile network should have the above coverage obligation.

ANNEXES

ANNEX 1

   Figure 1

Source: http://www2.alcatel-lucent.com/blogs/techzine/2011/boosting-vdsl2-bit-rates-with-vectoring/

Speed in Mbps declines over distance of copper line – Lower band with dotted line represents typical FTTC upgraded line.

Annex 2

Table 1 - UK Sector 1 ranking for superfast broadband network coverage in the context of a sample of EU and non EU countries (Akamai State of the Internet 3rd Quarter 2013 Report)

Country	Ranking	Average Peak Connection Speed Mbps
Romania	1	47.7
Netherlands	2	39.6
Belgium	3	38.5
Switzerland	4	38.4
Czech Republic	5	34.8
Sweden	6	33.1
Portugal	7	32.7
Russia	8	32.6
Ireland	9	31.8
Germany	10	30.4
Denmark	11	29.9
Slovakia	12	27.0
UK Sector 1	13	24.0
France	14	22.1
Italy	15	18.2

*Data sourced from Akamai – State of the Internet 3rd Quarter 2013 Report

Table 2 - UK Sector 2 ranking for superfast broadband network coverage in the context of a sample of non EU countries/US states (*Data sourced from Akamai – State of the Internet [3rdt] Quarter 2013 Report)

Country/State	Average Connection speed Mbps	Average Peak Connection Speed Mbps
US		
New Hampshire	11.9	45.6
Delaware	12.7	48.1
District of Columbia	13.5	48.1
Utah	11.6	----
Mexico	3.9	17.1
Chile	3.3	17.2
Peru	2.4	13.2