Response to Department for Digital, Culture, Media and Sport:
Future Telecoms Infrastructure Review:
Call for Evidence

BSG
Broadband
Stakeholder
Group

January 2018

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> The Broadband Stakeholder Group (BSG) is the UK government's leading advisory group on broadband. It provides a neutral forum for organisations across the converging broadband value-chain to discuss and resolve key policy, regulatory and commercial issues, with the ultimate aim of helping to create a strong and competitive UK knowledge economy.
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> Individual sponsors of the BSG will be making their own responses to this consultation which may very or expand on points contained within this submission.

Executive Summary

The Broadband Stakeholder Group (BSG) welcomes the opportunity to respond to the Government on the Future Telecoms Infrastructure Review and look forward to engaging with DCMS throughout this process.

We believe in the need to continue to incentivise sustained investment so as to accelerate the deployment of high-quality digital infrastructure. The UK's position at the forefront of the digital revolution can only be maintained if the right communication networks have the coverage and capacity to support it. Those networks must be resilient, stable and capable of facilitating and supporting the next generation of access technologies.

If this investment is to be industry-led – as the government has stated it must be – then pro-competitive conditions must be in place to support the commercial case for roll out. The Government is right to review market conditions to ensure that we have an effective policy and regulatory framework that will support the delivery of industry-led deployment of full-fibre and 5G on the scale that the Government is seeking. We are clear that for the UK to meet these ambitions, change is necessary as the current policy, regulatory and commercial environment will not deliver them on a commercial basis alone.

A core part of investment cases in full fibre networks is the operational cost savings made over the existing infrastructure. This necessitates some sort of transition from the existing network which introduces policy challenges such as the move from the Publicly Switched Telephone Network (PSTN) to an alternative. Industry is keen to work with Government, Ofcom and relevant stakeholders on how to tackle these issues.

Reducing the cost of network deployment is a key enabler for higher levels of investment.

Following on from the BSG report into Lowering Barriers to Telecoms Infrastructure Deployment[1], we welcome the creation of the Barrier Busting Taskforce and look forward to working closely together in a bid to overcome the obstacles highlighted in that report. The adoption of practical solutions and good practice highlighted in the report will help to overcome many of the practical impediments to broadband rollout that have direct impact on the overall cost, pace and extent of deployment. It is important that this work, including around business rates, delivers results if we are to deliver a digital infrastructure fit for our economy's and society's needs.

Q1: What is the existing UK telecoms market structure and policy framework able to deliver?

- *When will it deliver, and how certain can we be that it will fulfil the Government's ambitions for full fibre networks and 5G deployment?*
- *What will this mean for roll-out of these technologies and for competitive models in different geographic locations?*

The UK telecoms market has a number of major players and a growing base of alternative providers. Both the regulatory framework and the overarching policy agenda is aimed at increasing competition across the sector. In fixed access, there is infrastructure competition at around 50% of, premises – albeit predominantly urban ones - and a competitive retail market operating over wholesale infrastructure - over 500 service providers rely on Openreach[2] which serves close to 95% of UK premises with superfast broadband[3]. In mobile we have four mobile network operators complemented by a substantial wholesale infrastructure market, with the addition of virtual operators providing retail competition. 4G coverage from all four MNOs is now at 58% for indoor premises and 43% for geographic areas[4]. 78% of the UK, geographically, has 4G coverage from at least one operator – up from 63% in 2016.

Thanks to the open nature of the internet UK consumers benefit from arguably the greatest offering of content and streaming services in the OECD[5], and owing to the competitive UK broadband market, as compared with, for example the USA, the open internet/ net neutrality has been protected by a successful process of self-regulation, led by the BSG. Indeed, the UK's approach became the model for the EU wide law[6] which currently provides for important back up and legal certainty for industry and consumers alike.

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[1] http://www.broadbanduk.org/2017/04/28/bsg-to-launch-report-lowering-barriers-to-telecoms-infrastructure-deployment/
[2] https://www.openreach.co.uk/orpg/home/aboutus/aboutus.do
[3] 30Mbps as defined by Ofcom https://www.ofcom.org.uk/about-ofcom/latest/features-and-news/connected-nations-digital-divide
[4] https://www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-2017/concise-summary
[5] http://www.broadbanduk.org/2015/11/17/publication-of-review-of-the-uks-open-internet-codes/
[6] https://ec.europa.eu/digital-single-market/en/policies/open-internet-net-neutrality

Full Fibre

The current policy and regulatory framework has delivered substantial benefits to the UK consumer. Indeed, to quote the then Digital Minister Matt Hancock, as far as superfast connectivity is concerned the UK ranks "the best in Europe"[7]. The Huawei Global Connectivity Index places the UK at number 5 out of 50 major nations in terms of connectivity[8].

However, whilst Ofcom's Connected Nations report[9] revealed an upwards swing in fibre-to-the-premise (FTTP) deployment in 2017, the total premises passed still stands at just 3%. It is important to remember though that there is substantial committed investment in ultrafast[10] technologies, using both full-fibre connections and other technologies such as DOCSIS and G.Fast, which will substantially increase this total. These include Virgin Media's £3bn Project Lightning, City Fibre and Vodafone's partnership that could deliver 5 million FTTP connections by 2025[11], substantial investment in other full fibre players such as Gigaclear and Hyperoptic as well as Openreach's ambitions to pass 10 million premises with ultrafast connections using a combination o f G.Fast and FTTP.[12] Furthermore, Talk Talk is expanding the Ultra Fibre Optic network in York to bring full fibre to a further 40K homes.

Despite the fact that we are in a relatively intensive period of investment in telecoms infrastructure it is unlikely that the achievements of the previous decade (as regards superfast connectivity) will be replicated in the move towards Gigabit connectivity and 5G. Indeed in relation to our international competitors we should recognise that compared to their full fibre deployment we lag behind them. The figures published by FTTH Council Europe in its 2017 Global Ranking[13] revealed a FTTH/ FTTB penetration rate of 9.4% across the EU28. With the UK not even appearing on the Council's ranking, Latvia, Sweden and Lithuania all enjoy penetration rates surpassing 40% and Spain has the largest market in absolute figures with 4.5 million subscribers following a 72% growth rate over 9 months. There are however very different drivers and influences behind these different FTTP rates from country to country, not all of which may be replicable in the UK. In our answer to Question 3 we consider where it is relevant to draw comparisons to international examples of FTTP roll-out.

Given the investment referenced above, it is likely that the market will aim to deliver 10 million full fibre premises by 2025, which is slightly later than the Government's intended date of 2022 as spelled out in the Conservative Manifesto[14]. There are several reasons why FTTP roll-out has been limited to date. Firstly, the commercial case for FTTP investment is finely balanced. Investment cases are hindered by continued barriers to deployment such as permits and noticing, as detailed in the recent BSG report[15] but also issues such as the technical skills

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[7] https://www.gov.uk/government/speeches/building-a-full-fibre-britain
[8] http://www.huawei.com/minisite/gci/en/country_profile-gb.html
[9] https://www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-2017
[10] Defined as 100Mbps
[11] https://www.cityfibre.com/news/vodafone-cityfibre-bring-gigabit-speed-fibre-uk/
[12] http://www.bbc.co.uk/news/technology-40643903
[13] http://ftthcouncil.eu/documents/PressReleases/2017/PR20170215_FTTHranking_panorama_award.pdf
[14] https://www.conservatives.com/manifesto
[15] http://www.broadbanduk.org/2017/05/23/tackling-barriers-to-telecoms-infrastructure-deployment-issues-and-recommendations/

required to conduct the related civils build and structural factors in the UK market such as the lack of MDUs etc. For instance, John Henry Group cite the shortage of civil engineering personnel to be one of its "main challenges"[16]. This is unlikely to ease in the short-term, particularly given the uncertainty of the UK's immigration system following the UK's exit from the EU.

Outside of the 10m premises goal and the USO, the UK's public policy targets for broadband and digital networks more generally have not been specified. As part of this review the Government should consider outlining further targets to help shape the path to national coverage. In doing so it would be unhelpful for the government to adopt an approach that is not technology neutral. The BSG firmly believes that we need substantially more fibre deployed, but whether this will be FTTP, to a distribution point to a 5G small cell or to all premises or the majority/those that need it remains to be seen; it will be the market that ultimately decides the most economical way of meeting the overarching targets.

As an indication, the National Infrastructure Commission cost analysis[17] of the UK's digital communications infrastructure options highlighted that FTTP would cost approximately 30% more than G.Fast would (after including the higher opex costs of G.fast compared to FTTP) over a 30 year period. The report further concluded that non-fibre technologies (G.Fast, DOCSIS and Fixed Wireless Access) could be used cost-effectively to achieve 100% coverage. However, the National Infrastructure Assessment: Congestion, Capacity, Carbon – Priorities for National Infrastructure also noted that whilst these technologies can deliver improvements "*faster and at less cost. But it delays investments in fibre networks, creating a risk that the UK is unready for new applications that may emerge and need the capability that fibre offers*".[18] These "new applications that may emerge and need the capability that fibre offers" are currently not evident however, and thus need to be taken on trust to justify any higher cost.

5G
The network densification required by 5G may well facilitate a move towards greater sharing of assets but even so it will be challenging to deploy small cells at scale in a reasonable timeframe. The potential of 5G and its abilities to create opportunities for innovation and new business models mean that it should not be seen as just a 4G upgrade. However, given that the commercial business models are as yet unproven and in order to maximise the value of the spectrum and standards, minimal regulatory overhead should be deployed.

Independent wireless infrastructure (also known as neutral host passive infrastructure) can, buy investing with a single anchor customer, see providers reducing the economic threshold to provide connectivity in challenging areas. The independent operator, by virtue of anticipating the addition of future sharers, furthermore reduces the cost to a fraction of the total cost of ownership of self-build. Independent infrastructure anchors the investment with

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[16] https://www.ispreview.co.uk/index.php/2017/09/john-henry-group-reveals-obstacles-building-uk-fibre-optic-networks.html
[17] https://www.nic.org.uk/publications/costs-digital-communications-infrastructures/
[18] https://www.nic.org.uk/wp-content/uploads/Congestion-Capacity-Carbon_-Priorities-for-national-infrastructure.pd

the wireless operator that has the greatest motivation to increase their footprint, and then uses the competitive forces of the market to draw the others out over time to match end user experience. It will be necessary however to ensure that these neutral host networks do not create effective local monopolies with restrictive access conditions etc. that could conversely drive up costs and reduce the benefits to end users. Enforced domestic roaming, on the other hand, would remove all investment incentives as the MNOs would be unable to differentiate in the provision of new coverage or capacity.

Q2: What barriers exist to *long term* investment in the UK telecoms market (beyond work underway by the Local Full Fibre Networks programme to stimulate demand and by the Barrier Busting Taskforce to reduce build costs)?

- What effect do existing revenue streams have on investment plans?
- What effect do visibility and predictability of returns have on investment plans?
- What is the effect of current infrastructure deployment models?
- What impact do current infrastructure sharing arrangements have on investment?
- What is the impact of the existing relationship between wholesale and retail markets?
- What changes to spectrum licensing and sharing could foster greater innovation and investment in 5G?

As has been noted the existing framework has proved itself capable of delivering investment in superfast and 4G technologies and is also beginning to attract substantial levels of investment in the next generation of technologies. The government backed Digital Infrastructure Investment Fund is a promising intervention which can support substantial initial investment in new fibre deployment. Private investment is ultimately allocated to areas or projects where it is forecast to generate positive returns for companies and shareholders. Individual business cases reflect a myriad of pressures from existing infrastructure, installed customer base, population density, competitive pressures etc.

We will focus our response on the overall policy and regulatory framework in which these decisions take place.

<u>Practical Barriers</u>
Getting the conditions right for infrastructure deployment is key and the creation of a more favourable regulatory and policy environment an absolute necessity vis a vis motivating investment where the initial costs are high and the returns unknown. To this end the BSG intends to undertake a further report that will look into the practical issues surrounding 5G roll out and what the deployment will actually mean and identify the potential for problems before they become actual barriers to making the UK 5G ready.

Many of the practical barriers to telecoms infrastructure deployment[19] highlighted by the BSG report are well known to Government and currently being looked into by the Barrier Busting Taskforce.

The obstacle posed by Wayleaves to industry's ability to deploy any kind of infrastructure at scale cannot be underestimated, and the BSG would urge the Government to focus action on absent or uninterested landlords as a first step. Further, a standardised wayleave agreement, sponsored by DCMS, could help provide reassurance to local authorities, and potentially private landlords, with a degree of credibility. Additional steps to removing practical barriers should focus on harmonising engagement between telcos and local authorities to help ease the pain around permits and noticing. Support from local government could also come in the shape of sharing in advance roadworks schedules, outlining when are where road closures will be taking place, so that work can be aligned accordingly. Whilst the BSG is encouraged by the initial work of the Barrier Busting Task Force, concerns remain about wider Government efforts such as the proposals around lane rental from the Department for Transport[20].

Business rates is also an area where Government will need to balance competing priorities. We would argue that as a fundamental building block of our economy and society, the balance should be tilted in favour of incentivising investment in digital infrastructure, rather than viewing that digital infrastructure as a revenue stream in of itself. The current business rates regime offers little certainty, has a relatively high administrative cost and acts as a drag on investment. An overhaul of the Cumulo tax regime therefore is a prerequisite so as to further bolster the investment case for FTTP. This is an area in which the BSG is considering further research.

Brexit
Brexit is an ongoing source of uncertainty when making long-term investments although it should be noted that funding has either been reconfirmed or agreed since the triggering of Article 50. Despite this positive news, there remains uncertainty about the principles and nature of the UK's regulatory regime once we have left the EU, particularly given that the overarching regulatory at the EU level is itself under review. Given the timings this opens up three options:
- alignment with the EU under the European Electronics Communications Code Directive,
- divergence from the EU if we retain our current approach,
- divergence from the EU as we pursue something else.

Whilst we understand that the exact model of regulation is dependent on the wider future trade agreement with the EU it nevertheless introduces uncertainty for companies investing the UK.

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[19] http://www.broadbanduk.org/2017/05/23/tackling-barriers-to-telecoms-infrastructure-deployment-issues-and-recommendations/
[20] https://www.gov.uk/government/consultations/future-of-lane-rental-schemes-for-roadworks

It is also worth noting that since the 1980s the UK telecoms sector has played a significant role in creating the EU regulatory frameworks – and not, as is commonly supposed in Brexit discussions, something imposed on the UK.

Subject to the final agreement of the EECC we therefore support continued alignment with the EECC framework in at least the short-medium term.

<u>Efficient access to existing infrastructure</u>
Whilst there has been a focus on accessing existing infrastructure across a number of areas this is still a challenge in some sectors. The industry welcomed the transposition of EU Broadband Cost Reduction Directive (2014/61//EU) but this has not yet made a substantial difference to access to existing infrastructures across the UK although there are some positive signs that it is helping to spur innovative network deployments. However, challenges remain.

For instance, providing connectivity to rail, which - as was outlined in the Update to the 5G Strategy - is a Government priority[21] yet is still a major challenge for providers. Whilst there are some remaining technical challenges with providing rail connectivity the major barrier is access to being able to place equipment close to the rail line. A recent report from the Rail Safety and Standard Board (RSSB) stated that *"unavoidable truth that access to assets located trackside… is not straightforward"*[22].

The report finds that *"Mutterings of state aid and confusion around Network Rail's transition to full public ownership have made it too easy to hide behind pseudo legal objections"*. This also reads across to other potential infrastructures and is where Government can play a key role in convening different bodies, including its own agencies and ensuring that commercial models do not fail due to institutional inertia.

Local Authorities have made substantial progress in opening up their existing duct infrastructure however, more can and should be done to ensure that their estates, including street furniture, are also opened up to commercial telecoms deployments. Whilst councils like Aberdeen are helping to define best practice about ensuring that their internal teams are structured (such as bringing together economic regeneration, digital, planning and highways teams) to help deliver 5G they have also been successful in attracting substantial investment into their region through the use of concession contracts.

When used correctly concession contracts offer a cost-effective way to deploy wireless technologies, particularly in urban areas as part of network densification. However, some contracts can be seen to maximise revenue to the local authority over investment in

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[21]https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/672118/Next_Generation_Mobile_Technologies__An_Update_to_the_5G_Strategy_for_the_UK_Final_Version_with_Citation.pdf
[22] https://www.realwire.com/releases/LS-telcom-examines-options-to-improve-digital-connectivity

connectivity. The Government could help to shape these contracts through advice to local authorities as it did under the Super Connected Cities Programme[23].

High speed backhaul such as that provided by access to fibre is an integral component as regards deployment of 5G. The Government recognises the necessity of bringing together full fibre and 5G technologies and highlights in its 5G strategy that it will be working "*with Ofcom to ensure that operators can get fair access to fibre on reasonable terms and explore the scope for a duct and pole access remedy as part of the next Business Connectivity Market Review*"[24].

Looking further ahead, as Government has chosen to pursue a competitive, regulated broadband USO, it is plausible that multiple network operators may compete to be a USP. Should multiple USPs be designated, Government should consider how ISPs will navigate through this market. Without some form of agreed standards in how USPs will operate, ISPs may be left to negotiate bilateral agreements between each USP. This would be inefficient and cumbersome. Government should consider instructing Ofcom to evaluate how USPs can operate to ensure that ISPs can deliver the USO efficiently and effectively – potentially through some sort of standard agreement.

Q3: What can the UK learn from the widespread deployment of fibre networks in other countries?
- What factors have led to higher full fibre investment in other countries and how applicable are these to the UK?
- What have been the impacts of fibre roll-out models in other countries on competition dynamics, consumer bills, and risk allocation?
- To what extent can the fibre that has been rolled out internationally be used for mobile backhaul, and what lessons can the UK learn?

There is no single common feature that has led to higher full fibre deployment in other countries outside of a strategic policy commitment, and it should be noted that this alone is not sufficient. There are however a range of primary reasons that have led to higher levels of FTTP in some countries and there are a number of research papers on this[25]. These include: a different regulatory regime with greater focus on infrastructure level competition over retail and typically no obligation to offer more service level competition options; or alternatively one that allows sole control of the infrastructure in any given area by a single operator and significant retail level competition; a different approach to connectivity from local authorities; different arrangements of population and premises (eg MDUs and extent of urbanisation); and

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[23] https://www.gov.uk/government/publications/super-connected-cities-programme-options-for-wireless-connectivity/super-connected-cities-programme-options-for-wireless-connectivity
[24] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/597421/07.03.17_5G_strategy_-_for_publication.pdf
[25] http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/6488-berec-report-challenges-and-drivers-of-nga-rollout-and-infrastructure-competition

different legacy infrastructure and topology. In summary, contrasting approaches have still managed to deliver large scale deployments of fibre.

Whilst these countries have not seen the emergence of applications or services that are possible only via gigabit infrastructure, this does not mean that the move to deploy more fibre in the network is redundant. Other factors such as enhanced reliability and lower operating costs of full fibre may at times be of a greater benefit than the speed uplift that they can provide. As the wider economy becomes increasingly digitised our digital infrastructure will become increasingly important as a sign of our international competitiveness and ensuring sufficient backhaul is an incredibly important element of deploying 5G in a timely manner.

In seeking to learn lessons, a coherently aligned policy and regulatory framework is critical. One such lesson is from New Zealand. The Government there pursued a policy of incentivising full fibre build through a series of procurements which required successful bidders to be wholesale only operators in order to facilitate strong retail competition, which in turn saw the voluntary structural separation of the incumbent network operator Chorus from Telecom New Zealand. Although successful in the long run, disagreement between the regulator and Government over copper pricing came close to derailing this programme. This took several months to resolve and caused significant uncertainty for investors and the shareholders of the two separate companies.

The UK can also learn lessons from those countries that have gone through the transition from copper to gigabit capable networks, particularly around the transition between those networks as detailed below.

Q4: The Government wants to consider all market models that will facilitate the next generation of technologies.
   a) **What different market models might work in the UK in the longer term, and what risks and opportunities do they present?**
   - What consequences could different market structures, including ones which support longer pay-back periods, have on the investment environment, competition and outcomes for consumers?
   - How might these vary in different geographic areas of the UK, including urban and rural areas?
   - Over what timescale could market models be changed, and what policy conditions would be necessary to enable this?
   - Are the current arrangements for BT legal separation working effectively?

The Government has a clear role to play in facilitating a policy ambition of widespread UK fibre rollout where an economic case for commercial investors does not exist. The Government should continue to support infrastructure investment, which has a key role to play in fibre deployment, and not look to pick winners or favour unduly one player in the market. By

supporting a diverse and competitive landscape with full and fair competition, the market will determine the most effective way of getting fibre to consumers and businesses alike.

Our response to question 2 lays out some of the policy conditions that Government should seek to address.

   b) **What should Government consider when assessing the potential for migration from copper to full fibre networks?**
   - Over what time period could migration occur?
   - What phases might migration be required to go through?
   - What would be the pros and cons for markets and competition?
   - What would the implications be for different groups of consumers?

A major potential benefit of full fibre networks is the saving realised in operational costs. Whilst maintenance costs of a 'new' network would generally be expected to be lower regardless, fibre networks also benefit from being generally more resilient – for instance a duct containing fibre optic cabling is unlikely to be affected by temporary flooding in the way that copper will be. However, the full savings will only be realised if copper networks are removed or 'turned off'. Running two networks will always be more expensive than running either of the two single networks.

Other countries are tackling this challenge already and there are clearly lessons that the UK needs to learn including regulatory approaches that may be required, and how to engage consumers and manage a transition. Localised migrations are likely given that there will be a differing pace of fibre deployment across the UK. This is seen internationally in countries such as Sweden. As well as looking abroad we can also look to areas in the UK which have a high concentration of FTTP lines such as Hull as testing ground for a national decommissioning of copper networks[26]. Lessons can also be applied from previous migrations such as the Digital Switchover which managed the end of analogue broadcast television in the UK, particularly in terms of a firm industry agreement on the end goal, strong policy and regulatory commitment and a coherent consumer message. As with the television switchover, industry agreement needs to come across the value chain – from retailers to infrastructure operators – so a government coordinating role would be as likely as it would be necessary.

The transition from the Public Switched Telephone Network (PSTN) to an all-IP alternative will take place alongside fibre roll-out. BT has committed to transitioning to an all-IP alternative by 2025 and other CPs are also planning for the transition. Work is already underway through Ofcom's All-IP Working Group which is facilitating collaboration between industry and interested parties on the transition, including the protection of vulnerable customers. Government should encourage Ofcom to take account of the intersection between full fibre roll-out and the move to delivering voice over IP as it takes forward this work. Clear, co-

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[26] https://www.ispreview.co.uk/index.php/2017/06/kcom-hull-uk-ponders-first-switch-off-copper-phone-lines.html

ordinated messages for consumers will help facilitate migration to more efficient technologies and allow the cost savings of retiring legacy network infrastructure and equipment to be realised.

Q5: The Government wants to achieve its digital infrastructure goals at the least additional cost. How should new digital infrastructure be paid for?
- Are consumers (residential and business) willing and able to pay for new digital infrastructure, given its expected benefits?
- What would incentivise investors and shareholders to make long-term investment decisions in telecoms infrastructure?
- What is the potential role of government in stimulating demand or otherwise de-risking new infrastructure investment?

Whether consumers are willing to pay via price rises for new digital infrastructure is still largely unknown. uSwitch data has shown that domestic consumers are willing to pay around £5 extra a month for superfast broadband speeds[27]. The challenge is therefore to lower the cost of fibre deployment whilst incentivising increased adoption of new networks, outside of purely a price focus, which should help drive increased revenue and therefore for investment.

As noted above however, the Government's digital infrastructure goals are themselves an integral part of investment decisions. If the Government is aiming for universal gigabit connectivity, the commercial case for such a deployment is currently ambiguous given that the superfast rollout has been subsidised from 65-70% of premises to the now 94% passed. The take up of this is now just under 40% so even where superior speeds are available, only 2 in 5 consumers are willing to pay the extra cost. Clearly lessons need to be learned regarding the incentives of switching from standard broadband to superfast as we consider how best to incentivise a switch to faster connectivity.

For business consumers the drivers to adoption of higher bandwidth networks may be slightly different, and driven by a focus on resilience given the move to cloud-based applications and the need to be 'always on'.

Demand for mobile data continues to grow with the average mobile data connection using 1.86GB per month in 2017, up 48% on the previous year. To meet this demand, mobile networks are densifying with the introduction of small cells which require backhaul. These end-points can be used as part of an anchor model agreement to de-risk investments. It is worth highlighting that a report for the National Infrastructure Commission recently found that investments in Ultrafast Broadband Access technologies could deliver cost savings in the deployment of 5G of between £4.1bn and £5.7bn[28].

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[27] https://www.ofcom.org.uk/__data/assets/pdf_file/0020/47603/uswitch.pdf
[28] https://www.nic.org.uk/wp-content/uploads/Benefits-analysis.pdf