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Who replies to consultations, and what do they say? The case of broadband universal service in the UK

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Abstract

Over the last decade or so, access to broadband telecommunication services has become increasingly important. Through broadband, households and companies are able to engage with the information-based economy that is emerging, through, for example, buying and selling online or using social media. While many in the UK already benefit from the provision of broadband, some do not – they may not be able to access the Internet and when they do, their connection may be poor.

After trying to resolve this through a stream of different initiatives, the UK government announced a broadband universal service obligation of 10 Mbps in late 2015. Ofcom, the telecommunications regulator, launched a consultation in April 2016 and sought the views of interested parties. The consultation attracted considerable interest, but after the submissions from orchestrated campaigns are discounted just over 100 responses remain. But who contributed and what did they say? To explore these two questions, this paper adopts a qualitative approach, using NVIVO, to analyse the responses to the consultation.

Our analysis found that submissions were made by individuals as well as pressure groups, companies and various levels of government. Their contributions were highly diverse, reflecting both the complexity of the issue as well as its politicised nature. Somewhat surprisingly, most of the responses address only some of the issues raised in Ofcom's consultation document, and tensions and contradictions can be identified between the different responses. There is, to a lesser or greater extent, a lack of agreement among the responses regarding the appropriateness of 10 Mbps, whether this should change in the future, how it should be funded and what technologies should be used. In other words, we found no agreement on the key issues that need to be resolved if everyone in the UK is to have access to broadband.

Keywords: universal service, broadband, Internet access, consultation, UK

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I. Introduction

Over the last couple of years, the UK has seemingly become fixated with broadband. Not only are many users unhappy with the broadband speeds that they are receiving,¹ but so too are many of the companies that provide broadband services as well as politicians (British Infrastructure Group, 2016; Whalley and Curwen, 2017). The recent debate regarding the status of Openreach illustrates both the highly charged nature of the issue, but also how socio-economically important broadband has become over the last couple of years. Recognising this, and reacting to widespread complaints regarding the speed of broadband in the UK, the government has sought to address the issue by announcing a broadband universal service obligation (Department for Culture, Media & Sport, 2015). This would make broadband available to everyone who asks, and is intended to be sufficiently fast at 10 Mbps to enable them to participate in the information based society and economy that is emerging.

The government's decision to have a broadband universal service obligation could be examined from a variety of perspectives, each of which draws on a different body of research. One way forward would be to analyse the obligation from a socio-economic perspective that recognises the significant and widespread advantages associated with broadband (see, for example, Ericsson, 2013; Gruber, Hatonen and Koutroumpis, 2014; Qiang, Rossotto and Kimura, 2009). This would touch on the digital divides that exist, in terms of access as well as devices and skills. Similarly, the government's policy could be examined from a traditional universal service perspective. This would draw on research that has investigated the development of universal service, either within a specific country such as the United States (see, for example, Mueller, 1997), Europe (see, for example, Batura, 2016a, 2016b) or Africa (see, for example, GSMA, 2014; ITU, 2013).

A third, less extensively adopted, perspective relates to the development and then functioning of the regulatory state that has emerged covering a range of utility sectors such as water and sewerage, telecommunications, rail, energy and airports. Not only does this involve the creation of sector specific regulatory bodies, but also a series of checks and balances that seek to ensure that the rules associated with competition and liberalisation are fairly and consistently implemented (House of Lords, 2004, 2007; Moran, 2003). Within this complex and dynamic system, consultations enable the views of stakeholders – consumers, companies, government bodies, pressure groups, lobbyists etc. – to be taken into account. Consultations are, in other words, integral to and a key component of the regulatory state.

While consultations occur across the whole of the UK's regulatory state, Ofcom arguably makes more use of them than many other regulatory bodies do. Rather than examine how Ofcom uses consultations in a general sense, our analysis here focuses on the broadband universal service

¹ Many websites now suggest how consumers can complain about the broadband services that they are providing. For example, Which?, the consumer association, provides extensive support as does Broadband UK and Broadband Choices. And newspapers regularly run articles on the issue.

obligation consultation to explore two key issues: who contributes and what do they say? With this in mind, the rest of the paper is divided into five main sections. In the first of these, the context of the replies is outlined before the methodology used to analyse the replies is detailed in Section 3. In Section 4, the findings are outlined in a series of sub-sections before being discussed in Section 5. In the final section of the paper, conclusions are drawn.

2. Context

In November 2015, David Cameron, the then Prime Minister, announced the government's intention to place broadband "on a similar footing as other basic services, giving everyone a legal right to request a 10 Mbps connection" (Department for Culture, Media & Sport, 2015). The Prime Minister also stated "access to the Internet shouldn't be a luxury, it should be a right – absolutely fundamental to life in 21st century Britain" (Department for Culture, Media & Sport, 2015). The government press release also drew attention to the broadband universal service obligation being a "safety net" as well, with the 10 Mbps speed proposed being sufficient according to Ofcom to enable a 'typical' household or small business to fulfil their needs.²

As expected, the announcement was long on rhetoric and short on details. This changed in early 2016 when the government published a consultation document laying out its approach (Department for Media, Culture & Sport, 2016a). After this short consultation period of just a few weeks closed, the government stated that it would use secondary legalisation to introduce the universal service obligation and delegate tasks to Ofcom (Rathbone, 2016).³ Hence, John Whittingdale, the Secretary of State for Culture, Media & Sport wrote to Sharon White, the chief executive of Ofcom, in late March 2016 with a request that it undertake research and development work that would flesh out what would constitute a broadband universal service obligation (Whittingdale, 2016). In April 2016 Ofcom launched its consultation that was structured around the following six areas:

- Specification and scope of the universal service obligation
- Demand for the universal service obligation
- Cost, productivity and efficiency of the universal service obligation

² While no explicit reference to an Ofcom report is made in the government's announcement, Ofcom (2015) does offer several possible reasons for the choice of 10 Mbps as the broadband universal service obligation. Firstly, at the time of the USO proposal in 2015, nearly half of rural premises enjoyed broadband access speeds of less than 10 Mbps (Ofcom, 2015, p 18). An infrastructure digital divide between urban and rural areas could and still can be observed. Secondly, users with a broadband connection below 10 Mbps are associated with lower rates of data consumption (Ofcom, 2015, p 23). This would appear to suggest that they are not participating in the online digital economy as extensively as they could be. Thirdly, Ofcom (2015) argues that faster speeds are associated with better consumer experience. With a 10 Mbps connection, a family of four could simultaneously stream a high definition video (6 Mbps), watch catch-up TV (2 Mbps), undertake a video call and browse the Internet (1.5 Mbps) and engage in basic web browsing (0.5 Mbps) (Ofcom, 2015, p 27).

³ In contrast, Department for Culture, Media & Sports (2016b) states that primary legislation will be used.

- The universal service provider or providers
- Funding of the universal service obligation and potential market distortions
- Review of the universal service obligation (Ofcom, 2016a)

The consultation closed in June 2016, with a summary of the replies being published in August of the same year (Ofcom, 2016b). In all, Ofcom received 115 responses, including some that were confidential, from companies, individuals etc. as well as 19 petitions with a total of 4,562 signatures (Ofcom, 2016b, p 29).⁴ Unsurprisingly, and as we shall demonstrate later on in this paper, these responses reflected a diversity of views regarding each of the six aforementioned areas. Having said that, Ofcom (2016c) was able to identify two different schools of thought regarding the broadband universal service obligation. Some respondents sought what Ofcom (2016c, p 4) describes as a “highly specified universal service for all” while others felt that it should provide individuals and businesses with a “safety net” that complements existing public and private initiatives.

Subsequent to the publication of this summary, Ofcom also published a considerably longer and more detailed discussion of the technical issues emanating from the provision of a broadband universal service obligation (Ofcom, 2016c). In this technical report, Ofcom explored the challenges that arise from providing broadband universal service under three different scenarios – standard broadband, a better specified broadband and superfast broadband.⁵

In parallel with Ofcom’s efforts, the Culture, Media & Sport Committee of the House of Commons also investigated broadband universal service (Culture, Media & Sport Committee, 2016), albeit as part of a wider exploration of how ‘world-class connectivity’ could be provided throughout the UK. While a high degree of overlap with the findings of Ofcom is inevitable, it is perhaps worth noting that they highlighted the complex and arguably contentious relationship between BT and other communication providers on the one hand and the cross-subsidization that occurs between different types of users and markets on the other (Culture, Media & Sport Committee, 2016, pp 37ff). Like the government, the committee favoured the universal service being funded through an industry levy, one they felt that *all* telecommunication companies should contribute towards (Culture, Media & Sport Committee, 2016, p 39).

The government has sought to enact the broadband universal service obligation in law. The Digital Economy Bill was included in the Queen’s Speech of 18 May 2016 (Rathbone, 2016), with its first reading in parliament occurring a few months later in early July (Jackson, 2016). As the Bill progressed through parliament, it was amended – in February 2017, the House of Lords, increased the

⁴ The non-confidential responses were published on the Ofcom website.

⁵ ‘Standard’ broadband equates to 10 Mbps download speed, while the better specified broadband includes an upload speed of 1 Mbps (Ofcom, 2016c, 2). Superfast broadband is characterised by 30 Mbps download and 6 Mbps upload speeds.

universal service obligation specifications to 30 Mbps download and 6 Mbps upload (Jackson, 2017a). Interestingly, government ministers argued that this change would contravene European Union directives that characterise universal service as a ‘safety net’ that sets a minimum broadband speed (UK Authority, 2017).⁶

Interestingly, both the 10 and 30 Mbps thresholds are significantly higher than those adopted in other European Union member states – Finland and Spain, for example, have set their broadband universal service obligations substantially lower at 1 Mbps (Davies, 2016). Less prominent in the discussion of the new higher broadband universal service was the increased costs of moving from 10 to 30 Mbps – it was estimated that a universal service obligation at 10 Mbps would cost up to £1.1 billion, compared to up to £2.1 billion for 30 Mbps (Jackson, 2017b).

The surprise announcement of a general election on the 18 April 2017 necessitated a ‘wash up’ period where those bills being considered by parliament were hastily discussed and agreed prior to parliament being dissolved through prorogation on 3 May 2017. As a consequence, some of the amendments made to the Digital Economy Bill were dropped – not only was the call for heightened Internet censorship dropped, but so was the proposed 30 Mbps broadband universal service obligation (Hansard, 2017; Jackson, 2017b).⁷ It is worth noting that in their opposition to the 30 Mbps proposal, the government reiterated their belief that such a speed would be subject to legal challenges on the one hand and that 30 Mbps was better than the majority of the country currently enjoyed (Hansard, 2017). It was, in other words, not a safety net as the government intended the broadband universal service obligation to be. The Bill received its Royal Assent on 27 April 2017 (Department for Media, Culture & Sport, 2017).

It is expected that Ofcom will report back on the operational details of the broadband universal service obligation by the end of 2017, with the scheme implemented from 2020 onwards (Jackson, 2017a).

3. Methodology

This paper draws on data from the replies made to the broadband universal service obligation consultation. This consultation was announced by Ofcom in April 2016, and closed in mid-June 2016 (Ofcom, 2016a). While a campaign was run by a lobbying organisation to encourage contributions, resulting in more than 90,000 email replies (Ofcom, 2016b), 110 substantive replies were submitted. These vary in length, from just a few words to 25 pages. In total, the submissions ran to more than 450 pages.

⁶ One peer, in his contribution to the debate, did note that the tension between European Union legislation and the higher 30 Mbps proposal would be removed once Brexit occurs (Hansard, 2017).

⁷ This is referred to as ‘ping pong’ as bills swiftly move between the Houses of Commons and Lords, with a series of compromises and trade-offs being agreed to ensure that the bill can be finalized and thus passed before the parliamentary session ends.

NVIVO 11, a qualitative software programme, was used to facilitate data analysis across the sample. This software has been used in a wide variety of contexts,⁸ and can include documents as well as videos and audio. Echoing Venkatraman (2013) and Welsh (2002) among others, NVIVO was used to ensure analytical consistency and provide an audit of how the analysis was undertaken.

Initially all of the submissions to the consultation were read by one of the authors. This ensured that all of the contributions did address the issue in question, namely, the proposed broadband universal service obligation. This also helped familiarise the initial coder with the content of the submissions (Kaplanidou, Al Emadi, Sagas, Diop and Fritz, 2016). These were then imported into NVIVO 11. Following Franks and Cohen (2012), coding was undertaken reflecting the following areas of interest:

- Who contributed to the consultation?
- Whether respondents agreed that the 10 Mbps suggested was appropriate?
- If, when and how the 10 Mbps obligation should be reviewed?
- How should the obligation should be funded?
- The technical characteristics of the obligation
- Who should provide the universal service obligation?

These areas of interest reflect both the questions raised in the consultation document (Ofcom, 2016a), as well as the range of technical factors that shape, to a lesser or greater extent, broadband consumer experience (Stocker and Whalley, 2017). Open coding was undertaken by both authors, with the codes discussed in an iterative fashion so that over time agreement was reached (Attar and Genus, 2014; Brodie, Illic, Juric and Hollebeek, 2013). A series of themes emerged from codes, which were then explored to identify interrelationships (Kaplanidou, Al Emadi, Sagas, Diop and Fritz, 2016).

4. Findings

In this section, the findings of our analysis are presented. Rather than present an exhaustive set of observations, the analysis focuses on a smaller set of issues that illustrate the complexity of universal service on the one hand and the intractable nature of the debate on the other. As a consequence, the first sub-section below addresses who replied to the consultation, with subsequent sub-sections focusing on the issue of whether 10 Mbps is sufficient, when the universal service obligation should be reviewed, how the obligation should be funded, its technical specifications and whether a company should be a designated provider.

⁸ NVIVO has been used in research examining, among other things, offshore wind in China (Korsnes, 2016), innovation at the ‘bottom of the pyramid’ in Bangladesh (Pansera and Owen, 2015), decision making in IT projects (Alkhuraiji, Liu, Oderanti and Megicks, 2016) and the creative industries (Wu and Wu, 2016).

4.1 Who contributes to the consultation?

110 unique responses were submitted to the consultation. It is possible to categorise these contributions in a variety of ways. The scope of the regulatory state could be drawn on to categorise contributions (Baldwin and Cave, 1999; Moran, 2003; Sutherland, 2016), enabling, for example, contributions to be divided into those originating from regulatory authorities as well as consumers (or their representative bodies) and the providers of telecommunication services. However, such a threefold division is problematic as it does not allow a distinction to be drawn between, for instance, the different parts of the regulatory state. Within the United Kingdom, telecommunications is a reserved matter, meaning that responsibility for it rests solely with Westminster (Tookey, Whalley and Howick, 2006). This has not, however, stopped the devolved administrations in Northern Ireland, Scotland and Wales from taking an interest in the provision of broadband (Sutherland, 2013 & 2017). Moreover, the threefold categorisation would not allow for a distinction to be drawn between pressure groups on the one hand and regulatory bodies on the other.

Given these limitations, a more nuanced categorisation approach is required. As a large number of individuals provided contributions to the consultations, they were grouped together in their own category. Similarly, a large number of contributions were made by companies and pressure groups. Together these three categories account for more than 80% of the contributions made to the consultation. The remaining contributions are divided across five different categories that reflect the wide socio-economic role of broadband. In all, eight categories – academics, companies, devolved administrations, local authorities, local initiatives, pressure groups, private individuals and regulatory bodies – were identified.

As can be seen from Table 1, the largest number of contributions were made by private individuals. These contributions vary in their length and detail, with many being rather short – the overwhelming majority of contributions are less than a page in length, with just one being six pages long.⁹ Regardless of their length and the level of detail in which they go, the contributions by private individuals highlight two issues: firstly, the socio-economic importance of broadband, and secondly, their dissatisfaction with the current state of affairs. The second largest group of contributions were made by companies. The ‘usual suspects’ can be found among the companies responding: large fixed operators like BT and Virgin Media replied, as did three mobile operators – Hutchison 3G UK, Telefonica and Vodafone – and vocal critics of BT like TalkTalk and Sky. Perhaps more surprisingly, three satellite companies – SES, Eutelsat and Satellite Internet – replied, as did MG Alba, the operator of BBC Alba in Scotland.

[Insert Table 1 about here]

⁹ Of the 49 contributions made by private individuals, 38 are less than page long. Five more contributions are less than two pages long, and three shorter than three pages. Just one contribution is four pages long, while two are five pages long and one response six pages.

The ‘Scottish Futures Trust’ also replied. This is a company, owned by the Scottish Government, with “responsibility for delivering value for money across public sector infrastructure investment” (Scottish Futures Trust, 2017). A second reply by a state-owned company was made by Ordnance Survey, the UK’s mapping agency.

The third largest group of responses were made by pressure groups. Given the nature of the consultation, it is little surprise that several contributions were made from pressure groups with an interest in rural issues. These contributions were made by the Action with Communities in Rural England (ACRE), National Farmers Union (NFU), National Farmers Union of Scotland and the Country Land and Business Association (CLA). Other contributions were made from pressure groups located, broadly speaking, in the information society – for example, the Foundation for Information Society Policy and Federation of Communication Services while others represent the interests of network operators – for instance, INCA and Rural Services Network. The final sub-category of pressure group contributions is those whose activities are influenced, to a greater or lesser extent, by the availability of broadband. One example here is the Royal National Institute for the Blind (RNIB) while others are Citizens Advice and the Federation of Small Businesses.

Five contributions were made by organisations associated with the regulatory regime. Interestingly while the Ofcom national advisory bodies for Northern Ireland, Scotland and Wales responded, the one for England did not. A joint submission to the consultation was made by The Communications Consumer Panel and the Advisory Committee on Older and Disable People, while another was made by the Broadband Stakeholders Group. The Broadband Stakeholders Group advises the UK government on broadband related matters (Broadband Stakeholders Group, 2017). Another five contributions were made by organisations associated with the devolved administrations. Two of these were made by the Scottish and Welsh Governments, while one came from Community Broadband Scotland.¹⁰ The remaining two contributions were made by the Consumer Council for Northern Ireland, and the Department of Enterprise, Trade and Investment in Northern Ireland.

The governance of the UK occurs at multiple geographical levels.¹¹ Northern Ireland is comprised of a series of districts, two of which – Fermanagh & Omagh and Mid-Ulster – responded, as did two English county councils – Kent and Shropshire. A rather short contribution was made by a body representing Greater Manchester,¹² while a single parish council, the smallest geographical unit

¹⁰ According to its website, the Community Broadband Scotland provides “advice, guidance and financial support to communities across Scotland as they pursue ... community-led broadband” (Community Broadband Scotland, 2017).

¹¹ For an overview of the structure of government within the United Kingdom, see, for example, <https://www.gov.uk/government/how-government-works>

¹² As this contribution does not clearly identify itself, it is not clear whether the local enterprise partnership or the metropolitan council were the author.

of administration, also submitted a response to the consultation. Thus, in total, six contributions by bodies operating at a sub-national level were made.

The penultimate category of responses are those made by broadband orientated local initiatives. Just three were made, one each from England, Northern Ireland and Scotland.¹³ Finally, there was a single academic contribution to the consultation.

4.2 Is 10 Mbps sufficient?

Given the prominence of 10 Mbps in the consultation, it is reasonable to expect that almost all of the replies would discuss, to a lesser or greater extent, whether or not it was sufficient. Quite surprisingly, this is not the case. In all, 69 replies addressed the issue of whether 10 Mbps is sufficient, though, as we shall see, not all of them did so in a clear or direct fashion.

Table 2 divides the replies into four different groups. Two groups, comprised of 34 replies, were supportive of the 10 Mbps, though it is worth noting those doing so while expressing their concerns outnumbered those who unreservedly supported the proposal. The third group, with 22 replies, identified in Table 2 is comprised of those who did not support the proposal, while the fourth and final group are those respondents whose answer was unclear. 13 replies can be found within this group. If we start with the first group, then support comes from largely from companies: Eutelsat, KCOM, SES, Satellite Internet and UK Broadband. While two of these are fixed operators, three – Eutelsat, SES and Satellite Internet – are satellite based providers of telecommunication services. This is, arguably, quite surprising though it perhaps reflects the desire of satellite providers to be visible in a discussion where their contribution is often dismissed for technical reasons surrounding latency as will be discussed in later sections. KCOM's contribution is interesting, not least because while agreeing with the 10 Mbps threshold they note that by 2020 they will have completed their current network investment programme with the consequence that none of their customers would receive speeds below 10 Mbps (KCOM, 2016, p 5ff). There is, in other words, no attempt to raise the threshold to a level that would place its rivals at a competitive disadvantage.¹⁴

[Insert Table 2 about here]

25 replies support the 10 Mbps threshold while expressing some form of reservation. Some replies accepted the 10 Mbps proposal, but suggested that it needed to be reviewed in the future (Consumer Council of Northern Ireland, 2016; Lansberry, 2016; Local Government Association,

¹³ These were, respectively, Moorsweb Community Broadband, Irish Central Border Area Network and High-speed Universal Broadband Services. As the second of these is a company, it could have been included in the 'company' category but given its remit it was felt that this allocation was more appropriate.

¹⁴ For example, rivals to the incumbent operators could argue that the obligation should fall solely on them due to their historic role in the fixed telecommunications market. This would, of course, place costs on them and undoubtedly distract their management in the process. Alternatively, the incumbents could seek to ensure that the obligation is funded by as many operators as possible, thereby reducing their own financial exposure to it.

2016; Meek, 2016; Miles, 2016; Scottish Government, 2016; Shropshire Council, 2016; Ordnance Survey, 2016; Rural Services Network, 2016; Scottish Futures Trust, 2016). In many respects, the broad thrust of these replies is captured by the Scottish Futures Trust (2016), who describes the 10 Mbps proposal as “an initial starting point” (p 3).

A second set of reservations can be observed around the technical specifications of the universal service obligation. ACRE (2016) noted that differences often exist between theoretical speeds and those that are actually delivered, while others (Local Government Association, 2016; Name withheld 13, 2016) highlighted the importance of upload speeds, arguing, in essence, that the suggested upload speed suggested in the consultation was too low. In contrast, Cisco (2016) drew attention to the availability of the 10 Mbps, noting:

“... agreeing that 10Mbps/second should be available for a minimum percentage of time and agreeing on a minimum upload speed to allow reliable bidirectional video conferencing, something that will become increasingly important for delivering health, education and other public services as well as flexible working” (Cisco, 2016, p 2).

By drawing attention to these services, Cisco (2016) stands in stark contrast to other respondents who argued that equating the proposed speed with the ‘essential participation’ of individuals in today’s information society should be treated with care (Broadband Stakeholders Group, 2016; CLA, 2016). What this means in practice is that ‘essential participation’ could be facilitated with broadband speeds slower or faster than the proposed 10 Mbps. In essence, it depends on defining what ‘essential participation’ means and then designing the universal service obligation accordingly.¹⁵ Virgin Media, in its contribution, circuitously illustrated this dilemma when observing that:

“... deriving a USO from an analysis of overall usage rather than specific activities effectively ensures that activities of little social value are facilitated, including ones that Government considers to be socially or economically deleterious” (Virgin Media, 2016, p 12).

Thus, defining ‘essential participation’ becomes central to determining what level the broadband universal service obligation should be set at. If, for example, ‘essential participation’ is deemed to be a set of relatively undemanding tasks then 10 Mbps may be appropriate, while, in contrast, if it includes more demanding (interactive) tasks then it may be too low.¹⁶ The latter would result in a higher universal service broadband speed, and thus enable individuals to engage in a mix of online activities that are likely to vary in the extent to which they are socio-economically beneficial.

¹⁵ MG Alba (2016), a content company, suggested that the speed should be determined by the content it delivers, noting that “minimum download speeds should be able to maintain video streaming services without buffering or displaying artefacts caused by slow connection speeds” (p 4). Of course, this raises another question, namely, what content (services) are essential to an individual’s socio-economic participation.

¹⁶ The Federation of Communication Services (2016, p 3) suggests that a “useful starting point” when determining what minimum speed is appropriate is the government’s ‘digital by default’ approach to the provision of public services.

In many respects, the contribution of BT brings together the reservations noted above. While the company states that it is willing to deliver a 10 Mbps universal service obligation (BT, 2016), it highlights a whole series of reservations that touch on the relationship between essential services, usage, future changes to the obligation and investment. They state that:

“It is therefore imperative that when considering the capabilities of any USO service, Ofcom take into account the types of usage considered necessary for a USO service that enables social inclusion, the current service specification needed to convey those services, AND how that specification is expected to change, both up and down (e.g. as a result of compression) over the investment period of any USO build” (BT, 2016, p 5).

In contrast to the 34 replies that supported, to a lesser or greater extent, the 10 Mbps proposal, 22 submissions opposed it. Although many of the submissions simply claimed that the 10 Mbps was too low and lacked ambition (Community Broadband Scotland, 2016; Federation of Small Businesses, 2016; Horne, 2016; Jack, 2016; Lee, 2016; Name withheld 1, 2016; Name withheld 6, 2016; NFU Scotland, 2016; Mid-Ulster District Council, 2016)¹⁷, some expressed their concerns very forcefully – B4RDS (2016, p 3) described the proposal as “rural digital apartheid” while both the Foundation for Information Society Policy and Sutter, a private individual, criticised the target as being reliant on BT’s existing infrastructure. The Foundation for Information Society Policy bluntly stated that:

“The provision of a 10Mb/s USO is technically unattainable and operationally unaffordable with only conventional ‘Fibre to the Cabinet’ solutions” (Foundation for Information Society Policy, 2016, p 4).

Several responses specified a speed that they felt was more appropriate. At the lower end of suggestions was Parle (2016), who suggested a download speed of 15 Mbps and, quite unusually, an upload speed of 3 Mbps. More common were suggestions between 20 and 25 Mbps (Name Withheld 4, 2016; Name Withheld 10, 2016; New Economy Greater Manchester, 2016) or those that approximate the target set by the Digital Agenda for Europe, that is, 30 Mbps (DETI, 2016; NFU, 2016; Newcastle Business School, 2016; Welsh Government, 2016).

Interestingly both OneWeb (2016) and TalkTalk (2016) suggested that a degree of flexibility was needed when determining the universal service policy to be adopted. TalkTalk suggested that flexibility was needed due to the variations in (local) circumstances that shape the availability and adoption of broadband:

“Rather than setting arbitrary national targets that will not be met universally, Government should instead consider funding more flexible interventions to address specific, local instances of market failure” (TalkTalk, 2016, p 3).

Although OneWeb (2016) broadly supports the notion of flexibility, its proposal is more detailed and suggests the adoption of a multi-tiered approach to broadband universal service. Urban areas would

¹⁷ Irish Central Border Area Network (2016) described the 10 Mbps proposed as a “sentiment” while the RNIB (2016) talked about “usable” broadband without explaining what they mean by this. Both of these contributions could be viewed as being critical of 10 Mbps.

be differentiated from rural and remote ones, each with their own universal service obligation, and a third, lower, obligation specified to address the issue of affordability:

“As such OneWeb believes that a two tier approach may be required whereby in Urban areas a USO of 30 Mbps (burst rate) and 10 Mbps sustained rate is easily achievable, while in hard to reach premises in Rural and Remote areas, the USO should not guarantee rates of 10 Mbps, but this would be the typical data rate for users, with the option for users to select a higher speed if they so choose, on a case by case basis” (OneWeb, 2016, p 6).

They continue:

“However, to ensure a very low cost USO affordable to all citizens in the UK, the Government may wish to consider a lower cost USO whereby the technical elements (speed, capacity) are more modest, for example perhaps a speed of 2 Mbps at capacity of 10 GB per month, but where it can be offered by urban service providers and OneWeb in rural and remote areas, free or for a few GBP per month, with a Government subsidy” (OneWeb, 2016, p 7).

Finally, it is worth noting that several responses questioned the legitimacy of focusing solely on speed. They either noted that throughput would constitute a more appropriate and precise measure than ‘speed’ (BitCommons, 2016), or that the consumer experience was shaped by a range of factors (Brightling Paris Council, 2016; Fraser, 2016; Predictable Network Solutions, 2016).¹⁸ Interestingly, BT (2016) stated that if the obligation focused solely on 10 Mbps then it could be delivered using a range of existing technologies, but this changes once other considerations – latency, guaranteed bandwidth etc. – are taken into account.

4.3 When should the universal service obligation be reviewed?

Although a large proportion of the replies discussed issues relevant to reviewing any universal service obligation that emerged from the consultation, only 35 replies explicitly addressed the issue and many of those did so in an unclear manner. Eleven replies stated when the obligation should be reviewed:

- Annually – ViaSat (2016)
- Every two years – ACRE (2016), Mid-Ulster District Council (2016)
- Every three years – Federation of Small Businesses (2016), Foundation for Information Society Policy (2016), Hyperoptic (2016), MG Alba (2016), Rural Services Network (2016), Consumer Panel & ACOD (2016)
- Every five years – Citizens Advice (2016), Name withheld 10 (2016)

In addition to these recommendations, the Scottish Government (2016) argued that the obligation should be “kept under regular review” while Shropshire Council (2016) preferred for it to be reviewed at “appropriate intervals” and Eutelsat (2016) at “on a regular period”. Grey Sky Consulting (2016) says that the review should happen within five-years, whereas Bennett (2016, p 1) suggests any

¹⁸ See, for example, Stocker & Whalley (2017) for a discussion of how consumer experience is shaped by a range of factors.

review should occur “in 5 to 10 years time”, a timing that is broadly in line with TalkTalk’s (2016, p 8) suggestion that the review should occur at the mid-point of the 2020-2025 parliament.

A substantial proportion of the remaining replies provided unclear responses, often referring to the rapid pace of change, both technically and in terms of consumer expectations (see, for example, B4RDS, 2016, or, ISPA, 2016), as well as linking the obligation to broadband speeds more generally (see, for example Advisory Committee for Scotland, 2016, or, Communications Consumer Panel and ACOD, 2016). The latter is integral to arguments that there is a danger that a static definition of the obligation will result in a widening digital divide between those receiving the mandated 10 Mbps and those who have access to more advanced and thus faster access technologies (see, for example, Welsh Government, 2016).

BT, in its contribution, notes that the EU Universal Service directive requires that it must be “reviewed periodically” (BT, 2016, p 5). This could, of course, be reasonably interpreted as suggesting that universal service obligation within the UK needs to be regularly reviewed. BT asserts that the more often a review occurs, the greater the likelihood that the specification of the obligation will increase and that the investment needed to provide the broadband will be affected. They write:

“A review process that does not enable a stable definition of the USO service over the investment period for USO solutions will mean that any USO deployment will have to be “over engineered” to cater for future reviews within the investment lifetime” (BT, 2016, p 19).

They continue:

“As a result, any review period within the expected pay back of the initial USO deployment will significantly increase the risk of/need for either further reinvestment as a result of the review or alternatively over-engineering of the initial solution to ensure it can cope with all likely review conclusions” (BT, 2016, 19).

Not only are these comments an attempt by BT to place the review period within a wider context, but they also highlight the complexity of initially defining the universal service obligation and then managing its delivery.

4.4 Who should contribute towards funding the obligation?

When it comes to deciding how the universal service obligation should be funded, two suggestions stand out among the comments that were made by respondents. The first of these is that the ‘industry’ should fund the obligation. While 12 respondents more or less wholeheartedly supported such a view, another two did so while expressing reservations. One individual respondent, albeit one who has experience of the telecommunications industry, stated that:

“It is fair to expect all industry players should contribute to a USO fund on an equitable basis, alongside a potential grant from government” (Radley, 2016, p 2).

The money raised by a levy on all telecommunications operators would be used to offset increases in the prices charged to end users for broadband services. This would, in other words, ensure that the

costs of broadband do not fall solely on those who are eligible for service provision via the universal service obligation. He states that:

“It is proposed that, for broadband, the increased price of service for end-users compared with what would normally be paid is funded by the USO fund. A typical figure could be say £25 extra per month - £300 per year. If 50% of the 200,000 took up the offer, that would amount to a total of £30M per year. The £30M per year would equate to a payment by the industry in to the USO fund of about 50p per year for each broadband fixed and mobile connection” (Radley, 2016, p 2).

The contribution by 3 UK, a mobile provider, casts doubt on the scope of the industry based fund suggested by Radley (2016). They note that the EU Universal Service Directive specifies that the obligation falls on fixed operators, before going on to argue that if the government does not wish to fund the obligation through general taxation then it should fall on fixed operators (3 UK, 2016, pp 2f).¹⁹ In particular, the cost of the obligation should fall on BT and, perhaps, Sky:

“Operators with the largest network reach have a natural competitive advantage. Costs within the telecoms industry are largely fixed, thus there are significant economies of scale advantages that can be achieved with large networks and large numbers of customers. In the UK we now have one dominate provider for both fixed and mobile services that dwarfs all the other operators with combined revenues in the region of £25 billion, the next largest operator being SKY with revenues a little higher than £7 billion” (3 UK, 2016, p 3).

Eight responses suggested that general taxation should fund the broadband universal service obligation – see Table 3 for details of who supported this suggestion. The Broadband Stakeholders Group (2016) stated that:

“If, as we believe, the USO is designed to be a safety net then should be considered a public policy objective worthy of Government funding” (Broadband Stakeholders Group, 2016, p 7).

While the Foundation for Information Society Policy (2016) arrives at the same conclusion, they argue that government funding is appropriate for economic reasons. TalkTalk (2016) states that the government should fund the obligation, possibly using some of the savings that it is expected to make through the move of services online. A related yet different argument is suggested by Sky (2016), who argue that regardless of who funds the obligation there is a danger that it will distort the market but then go on to state that:

“Where Government determines there is a substantial societal benefit only achievable through a USO-like intervention and requiring significant public funding, the most distortion-free approach to that funding is recognised to be general taxation” (Sky, 2016, p 6).

[Insert Table 3 about here]

The contributions of BT, Telefonica and Vodafone highlight the complexity of the issue. This is illustrated by Telefonica (2016), who stated that:

“The issue of how to fund a universal service obligation is not a trivial matter. In principle, different approaches can have implications for important factors such as: efficiency;

¹⁹ This point is also made by Telefonica (2016), another one of the UK’s mobile network operators.

competition; social equity; compatibility with state aid rules; transparency; practicability; proportionality; and certainty. In Telefonica UK's view, it is simply not acceptable to deal with these issues of substance in the dismissive approach apparently favoured by the Government" (Telefonica, 2016, p 3).

The complexity that Telefonica alludes to is evident in the contributions of both BT and Vodafone, contributions that unsurprisingly seek to advance their own interests. After asserting that any intervention could distort the market, BT (2016) goes on to suggest that:

"...creating the conditions for voluntary commercial investment will meet the goal of universal coverage more effectively, more economically and more quickly than creating legally enforced obligations" (BT, 2016, p 8).

Perhaps recognising that a 'laissez faire' approach to the issue is unlikely to be supported by the government, BT then suggests both a framework to guide the intervention as well as who should contribute to the funding needed to facilitate it. The framework identifies a series of challenges – financial, (un)certainly, deployment, policy and technological – that the response of BT addresses albeit not to the same extent. BT argues that the obligation should be funded from telecommunication companies drawn from across the whole industry, thereby including both mobile and cable operators and goes on to state that:

"A universally available service will also enable users to access services from a whole range of global, regional and national "over the top" providers such as Amazon Prime, Netflix, Skype, Facebook, Google, the BBC (iPlayer) and many others. Indeed the BBC licence fee funding was a significant contributor to the BDUK funding for Superfast in the final third. These are also within scope as potential contributors to USO funding, in our view" (BT, 2016, p 10).²⁰

While BT sought to cast a wide net regarding who should fund the universal service obligation, Bit Commons (2016) and Vodafone (2016) both argued for the need to treat the arguments that BT makes with caution. Bit Commons (2016, p 4) stated that it was "necessary to mistrust BT statements on costs", whereas Vodafone (2016, p 13) asserted that "experience has shown that BT has used any latitude in cost allocation and calculations to enrich itself". A broader point was made by INCA (2016) who stated:

"INCA members do not generally favour an industry-funded scheme, particularly if that means funding a competitor like BT" (INCA, 2016, p 2).

To counter the risks of BT being inappropriately funded, Vodafone (2016) asserts that:

"Self funding by BT should be considered before any external funding. BT's excess profits should be used to fund USO investments. Self funding also provides strong incentives for productively efficient outcomes. However, if the Government considers that external funding is required to support a broadband USO, in Vodafone's view it would be appropriate to use Government funding to do so. If the Government insists on that telecoms operators should

²⁰ A similar point, arguably made more directly, is raised by Sedlackova (2016, p 2) who stated "[t]here could be some new approaches to funding based on the fact of who is making money on the fact that people are on the network." Determining who is making money from the use of broadband services is, of course, not straightforward and would raise other challenges such as persuading non-UK based companies to contribute.

contribute, the funding should be on an equity investment basis, not an industry fund to primarily cash subsidise BT's P&L" (Vodafone, 2016, p 16).

This statement clearly ranks three funding alternatives, from the most to least attractive according to Vodafone: the first and preferred port of call for funding should be BT, followed by the government and, finally, industry. Vodafone's suggestion that industry should fund the broadband universal service obligation on an equity basis is unusual, but arguably reflects its desire to avoid the funding mechanism becoming a means through which one particular company – that is, BT – is financially rewarded. Moreover, it comes after the mobile operator details what it describes as a "rigorous approach" to identifying which areas are uneconomic and thus can be funded through the universal service obligation (Vodafone, 2016, p 15).²¹ Within this rigorous approach, the focus on the cabinet could reflect two issues: a desire to bring the improved infrastructure as close as possible to the end user, as well as to 'unbundle' the network so funding is limited in its scope.²²

ISPA (2016, p 3) notes that if the obligation is to be funded by industry, it is likely that any costs incurred will be passed onto consumers. Hence, it suggests that if the government does not want to increase costs for consumers then it should examine the existing regulatory environment and lessen the financial burden that this imposes on companies.²³ Finally, Hyperoptic (2016) suggested that operational expenditure must consider the 'fibre tax'.²⁴

4.5 Technical specifications

While the universal service obligation target of 10 Mbps is, in itself, a contentious issue that was discussed provocatively in the consultation replies, additional considerations with respect to the technical specifications of the target were addressed, to a more or less explicit extent, by a number of replies. 17 replies refer to the universal service obligation as a "safety net", 11 replies refer to "decent" broadband and 30 replies refer to the "reliability" of broadband services. This emphasizes that there is more to the universal service obligation and its technical specification than just the 10 Mbps proposed.

²¹ In all, Vodafone (2016) outlines seven parts to its rigorous approach to determining whether an area is uneconomically to be served and thus eligible for support. The first of these focuses on the business model for the area claiming support, and seeks to ascertain whether infrastructure provision is uneconomic or not. The next four issues identified by Vodafone (2016) relate to the costs incurred, in terms of both specifying which costs should and should not be covered as well as how they should be billed. The sixth issue noted by Vodafone is that BT should only be able to claim support from the fund *if* it provides products on a bitstream basis, while the final issue relates to equity investment if industry funds the infrastructure.

²² Virgin Media (2016, p 23) wrote that "we suspect that the costs of the USO are known only to BT", so by 'unbundling' the network Vodafone could shed light on the cost structure of BT. This would, of course, enhance its ability question the assertions and claims made by BT in the regulatory debates that occur.

²³ In particular, ISPA (2016) draws attention to the 'wayleave process' with the consequence that it is reasonable to assume that this is of particular concern for its members.

²⁴ Telecommunications operators are currently subject to a fibre tax – see, for example, Fildes (2016). It is, however, not clear what Hyperoptic (2016) means when stating that this tax needs to be taken into account.

A first group of 38 replies referred to the symmetry of broadband speeds or upload speeds. While the degree of detail within individual replies varies considerably, the general consensus among the replies is that upload speeds should not be ignored in the universal service obligation specification. For example, Eutelsat (2016) claims that in order:

“[T]o address Internet trends, with increased user-generated traffic, we also believe it is relevant to have minimum upload speeds of 4Mbps” (Eutelsat, 2016, p 1).

While MG Alba (2016, p 4) supports this claim, Name Withheld 10 (2016, p 1) introduces a dynamic interpretation and claims “that upload speeds should be at least half of the download speed”. Similarly, Shropshire Council (2016, p 2) suggests “to consider a split obligation between download and upload speeds at a ratio of 4:1 minimum”. Other replies more generally emphasize the growing importance of upload speeds for applications like video conferencing via Skype (cf. Name withheld 3, 2016, p 1), file sharing (cf. Rural Services Network, 2016, p 1) or cloud services (cf. New Economy Greater Manchester, 2016, p 1; Reed, 2016, p 1). In contrast, UK Broadband (2016) notes that they:

“do not think that any minimum specifications in terms of upload, latency, jitter or contention are necessary or appropriate, as these are not currently required under broadband advertising rules” (UK Broadband, 2016, p 2).

This last reply raises further issues with respect to the quality of data transmission and additional metrics like latency (that is, the round-trip delay) or jitter. Several replies emphasize the relevance of additional metrics beyond speed and recognize their (potential) impact on broadband consumer experience. As a consequence, it is often argued that additional metrics should be considered within the universal service obligation specification. While it is thus rather surprising that only 16 replies explicitly mention “Quality of Service” or “QoS”, a larger group of 36 replies refer to related metrics delay/latency. Jitter (that is, variations in delay) is mentioned in 13 replies, and packet loss rates are referred to in another 4 replies. As expected, replies considerably vary with respect to their level of detail as well as precision in their arguments. A majority of relevant replies rather vaguely mentions or refers to the role of latency and that it should not be ignored in specifying the universal service obligation. In contrast, some replies proactively propose specific targets for latency levels. For example, Reed (2016) states that:

“as far as latency is concerned anything above around 75ms for applications such as gaming and video calling results in less than desirable outcomes, so I would suggest latency is considered a key part of the USO and is set at a suitable level for these types of application” (Reed, 2016, p 1).

Similarly, stringent target levels for latency are proposed by Brightling Parish Council (2016, p 1) who emphasize “that one of the criteria for “decent service” should be a latency of less than 100 ms.” The same target is mentioned by High-Speed Universal Broadband Services (2016, p 2). Other

replies refer to less stringent maximum levels of 300 ms (cf. Name Withheld 12, p 2)²⁵ or 500 ms (cf. Name Withheld 16, p 1) respectively. A different approach is suggested in the reply by B4RDS (2016). They propose and outline a gradual reduction of latency targets for the universal service obligation specification so that, by 2030, they envisage latency levels below 50 ms (cf. B4RDS, 2016, pp 6f). Similar level of detail is missing in the replies referring to jitter or packet loss rates. Instead, corresponding comments are rather general and refrain from mentioning specific parameter values.

The fact that different broadband access technologies typically have different characteristics (for example, shared versus dedicated capacities) and thus heterogeneous capabilities with respect to the QoS levels they can provide raises another question, namely, whether the universal service obligation should adopt a technology neutral perspective. The specification of additional metrics within the USO may have a significant impact on whether all access technologies that are capable of delivering speeds of 10 Mbps actually fall within the scope of the universal service obligation or not. In this context, a group of 25 replies referred to technical or technological neutrality. Although related discussions are prone to touch on a variety of contexts ranging from QoS to affordability and procurement, multiple replies explicitly voiced their preference for a USO specification that in principle comprises all available broadband access technologies – wired and wireless – capable of delivering 10 Mbps. Some of these replies, however, included some (slight) relativizations, or are even opposed to specific access technologies. For example, UK Broadband (2016, p 2) states:

“The obligation to deliver should of course be technology neutral, so that not only fixed wireless, satellite and copper technologies can be used, but also mobile services that are capable of providing the minimum specified service” (UK Broadband, 2016, p 2).

While Moorsweb Community Broadband (2016, p 1) similarly states that “[A]ny USO does, of course, need to be technologically neutral”, Cisco (2016, p 1) recognizes that “[T]here are a range of technologies that can deliver these services and we support technology-neutral policies in this respect”. High-Speed Universal Broadband Services (2016, p 2) supports these views and argues that “[A]ny mechanism for implementing the USO must be technology neutral.” New Economy Greater Manchester (2016, p 2) argues that “[I]n particular where a USO is enforced it must be technology neutral since favouring one technology over others would inevitably distort market driven solutions.” Slight relativizations are made by BT (2016, p 12) who state that “we believe that a goal for a scheme is that it should be technology neutral as far as possible”. Similarly, Citizens Advice (2016, p 8) notes that “[I]t is also important here (as far as possible) to avoid any measures which breach the principle of technology neutrality”.

In the context of technological neutrality, the role of wireless and satellite draw a significant amount of attention as demonstrated by the number of respondents. A group of 34 replies addressed

²⁵ The author of this reply very precisely specifies this latency target as “latency to any UK IXP shall not be more than 300ms” (Name Withheld 12, 2016, p 2).

the role of fixed and mobile wireless broadband access technologies in the context of the universal service obligation. While some respondents recognize and describe complementarities arising between wireless access technologies (based on, for example, 4G, 5G or WiFi) and the upgrading of fixed network capacities (see, for example, Advisory Committee for Wales, 2016, pp 1f; Cisco, 2016, p 2; Citizens Advice, 2016, p 2; Radley, 2016, pp 1f; Scottish Futures Trust, 2016, pp 3f; Telefonica, 2016, p 2),²⁶ others critically discuss the (limited) capability of wireless to meet more stringent requirements with respect to available speeds and additional metrics (BitCommons, 2016, p 2; BT, 2016, pp 2/15).²⁷ As it turns out, the role of satellite seems to be the more contentious issue. This should come as no surprise as, adding to the potential problems arising from the shared capacities that inherently characterize both wireless and satellite service provision, the key factor is the latency problem that inherently arises in satellite communications due to the typically long distances signals need to travel – especially in the case of geostationary satellites. While satellite technology is mentioned in 53 replies, 14 replies express reservations, slight or strong, against satellite or even oppose satellite altogether as being a legitimate technology to be included in the USO. For example, B4RDS (2016) notes:

“Satellite latency is determined by the distance to the satellite and is often of the order of 1200 milliseconds. Recently launched near earth orbit satellites can deliver 600 to 900 milliseconds latency, but this will still make interactive applications like VoiP and Skype almost unusable” (B4RDS, 2016, p 6).

Brightling Parish Council (2016) states, in accordance with their claim for a 100 ms latency target as mentioned above, that:

“Having spoken to several people who have tried so-called satellite broadband, and read comments from many more, I do not believe that satellite can provide a “decent broadband service”, mainly because of the latency problem” (Brightling Parish Council, 2016, p 1).

Similar objections arise based on the observation that the more stringent the requirements with respect to additional metrics, the less likely is to be satellite within the scope of the universal service obligation. BT (2016) even introduces a hierarchy of different access technologies and argues:

²⁶ For example, Cisco (2016, p 2) emphasizes complementarities with respect to physical network infrastructures and notes that “to deliver connectivity to a cellular transmitter or Wi-Fi transmitter, robust fixed networks are needed.” Telefonica (2016, p 2) describes a different type of complementarity and remarks that “if mobile networks operators were incentivised by Government and regulatory policy, to roll out their networks more extensively, it is likely that the demand for (potentially a higher cost) broadband universal service obligation would be lower than would otherwise be the case. The government and Ofcom should, therefore, consider how policy in areas beyond the proposed USO could be adjusted”.

²⁷ Beyond potential issues with respect to wireless signal transmission, BT emphasizes the problems associated with the shared capacity paradigm that underlies mobile broadband technologies. They state that “[T]his shared capacity leads to the possibility of high peak rates being available when the network is quiet but significantly reduced sustained rates if the network is busy with simultaneous heavy data use (e.g. streamed video)” (BT, 2016, p 15).

“The more the specification requires; in terms of committed or guaranteed bandwidth, download capability (e.g. unlimited volume) latency, upload speed or ability to meet rising requirements over time, the more technical options will be removed from viability, with satellite likely to fall out of scope first then most likely wireless/mobile options due to the shared access capability, followed by copper and potentially even hybrid copper networks until in extremis only full FTTP networks might be acceptable” (BT, 2016, p 2).

In anticipation of what they perceive as overly stringent requirements with respect to QoS parameters like latency, other replies, especially those by companies related to satellite-based broadband access, note that corresponding targets would lead to a de facto exclusion of satellite access technologies from the universal service obligation. For example, Satellite Internet (2016) argues that:

“if too much significance is placed on other desirable but unnecessary factors mentioned (such as latency and jitter, for example), then there is a major risk of delivery technologies (such as satellite broadband) being excluded” (Satellite Internet, 2016, p 1).

Other replies, however, explicitly or implicitly suggest that satellite broadband transmission and latencies incurred are sufficient to meet the requirements of most (relevant) applications and thus are suitable for a USO (cf. Eutelsat, 2016, p 1; One Web, 2016, p 6; ViaSat, 2016, p 6). One Web (2016) further points out advances in satellite communication technology and elaborates on the variety of technologies available. They state that:

“latency will vary from satellite system to another and for many interactive applications user experience will be greatly enhanced with LEO satellite systems [...] LEO based broadband systems instead have a latency that is dramatically reduced to about 30 to 50 ms and user experience will be equivalent in most cases to that of terrestrial broadband internet” (OneWeb, 2016, p 2).

4.6 Who should be the designated universal service obligation provider?

Three replies – Irish Central Broadband Area Network, Virgin Media and Vodafone – suggested that BT should be the designated universal service provider, with almost as many – Grey Sky Consulting and INCA – stating that it should not be BT. That BT has been proposed is unsurprising, especially when its nationwide geographical reach of the company is taken into consideration. While INCA (2016) suggests BT should not simply be designated as the provider, the competitive process it advocates does leave open the possibility that the incumbent could become, in time, the provider. Grey Sky Consulting (2016) identified a different reason why BT should not be the universal service obligation provider:

“If BT were the single designated USP, then every service provider considering building infrastructure in rural areas would know that the USO would fund BT to over-build their infrastructure to deliver USO services – and hence allowing BT to build out infrastructure to compete throughout their area” (Grey Sky Consulting, 2016, p 6).

Grey Sky Consulting (2016, p 6) goes on to suggest that “lots” of providers could be designated, with each possibly corresponding to a local authority. Designating multiple providers is, perhaps surprisingly, the most common reply – in all, nine replies suggested either regional – CLA,

High-speed Universal Broadband Services, DETI, Scottish Futures Trust and TalkTalk – or ‘several’ – Name withheld 6, NFU Scotland, OneWeb and Rural Services Network – providers. OneWeb (2016), among other things, highlights the importance of a competitive designation process enabling market forces to unfold and thus resulting in a competitive outcome:

“OneWeb would support a USO regime which permits any provider to become a USP, or at least would promote multiple USP’s so that the Government benefits from the forces of competition. A USP should encompass a variety of technologies, including satellite solutions. This will ensure that hard to reach and far remote rural areas can also covered” (OneWeb, 2016, p 9).

Interestingly, TalkTalk (2016, p 3) suggests that one benefit of designating multiple universal service obligation providers is that this would facilitate the tailoring of broadband provision to local circumstances. While this may appear appealing at first glance, it is not clear from their response how this would be achieved in practice.

BT raises two issues as it addresses the designation process. Firstly, the incumbent wonders how a broadband universal service provider can be identified when the purpose of the universal service obligation remains unclear (BT, 2016, p 15). Secondly, BT highlights the role of European Union directives in shaping who will be the designated universal service obligation provider:

“The actual designation process for USO however, as opposed to the who is technically best placed to deliver is covered in the EU directive as is the process of determining benefits and the extent to which any designated USO provider can recover those benefits” (BT, 2016, p 18).

BT is, quite surprisingly, alone in highlighting the role of the European Union. They go on to state that designation should not happen in those cases where a reversed auction does not result in a company being appointed as the universal service obligation provider.²⁸ While designation should thus be voluntary and not imposed, BT (2016, p. 18) further emphasizes the need for mandating universal service obligation providers to “cover all areas” in order to prevent opportunistic cherry picking behaviour.

Surprisingly the Foundation for Information Society Policy (2016) writes that the designation should be time limited, with a decade being proposed. A decade, however, stands in stark contrast with the much shorter universal service obligation review periods noted above, though it may reflect the economics of building and then operating infrastructure in remote and rural areas and further mitigates uncertainties.

Both Sky and the Welsh Government argue that the universal service provider should act at the wholesale level. On closer examination, Sky’s argument (2016, pp 3/6) is based on a myriad of risks of market distortions that they anticipate if specific companies operating at the retail level are

²⁸ Although BT mentions an auction process, it is not clear from its submission to the consultation what this would entail.

designated. Both Sky (2016, p 6) and the Welsh Government (2016, p 3) emphasize the importance and role of service based retail competition.

3 UK (2016) states, in line with the rest of its submission, that the universal service obligation provider should be a fixed infrastructure operator.

5. Discussion

In the previous section, we outlined the responses made in six areas to the broadband universal service obligation consultation. These responses demonstrated not only the scope of replies made, but also quite vividly the contradictory nature of many of the positions taken by respondents. Given the diversity of replies, identifying key themes is not straightforward. The replies could, for instance, be characterised as a series of games – one game is being played out between BT and its rivals, while another is occurring between the providers and users of broadband telecommunication services. Not only are these games characterised by the desire to moderate expectations and shift costs, but also by the frustration that many feel at the current state of broadband in the UK. Although a degree of frustration is observable among the replies made by companies, it is particularly evident across the replies from individuals and, to a lesser extent, those from pressure groups.

Rather than explore these essentially political games, which can only be satisfactorily resolved through government intervention, our starting point is technological in nature. To start with, it needs to be recognized that different broadband access technologies considerably vary with respect to, firstly, the maximum and symmetry of data rates (or, ‘speeds’) they can provide, secondly, whether access capacities are dedicated or shared between different end users which affects available data rates – especially in peak times, and thirdly other metrics such as delay, jitter or packet loss rates that describe the stability and reliability of services these access technologies deliver. While from a holistic perspective, seemingly homogenous access technologies thus reveal rather heterogeneous performance capabilities, they also differ substantially in their cost characteristics, that is, the incremental costs of connecting additional end users may vary considerably. The corresponding costs may be influenced by a host of factors like the access technology under consideration, density economies, but also quite significantly by the current state of network deployment. In general, without taking into account further requirements, a ‘plain vanilla’ interpretation of the 10 Mbps, as suggested for the broadband universal service obligation of 10 Mbps, enables a number of access technologies such as (hybrid) fibre (that is, FTTx), mobile wireless (for example, 4G), or satellite to be used. Thus, along the lines of the proposition of technological neutrality, it may seem reasonable to combine different technologies together to deliver the broadband universal service obligation. Finding the optimal mix of access technologies that eventually deliver the universal service obligation, however, needs to take into account the current state of network deployments, subsequent cost characteristics as well as potential path dependencies with respect to network investments that may eventually shape the evolution of broadband networks.

When analysing those regions where existing fixed-line (broadband) infrastructures are not available, satellite access technologies, especially the new generation of low earth orbit (LEO) satellites that have started to become available, may provide an attractive option. Although the positioning of corresponding satellites may help to overcome many of the traditional problems associated with satellite based communication services, generic limitations associated with capacity sharing among large numbers of people that are simultaneously using satellite services may ‘naturally’ target the use of satellite towards rather small numbers of users located in the more rural and remote areas.

But, if satellite should be chosen to serve (parts of) rural and remote areas, with what other technology should satellite be combined with? Given the widespread arguments of fibre as a ‘future proof’ technology, combining satellite with fibre would appear to be a plausible combination. The expansion of fibre networks can be used to connect end users via new generations of mobile wireless access technologies. It is in this context, however, necessary to be cautious regarding the extent to which wireless technologies can already provide broadband in rural and remote areas. Although considerable progress has been made in the geographical expansion of 4G services, no operator is currently available in 28% of the country (Ofcom, 2016d, p 2), while in 16 % of the country no 3G or 4G services are available. Considerably smaller, however, is the number of premises in the UK that are not covered by mobile broadband access via 3G or 4G.²⁹ As some areas and users do not have access to appropriate mobile wireless services, two questions arise: which alternative technologies can be used? And, will extensive fibre investments become inevitable?

Emphasizing the role of fibre leads to the emergence of another question: why adopt a universal service obligation of 10 Mbps when fibre enables considerably faster broadband speeds to be delivered? In other words, the inclusion of fibre inherently challenges the mandated universal service obligation speed of 10 Mbps and subsequently raises a follow-up question: should the speed be improved as the network access infrastructure becomes ever reliant on fibre?³⁰ In answering these questions, the symbiotic relationship as well as the division of labour between industrial policy that aims at proliferating the widespread deployment of and affordable access to high-capacity broadband (for example, as part of the Digital Agenda for Europe) to foster socio-economic benefits (see, for example, European Commission, 2016) and the broadband universal service obligation as a ‘safety

²⁹ According to Ofcom (2016d), the number of indoor premises not covered by any 4G operator is 4%. When combined with 3G, this figure falls to just 2%.

³⁰ The current situation, which combines fibre with metallic copper or coax to serve end user premises, would be replaced by one that extends fibre closer to end users, thus reducing the distance signals need to travel via metallic (that is, FTTC via copper or coax) cables, the air (in case of wireless mobile like 4G), or even directly connecting premises via fibre (that is, FTTB or FTTH). Given the cost implications of connecting individual premises with fibre, key buildings in rural and remote communities such as the church or pub could, for example, become focal points for fibre. Serving as hubs, metallic cables or wireless technologies could then be used to connect individual premises.

net' gain importance. While both mechanisms inherently differ in their goals, their legislative foundations they stand on and the immediacy with which targets are implemented, the more ambitious the universal service obligation targets are set, the more may their goals converge and the lines between the mechanisms blur. The underlying reason for this is elaborated below.

Another way to interpret the views expressed as part of the broadband universal service obligation consultation is that a series of dynamic relationships exist. As describe above, adopting a 'plain vanilla' universal service obligation of 10 Mbps means that it can be delivered by a range of existing technologies. But, as the technical specifications become more stringent – reduced latency, less jitter and so forth – then the technological choices available to deliver the universal service obligation change. In effect, a hierarchy of technological solutions becomes relevant. That is, the more diverse and stringent additional technical specifications are, the more is the proposition of technological neutrality challenged. While satellite is becoming less suitable, solutions increasingly reliant on fibre gain importance. Consequently, the ever-increasing reliance on fibre not only suggests that 10 Mbps may be a target well exceeded by the relevant technologies' capabilities, but also that the costs associated with the obligation will increase. Firstly, the closer that fibre is brought to the end user, the more expensive will the provision of the universal service obligation be. Secondly, as fibre is brought closer to the end user and broadband speeds potentially increase, the range of services available to end users widens. As a result, the obligation is no longer concerned with the relatively limited range of services highlighted in Ofcom (2015) but instead it is widened to include more data intensive services so that the digital divides that would have existed under the 10 Mbps obligation decline.

Similarly, if the obligation is interpreted as fulfilling a need shaped by today's online activities, then one set of technological choices, which combine satellite with fibre and other technologies, emerge as a relatively cost effective and quick solution. However, as the relevant time frame lengthens and the expectations of what users should be able to undertake online changes, the technological solutions available also change with the costs increasing as a result. In other words, if the obligation moves from fulfilling today's online requirements to positioning the UK for the future, then not only does the obligation inevitably increase but the technological choices available to fulfil it is narrowed and can be expected to converge to more fibre-centred strategies. Significantly, the obligation will also increase – in terms of both the speed provided but also additional technical characteristics of the service – as a more future orientated stance is adopted.

As the obligation changes, the costs associated with it will change accordingly. While the expenditure required to provide 10 Mbps to everyone who requests such a connection are not insignificant, implementing a more ambitious and progressive broadband universal service obligation that is 'future proof' in a way that future demands are anticipated will, of course, be considerably more expensive. While some respondents may find it reasonable to place the burden of providing the

obligation on former incumbent BT, as the obligation moves away from its current somewhat limited definition towards being more ambitious than the case for funding through alternatives mechanisms – for example, through a universal service fund fuelled by industry wide levies, or general taxation – may become stronger. This, however, raises a whole series of related issues such as the scope and design of industry wide contributions or whether it is appropriate to subsidise the provision of a service that can have multiple uses, some of which may be deemed inappropriate by society.³¹

If the government opts for an industry wide levy and thus sector internal financing, it runs the risk of the decision being challenged by telecommunication companies, especially mobile ones, who feel that the financial burden should lie elsewhere. Conversely, if the government opts to fund the obligation through general taxation, then the available funds may be limited by austerity. That the National Infrastructure Commission has highlighted the importance of the government making a decision by the end of 2017 (National Infrastructure Commission, 2017) could be interpreted as a not so subtle attempt to encourage the government to avoid delaying legal challenges from operators and fund the obligation itself.

6. Conclusion

This paper has focused on the universal service obligation consultation in the UK, identifying who contributed to it and exploring what they said in their submissions. Through this analysis, which was facilitated using NVIVO, we have highlighted the diversity of submissions: not only were submissions received from individuals as well as pressure groups and companies, but they raised a myriad of views that often failed to settle on a consensus regarding what should be done in the UK. Quite simply, these responses highlight the challenges associated with designing and then implementing a broadband universal service obligation.

The challenges reflect the complexity of the task at hand. Traditionally, universal service was associated with a single, purpose built, technology. Voice telephony, which was for many years the focus of universal service, was delivered through a dedicated network that effectively bound the service and the infrastructure together. In contrast, broadband acts as a platform that enables users to access an evolving array of different services ranging from surfing the web or email, to video streaming services and online gaming to new services emerging in the context of the Internet of Things.³² Corresponding services are diverse in nature, and, as such, are characterized by a variety of

³¹ If broadband were treated like a utility similar to gas, electricity, water and sewerage then the case for financial support from general taxation is arguably strengthened given the role that the state has played in these other industries, albeit sometimes quite a few years ago. By the same token, however, as these utilities are almost ubiquitous in their coverage, some premises are not connected to the gas or electricity networks and use other sources of fuel, then not every household or business should be provided with a broadband connection on the same terms.

³² In this context, broadband may be considered as an enabler of general purpose technologies (GPTs) (OECD, 2007, p. 8). Bresnahan and Trajtenberg (1995, p. 84) originally describe GPTs as being “characterized by the potential for pervasive use in a wide range of sectors and by their technological dynamism. As a GPT evolves

heterogeneous requirements with respect to bandwidth and QoS. As a result, the relevant range of services and activities that are facilitated by broadband is dynamically evolving and considerably wider than that of voice telephony.

The fact that broadband facilitates a diverse and evolving array of activities is a key source of the complexity faced. The proposed 10 Mbps broadband universal service obligation acts as a ‘safety net’ that ensures all within society are able to access a basic set of ‘desirable’ Internet services, but the definition of what these are is inevitably subjective. Moreover, determining the bundle of services on the one hand and resolving issues on how to provision and configure the relevant broadband infrastructure to provide access to these services on the other are subject to the games played by stakeholders. Some of these games may aim to shape the infrastructure in a way that the mix of relevant access technologies that shall be deployed is influenced, while others could focus on determining what services are desirable and should be accessible for everyone. Not only are these games inherently dynamic, played out among numerous, often competing, stakeholders in the same area, but they influence one another as well: determining a set of desirable services everyone needs to have access to will influence the infrastructure choices to be made, and vice versa. And, of course, games are played out over time where data consumption increases and both the range of relevant services as well as their QoS requirements change one year to the next.

Arguments for a limited or a more ambitious broadband universal service obligation blur the distinction between industrial policy and the regulation of the telecommunications sector. This further complicates the task of designing and then implementing the universal service obligation. Politics is at the heart of the discussion in the UK, yet the regulatory regime that has emerged since the industry was first opened up to competition has been shaped by the desire to remove politics from what is, after all, a key strategic industry. The blurring of politics, regulation and industrial policy is reflected in the National Infrastructure Commission (2017) highlighting the need for a decision to be made before the end of 2017.

Once a decision is made, whether it is by the end of the year or not, it will be possible to compare the contributions with the broadband universal service obligation scheme that will be implemented in the UK. Such a comparison will shed light on who has been listened to in the consultation, and perhaps more importantly who has not been listened, and thus whether it is possible to influence governmental and regulatory decision making through the consultation process. This suggests one area of further research, while a second relates to the split between services and

and advances it spreads throughout the economy, bringing about and fostering generalized productivity gains. Most GPT's play the role of ‘enabling technologies’, opening up new opportunities rather than offering complete, final solutions.” Knieps and Bauer (2016, p. 32) further state that “[T]he convergence towards all-IP networks has rendered the distinction between telecommunication infrastructure and the Internet untenable as both are seamlessly integrated. Instead all-IP network infrastructures are better conceptualized as GPTs.”

infrastructure that characterises broadband. One issue that requires further clarification is what services are essential to an individual's or company's socio-economic participation, not only today but also in the near and longer term future. Related to this is a second area of future research, namely, what technologies are best placed to deliver the broadband obligation. This would build on Stocker and Whalley (2017) and include a more explicit temporal dimension in the analysis.

References

- 3 UK (2016) *Designing a new broadband USO obligation – call for inputs*, 28 June, www.ofcom.org.uk
- ACRE (2016) *Consultation response from Action with Communities in Rural England (ACRE)*, www.ofcom.org.uk
- Advisory Committee for Scotland (2016) *ACS response to the Ofcom designing the broadband universal service obligation call for inputs*, www.ofcom.org.uk
- Advisory Committee for Wales (2016) *Advisory Committee for Wales – Input. Universal service obligation broadband (USOB)*, www.ofcom.org.uk
- Alkhurairji, A., Liu, S., Oderanti, F.O. and P. Megicks (2016) New structured knowledge network for strategic decision-making in IT innovative and implementable projects, *Journal of Business Research*, 69 (5), 1534-1538
- Attar, A. and A. Genus (2014) Framing public engagement: A critical discourse analysis of GM Nation?, *Technological Forecasting and Social Change*, 88, 241-250
- B4RDS (2016) *Response by B4RDS (Broadband for Rural Devon & Somerset) to the OFCOM consultation on: “Designing the Broadband Universal Service Obligation”*, www.ofcom.org.uk
- Baldwin, R. and M. Cave (1999) *Understanding regulation – theory, strategy and practice*, Oxford University Press: Oxford, UK
- Batura, O. (2016a) *Universal service in WTO and EU law – Liberalisation and social regulation in telecommunications*, Springer: The Hague, The Netherlands
- Batura, O. (2016b) Can a revision of the universal service scope result in substantive change? An analysis of the EU’s universal service review mechanism, *Telecommunications Policy*, 40 (1), 14-21.
- Bennett, S. (2016) *No title*, www.ofcom.org.uk
- Bit Commons (2016) *The Bit Commons response to Ofcom’s call for inputs – Broadband USO*, www.ofcom.org.uk
- Bresnahan, T.F. and M. Trajtenberg (1995) General purpose technologies: Engines of growth?, *Journal of Econometrics*, 65 (1), 83-108.
- Brightling Parish Council (2016) *Designing the broadband universal service obligation*, www.ofcom.org.uk
- British Infrastructure Group (2016) *Broadbad*, January, www.britishinfrastructuregroup.uk
- Broadband Stakeholders Group (2016) *Broadband Stakeholder Group response to Ofcom’s call for input on designing the broadband universal service obligation*, www.ofcom.org.uk
- Broadband Stakeholders Group (2017) *About us*, www.broadbanduk.org
- Brodie, R.J., Illic, A., Juric, B. and L. Hollebeek (2013) Consumer engagement in a virtual brand community: An exploratory analysis, *Journal of Business Research*, 66 (1), 105-114
- BT (2016) *BT Response to the Ofcom call for inputs on: “Designing the broadband universal service obligation”*, www.ofcom.org.uk
- Cisco (2016) *Ofcom call for inputs: Designing the broadband universal service obligation Response from Cisco*, 24 June, www.ofcom.org.uk

Citizens Advice (2016) *Citizens Advice response to Ofcom consultation seeking inputs into the consultation on the broadband universal service obligation (uso)*, 23 June, www.ofcom.org.uk

CLA (2016) *Consultation response. Designing the broadband universal service obligation call for inputs*, 23 June, www.ofcom.org.uk

Community Broadband Scotland (2016) *Community Broadband Scotland (Dr Zoe Laird). Response to: Designing the broadband universal service obligation – Call for inputs*, www.ofcom.org.uk

Community Broadband Scotland (2017) *About us*, www.hie.co.uk

Consumer Council of Northern Ireland (2016) *Designing the broadband universal service obligations - Call for inputs. PID Reference: PD20010 2585*, www.ofcom.org.uk

Consumer Panel and ACOD (2016) *Communications Consumer Panel and ACOD response to Ofcom's call for inputs into designing the Universal Service Obligation for Broadband*, www.ofcom.org.uk

Culture, Media & Sport Committee (2016) *Establishing world-class connectivity throughout the UK, Second report of Session 2016-17*, 13 July, House of Commons, www.parliament.uk

Davies, R. (2016) *Broadband as a universal service*, European Parliamentary Research Service, April, PE581.977, www.europarl.europa.eu

Department for Culture, Media & Sport (2015) *Government plans to make sure no-one is left behind on broadband access*, 7 November, www.gov.uk

Department for Culture, Media & Sport (2016a) *A new broadband universal service obligation consultation*, 23 March, www.gov.uk

Department for Culture, Media & Sport (2016b) *New broadband universal service obligation consultation – summary of responses and government responses*, 17 May, www.gov.uk

Department for Culture, Media & Sport (2017) *Digital Economy Bill receives Royal Assent*, 27 April, www.gov.uk

DETI (2016) *No title*, 5 May, www.ofcom.org.uk

Ericsson (2013) *Socioeconomic effects of broadband speed*, Research by Ericsson, Arthur D Little and Chalmers University of Technology, www.ericsson.com

European Commission (2016) *Review of the scope of universal service – Final report*, European Commission, 30 September, <https://publications.europa.eu>

Eutelsat (2016) *Designing the broadband universal service obligation*, www.ofcom.org.uk

Federation of Communication Services (2016) *A broadband universal service obligation – consultation response*, 19 June, www.ofcom.org.uk

Federation of Small Businesses (2016) *Universal service obligation: Call for inputs*, June, www.ofcom.org.uk

Fildes, N. (2016) UK telecoms groups furious over rise in business rates, *Financial Times*, 30 September, www.ft.com

Foundation for Information Society Policy (2016) *A broadband universal service obligation – consultation response*, 19 June, www.ofcom.org.uk

- Franks, D.M. and T. Cohen (2012) Social licence in design: Constructive technology assessment within a mineral research and development institution, *Technological Forecasting & Social Change*, 79 (7), 1229-1240
- Fraser, J. (2016) *Broadband universal service obligation*, www.ofcom.org.uk
- Grey Sky Consulting (2016) *Designing the broadband USO*, www.ofcom.org.uk
- Gruber, H., Hatonen, J. and P. Koutroumpis (2014) Broadband access in the EU: An assessment of future economic benefits, *Telecommunications Policy*, 38 (11), 1046-1058
- GSMA (2014) *Sub-Saharan Africa universal service fund study*, GSMA: London, UK
- Hansard (2017) *Digital Economy Bill*, 27 April, volume 782, www.hansard.parliament.uk
- High-speed Universal Broadband Services (2016) *Response to Ofcom on the consultation on: Designing the broadband universal service obligation*, www.ofcom.org.uk
- Horne, A. (2016) *No title*, www.ofcom.org.uk
- House of Lords (2004) *Select Committee on the Constitution, The Regulatory State*, 2003-04, www.parliament.uk
- House of Lords (2007) *Select Committee on Regulators, UK Economic Regulators*, 2006-07, www.parliament.uk
- Hyperoptic (2016) *Hyperoptic's response to designing the broadband universal service obligation call for inputs*, www.ofcom.org.uk
- Independent Networks Co-operative Association (INCA) (2016) *Response to: Designing the broadband universal service obligation - Call for inputs*, www.ofcom.org.uk
- Irish Central Border Area Network (2016) *ICBAN's Response to Ofcom's call for inputs – broadband USO*, www.ofcom.org.uk
- ISPA (2016) *ISPA response to Ofcom USO response*, www.ofcom.org.uk
- ITU (2013) *Universal Service Fund and Digital Inclusion for all Study*, ITU: Geneva, Switzerland
- Jack, W. (2016) *No title*, www.ofcom.org.uk
- Jackson, M. (2016) New UK Digital Economy Bill details broadband USO and Internet changes, *ISP Review*, 5 July, www.ispreview.co.uk
- Jackson, M. (2017a) UK House of Lords vote for 30 Mbps broadband USO with 6Mbps uploads, *ISP Review*, 22 February, www.ispreview.co.uk
- Jackson, M. (2017b) Internet censorship, 10 Mbps USO and more – Digital Economy to pass, *ISP Review*, 26 April, www.ispreview.co.uk
- Kaplainidou, K., Al Emadi, A., Sagas, M., Diop, A. and G. Fritz (2016) Business legacy planning for mega events: the case of the 2022 World Cup in Qatar, *Journal of Business Research*, 69 (10), 4103-4111
- KCOM (2016) *KCOM's response to Ofcom's call for inputs to assist in the designing the broadband universal service obligation*, www.ofcom.org.uk
- Knieps, G. and J.M. Bauer (2016). The industrial organization of the Internet, in, Bauer, J.M. and M. Latzer, Editors, *Handbook on the Economics of the Internet*, Edward Elgar: Cheltenham, UK.

Korsnes, M. (2016) Ambition and ambiguity: Expectations and imaginaries developing offshore wind in China, *Technological Forecasting & Strategic Change*, 107, 50-58

Lansberry, P. (2016) *No title*, www.ofcom.org.uk

Lee, S. (2016) *No title*, www.ofcom.org.uk

Local Government Association (2016) *LGA submission to Ofcom's - Call for inputs on the design of the broadband universal service obligation*, June, www.ofcom.org.uk

Meek, A. (2016) *No title*, www.ofcom.org.uk

MG Alba (2016) *Ofcom consultation on broadband universal service obligation (USO) Submission by MG ALBA*, 23 June, www.ofcom.org.uk

Mid-Ulster District Council (2016) *Mid Ulster District Council's consultation response to designing the broadband universal service obligation*, June, www.ofcom.org.uk

Miles, P. (2016) *Designing the broadband universal service obligation*, www.ofcom.org.uk

Moorsweb Community Broadband (2016) *Response to Designing the broadband universal service obligation – call for inputs*, www.ofcom.org.uk

Moran, M. (2003) *The British regulatory state – High modernism and hyper-innovation*, Oxford University Press: Oxford, UK

Mueller, M. (1997) *Universal service – Competition, interconnection and monopoly in the making of the American telephone system*, MIT/AEI: Cambridge, Mass

Name withheld 1 (2016) *No title*, www.ofcom.org.uk

Name withheld 3 (2016) *No title*, www.ofcom.org.uk

Name withheld 4 (2016) *No title*, www.ofcom.org.uk

Name withheld 6 (2016) *No title*, www.ofcom.org.uk

Name withheld 10 (2016) *No title*, www.ofcom.org.uk

Name withheld 12 (2016) *No title*, www.ofcom.org.uk

Name withheld 13 (2016) *No title*, www.ofcom.org.uk

Name withheld 16 (2016) *No title*, www.ofcom.org.uk

National Infrastructure Commission (2017) *Post-election statement – Priority actions for government*, 26 June, www.nic.org.uk

Newcastle Business School (2016) *Response to the designing the broadband universal service obligation – call for inputs*, www.ofcom.org.uk

New Economy, Greater Manchester (2016) *Response to: Designing the broadband universal service obligation - Call for inputs*, www.ofcom.org.uk

NFU (2016) *NFU Consultation Responses – Designing the universal service obligation*, www.ofcom.org.uk

NFU Scotland (2016) *Designing the broadband universal service obligation*, 22 June, www.ofcom.org.uk

OECD (2007) *Broadband and the Economy*, Ministerial Background report, DSTI/ICCP/IE(2007)3/Final

Ofcom (2015) *Connected Nations*, 1 December, www.ofcom.gov.uk

- Ofcom (2016a) *Designing the broadband universal service obligation – Call for inputs*, 7 April, Ofcom, London
- Ofcom (2016b) *Designing the broadband universal service obligation – Summary of responses to the call for inputs*, 16 August, Ofcom, London
- Ofcom (2016c) *Achieving decent broadband connectivity for everyone – Technical advice to UK government on broadband universal service*, 16 December, Ofcom, London
- Ofcom (2016d) *Connected Nations*, 16 December, Ofcom, London
- OneWeb (2016) *Response from OneWeb to Ofcom's call for input on broadband universal service obligation (USO)*, 22 June, www.ofcom.org.uk
- Ordnance Survey (2016) *Response to: Designing the broadband universal service obligation - Call for inputs*, www.ofcom.org.uk
- Pansera, M. and R. Owen (2015) Framing resource constrained innovation at the 'bottom of the pyramid': Insights from an ethnographic case study in rural Bangladesh, *Technological Forecasting & Social Change*, 92, 300-311
- Parle, M (2016) *No title*, www.ofcom.org.uk
- Predictable Network Solutions (2016) *Response to "Designing the Broadband Universal Service Obligation"*, 23 June, www.ofcom.org.uk
- Qiang, C., Rossotto, C.M. and K. Kimura (2009) Economic impacts of broadband, in, World Bank, *Information and communications for development 2009*, World Bank: Washington DC, USA
- Radley, P. (2016) *Response to the OFCOM consultation on - Designing the broadband universal service obligation*, www.ofcom.org.uk
- Rathbone, D. (2016) *Superfast broadband coverage in the UK*, 4 July, House of Commons Library, www.parliament.uk
- Reed, D. (2016) *No title*, www.ofcom.org.uk
- RNIB (2016) *Response from Royal National Institute of Blind People*, www.ofcom.org.uk
- Rural Services Network (2016) *Consultation response from the Rural Services Network*, www.ofcom.org.uk
- Satellite Internet (2016) *Response to the designing the broadband universal service obligation – Call for inputs*, www.ofcom.org.uk
- Scottish Futures Trust (2016) *Designing the broadband universal service obligation, SFT Response*, June 2016, www.ofcom.org.uk
- Scottish Futures Trust (2017) *About us*, www.scottishfuturestrust.org.uk
- Scottish Government (2016) *Ofcom – Designing the broadband universal service obligation*, www.ofcom.org.uk
- Sedlackova, O. (2016) *Designing the broadband universal service obligation – Call for inputs*, www.ofcom.org.uk
- Shropshire Council (2016) *Consultation on "Designing the broadband universal service obligation. Shropshire Council response to Ofcom*, 22 June, www.ofcom.org.uk
- Sky (2016) *Sky's response to Ofcom's call for inputs on designing the universal service obligation*, www.ofcom.org.uk

- Stocker, V. and J. Whalley (2017) Speed isn't everything: A multi-criteria analysis of the broadband consumer experience in the UK, *Telecommunications Policy*, forthcoming
- Sutherland, E. (2013) Independence and the regulatory state – Telecommunications in Scotland and the rest of the United Kingdom, *Telecommunications Policy*, 37 (11), 1046-1059
- Sutherland, E. (2016) Broadband and telecommunications markets – policy, regulation and oversight, *Parliamentary Affairs*, 69, 387-408
- Sutherland, E. (2017) The implications for Brexit for the governance of telecommunications markets in the United Kingdom, *Digital Policy, Regulation & Governance*, 19 (1), 2-20
- TalkTalk (2016) *Designing the broadband universal service obligation. TalkTalk response to Ofcom's April 2016 call for inputs*, 30 June, www.ofcom.org.uk
- Telefonica (2016) *No title*, www.ofcom.org.uk
- Tooke, A., Whalley, J. and S. Howick (2006) Broadband diffusion in remote and rural Scotland, *Telecommunications Policy*, 30 (8-9), 481-495
- Venkatraman, M. (2013) Consuming digital technologies and making home, *Journal of Business Research*, 66 (12), 2626-2633
- ViaSat (2016) *USO OFCOM consultation – Comments input by ViaSat to support the universal service obligation (USO) consultation high capacity satellite (HCS) broadband*, www.ofcom.org.uk
- Virgin Media (2016) *Designing the broadband universal service obligation: Call for Inputs*, www.ofcom.org.uk
- Vodafone (2016) *Vodafone non-confidential version*, 24 June, www.ofcom.org.uk
- UK Authority (2017) *Lords send broadband plan back to government*, 23 February, www.ukauthority.com
- UK Broadband (2016) *Designing the broadband universal service obligation – UK Broadband's response to Ofcom's call for inputs*, www.ofcom.org.uk
- Welsh, E. (2002) Dealing with data: using NVIVO in the qualitative data analysis process, *Forum: Qualitative Social Research*, 3 (2), Art 26, May
- Welsh Government (2016) *Ofcom: Designing the broadband universal service obligations. Welsh Government response*, www.ofcom.org.uk
- Whalley, J. and P. Curwen (2017) From phones to football: The changing strategic focus of BT, *Telematics & Informatics*, 34 (5), 789-809
- Whittingdale, J. (2016) *Letter to Sharon White, Chief Executive of Ofcom*, 22 March, CMS 281201/DC, www.ofcom.org.uk
- Wu, Y. and S. Wu (2016) Managing ambidexterity in creative industries: A survey, *Journal of Business Research*, 69 (7), 2388-2396

Table 1: Who contributed to the consultation?

Category	Number	Examples
Academic	1	Newcastle Business School
Companies	23	BT, Eutelsat, Sky, SSE, TalkTalk, Vodafone, Virgin Media
Devolved administrations	5	Scottish Government, Welsh Government
Private individuals	49	Dr Coates, Mr Miles, Dr Radley, Mr Sedlackova
Local authorities	5	Brightling Parish Council, Fermanagh & Omagh District Council, Kent County Council, Mid-Ulster County Council
Local initiatives	4	Irish Central Border Area Network, Moorsweb Community Broadband
Pressure groups	18	ACRE, Age UK, FSB, Local Government Association, Rural Services Network
Regulatory bodies	5	Advisory Committee for Wales, Broadband Stakeholders Group

Table 2: Is 10 Mbps sufficient?

Replying			
Yes (9)	Yes, but... (25)	No (22)	With an unclear answer (13)
Mr Booth, Eutelsat, Fermanagh & Omagh District Council, Mr Goode, KCOM, Mr Patterson, SES, Satellite Internet, UK Broadband.	ACRE, Arqiva, Broadband Stakeholders Group, CLA, Cisco, Consumer Council for Northern Ireland, Consumer Panel & ACOD, Grey Sky Consulting, Hyperoptic, Mr Lansberry, Local Government Association, Ms Meek, Mr Miles, Moorsweb Community Broadband, Name withheld 13, Mr Napier, Ordnance Survey, Mr Rix, Rural Services Network, Scottish Futures Trust, Scottish Government, Shropshire Council, Sky, ViaSat, Virgin Media.	B4RDS, Community Broadband Scotland, Foundation for Information Society Policy, FSB, Mr Horne, Dr Jack, Mr Lee, Mid-Ulster District Council, Name withheld 1, Name withheld 4, Name withheld 6, Name withheld 10, New Economy Greater Manchester, Newcastle Business School, NFU, NFU Scotland, NI DETI, OneWeb, Mr Parle, Dr Sutter, TalkTalk, Welsh Government.	BT, Bit Commons, Brightling Parish Council, Citizens Advice, FCS, Mr Fraser, High Speed Universal Broadband Services, INCA, Irish Central Border Area Network, ISPA, MG Alba, Predictable Network Solutions, RNIB.

Table 3: Who should fund the broadband universal service obligation?

Replying		
Industry (14)	Taxation (10)	With an unclear answer (15)
Advisory Committee for Scotland, Advisory Committee for Wales, Brightling Parish Council, Citizens Advice, Fermanagh & Omagh District Council, Mr Fraser, KCOM, Kent County Council, Local Government Association, Mr Radley*, Scottish Government, Shropshire Council, Welsh Government, 3 UK*	B4RDS**, Broadband Stakeholders Group, Foundation for Information Society Policy, Hyperoptic, ISPA**, Mr Napier, NFU Scotland*, OneWeb, Sky, TalkTalk	BT, Bit Commons, Cisco, Grey Sky Consulting, High-speed Universal Broadband Services, Mr Horne, INCA, Name withheld 12, Newcastle Business School, Rural Services Network, Scottish Futures Trust, Telefonica, Mr Sedlackova, UK Broadband, Vodafone

Notes: *with reservations, **implied

Table 4: BT's funding principles

<ul style="list-style-type: none"> • Sufficient cash can be generated to fund the investment (cash-flow challenge)
<ul style="list-style-type: none"> • Sufficient return can be generated over a reasonable period to make the investment worthwhile and to reflect market and execution risks (profitability challenge)
<ul style="list-style-type: none"> • Sufficient confidence that the framework will be stable for many years reflecting the long payback periods required (certainty challenge)
<ul style="list-style-type: none"> • Sufficient confidence in market demand, particularly at higher prices (market challenge),
<ul style="list-style-type: none"> • The ability to aggregate premises together to share build costs and plan network rollout over a realistic timeframe (deployment challenge) – meaning that some may need to wait for deployment to reach them
<ul style="list-style-type: none"> • Equitable across industry, to avoid distorting a successful market and to ensure that currently planned commercial investments continue, and equitable for end-customers (policy challenge)
<ul style="list-style-type: none"> • Flexibility to allow commercial decisions on the right technology to deliver 10Mb/s where needed; for example, using fibre, wireless or satellite as appropriate (technology challenge)

Source: BT (2016)