

Funding fibre

Bringing fast, affordable broadband
to the whole of the UK

Scott Corfe
Richard Hyde
Kathryn Petrie

SMF

**Social Market
Foundation**

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For Everyone

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EXECUTIVE SUMMARY

High speed broadband has risen up the political and policy agenda over the past year. Prior to becoming Prime Minister, Boris Johnson set out his ambition to deliver “full fibre broadband to every home in the land” by 2025.¹ The Conservative Party’s 2019 General Election manifesto reiterated this commitment. The 2020 Budget confirmed that the Government intends to provide £5bn of support for the rollout of gigabit-capable broadband in the most difficult to reach 20% of the country, as well as confirming the government’s intention to legislate to ensure that new build homes are built with gigabit-capable broadband.

The timeline and extent of high speed broadband coverage set out by the government is ambitious; analysis undertaken in this report shows that at present full fibre to the premises (FTTP) broadband coverage stands at just 14% across the country as a whole, highlighting the mountain to be climbed. Analysis in this report also shows the UK lagging far behind other economies on FTTP broadband penetration, including Spain, New Zealand and South Korea.

Reflecting this substantial commitment made by government, this Social Market Foundation report explores the current broadband landscape in the UK and the extent to which policy and regulation are well-equipped to meet government ambitions. We also explore the policy landscape in other countries, and provide a number of recommendations for consideration.

The costs of FTTP rollout

The costs of full FTTP penetration are likely to be significant. One estimate suggests the costs are about £30 billion. Much of the cost of rolling out FTTP will come from private investment. However, costs of FTTP rollout are particularly high for hard-to-reach households and businesses in remote and rural areas. It has been estimated that providing FTTP to the “final 10%” of UK households will cost about £4,000 per premises. This compares to costs of £300-£400 for the first 50% of premises.

Potential issues with the current and proposed policy landscape for FTTP rollout

The costs of full fibre rollout raise a number of questions about how this should be financed.

The recent easing of wholesale price controls for Openreach has been justified on the basis that this will support higher levels of investment in the telecommunications infrastructure needed to achieve greater FTTP penetration. Ofcom’s proposed regulatory regime beyond 2021 also implies a use of higher wholesale prices to incentivise investment in fibre broadband. However, it has been argued that this approach might undermine competition in the broadband market. There are also questions over the extent to which this approach will meet the government’s ambitions of nationwide full fibre coverage by 2025, or whether incentives to invest in full fibre are too weak.

It is also important to consider the distinction between full fibre *coverage* and *usage* of the broadband speeds that it offers. Without significant usage of high-speed full fibre broadband, its economic benefits will be limited – consumers and businesses must,

therefore, want to purchase full fibre services, which requires the right products to be offered at the right price points.

This report raises a number of concerns with current plans to incentivise and promote rollout of gigabit-capable internet across the UK:

- **We are concerned that the future regulatory framework set out by Ofcom will provide insufficient safeguards for UK consumers going forward.** Ofcom is proposing to ease charge controls in areas where it deems there is “potential” for network competition to emerge. However, the *potential* for competition does not guarantee the *emergence* of competition in an area, meaning that price controls could be lifted prematurely.

Further, the number of infrastructure providers in an area is a poor gauge of underlying retail competition in the broadband market and likely impacts on consumer outcomes. Consumer switching rates in the broadband market remain low, suggesting a high proportion of disengaged consumers. Such a market lends itself to poor consumer outcomes, where consumers are unlikely to switch provider even in the face of price rises. There are thus clear risks from price deregulation that occurs prior to competition being established.

The easing of wholesale price controls for Openreach has been justified on the basis that this will support higher levels of investment in the infrastructure needed to achieve greater full fibre penetration. However, a number of internet service providers have argued that this might undermine competition in the broadband market. This could occur if the easing of price controls leads to higher retail broadband charges from companies other than BT that use the Openreach network. With BT and Openreach owned by the same parent company, BT’s broadband charges could be kept down, hindering the ability of other firms to compete and gain market share.

- **More needs to be done by central and local government to reduce the costs of full fibre rollout, and in turn the costs faced by households and businesses from the rollout.** This includes improving the efficiency of street works and using the planning system to make it easier to install and improve telecommunications infrastructure in premises.
- **Another concern that we have with the proposed policy framework is the lack of focus on demand management, to reduce risks of investment in fibre and other gigabit capable connectivity.** This is despite the fact that stimulating demand for full fibre broadband reduces the rollout risk for infrastructure providers and therefore strengthens investment incentives. The case of South Korea, discussed in this report, highlights the benefits that can be realised from government being proactive in encouraging demand for broadband services.
- **Question marks remain over consumer outcomes if and when the copper telecommunications network is retired.** Ofcom has acknowledged that the retirement of the copper network carries potential risks to consumer welfare. This includes risks to those reliant upon analogue telephony services, such as care alarms. In addition, standard broadband customers affected by the retirement of copper will have to migrate to a new full fibre service, which may be more expensive despite those

customers having limited interest in the higher speeds and additional bandwidth capacity offered by full fibre services.

Policy recommendations

To ensure consumers are protected:

1. **Dynamic regulation** - Ofcom should adopt a more dynamic approach to regulation, that proactively monitors the effectiveness of broadband competition in an area, and ensures that price controls are not eased prematurely. Assessments of the strength of broadband competition in an area should also reflect the behaviour of consumers, including customer switching rates. If consumer engagement remains relatively low, as is the case at present, the easing of wholesale charge controls risks translating into higher prices and a loss of consumer welfare.
2. **Equalities and affordability impact assessment** - Ofcom should set out how it will protect customers in a new broadband regime and publish an equalities impact assessment illustrating how the new regime will impact households at different points of the income distribution. This must be based on realistic assumptions around customer switching rates, and reflect the fact that a significant segment of consumers is unlikely to switch even in the event of higher prices. The assessment should show clearly how the affordability of broadband, for households of different incomes, is likely to change under the new regime.

To reduce the costs of gigabit broadband rollout:

3. **Digital champions** - Government should adopt the approach suggested by the National Infrastructure Commission of appointing local authority digital champions. These champions would act as a single point of contact for telecommunications companies in local areas, and create efficiencies in processes such as granting permission for street works. The Digital Champion should also seek to coordinate broadband infrastructure work with other street work such as those related to the water and gas networks. The potential for street work cost sharing should bring down some costs of fibre rollout, reducing the financial burden on consumers.
4. **New build policy** - Government should require new buildings, such as apartment blocks, to have easy-access telecommunication ducts, reducing barriers to accessing premises and providing fibre connectivity. In addition, the Government should pursue its intention to legislate to ensure that new homes are built with gigabit-capable broadband from the outset, as reiterated in the March 2020 Budget.
5. **Technology agnosticism** - Government and regulators should maintain a technology agnostic approach to gigabit-capable rollout, which acknowledges the potential case for alternative technologies such as 5G and coaxial cables to provide high speed connectivity more cost effectively than fibre, in some instances.

To strengthen fibre investment incentives and reduce uptake risks:

6. **Government purchasing of full fibre** - Central and local government should commit to purchasing full fibre broadband services, as a means of providing some certainty of demand for such products. This should be complemented with efforts to demonstrate the benefits of full fibre broadband to businesses and consumers. Government should also use full fibre to push forward household and business use of e-government services.
7. **Expanded role for government** - Examine the case for an expanded role for government in managing the uptake risks of rolling out full fibre broadband, including through adopting an approach similar to the Local Fibre Companies of New Zealand, where government and the private sector have shared risks. Departure from EU rules following Brexit, including state aid rules, opens up the possibility for such models to play a role in the rollout of fibre broadband across the UK.

Following future retirement of copper-based broadband services:

8. **Strengthening of consumer safeguarding following retirement of the copper network.** Current proposals to safeguard consumers following the retirement of the copper network need to be strengthened, with Ofcom requiring Openreach to provide new anchor products at speeds greater than 40/10 Mbit/s. Providing more anchor products will ensure consumers are able to access the right broadband services, at the right price points following copper retirement – and prevent consumers being “pushed” onto more expensive ultrafast broadband services. Government and Ofcom should work together to understand more about this group, how it will evolve over time and any additional support it may require.

CHAPTER 1 - INTRODUCTION

In 2018, the National Infrastructure Commission (NIC) – which was set up to address the problems with long term infrastructure investment planning the UK – set out its core proposals for the next 10 to 30 years, one of which was nationwide full fibre broadband by 2033.² The NIC stated that whilst present broadband connectivity is enough given existing levels of demand, demand is rapidly increasing and superfast broadband may not be sufficient for the future. The report states that investment must start now to save the UK from being left behind other countries.

Full fibre broadband has a range of benefits including download speeds up to 1 Gb per second. It has also been shown to be more reliable with five times fewer faults than copper connections. It is also cheaper to run, with the NIC suggesting fibre would save up to £5bn in operating costs over 30 years.³ The way consumers are using the internet is changing with increased use of online streaming services and content-rich websites. People and businesses expect more from their broadband and need a reliable and stable broadband service.⁴

The current coronavirus crisis, and the economic lockdown it has brought about, has seen huge numbers of workers and businesses working from home. Even as the lockdown is lifted, we are likely to be entering a world where home working is much more prevalent. Lockdown has demonstrated that, for many businesses, new ways of working are possible: a world of flexible and remote working, videoconferencing, and employee collaboration from afar. Lockdown has essentially provided a “proof of concept” and some businesses will change their ways of working on a permanent or semi-permanent basis as a result. With remote working on the rise, having high quality and affordable broadband to households across the country has never been more important.

Under Boris Johnson, the UK Government has committed to providing full fibre (“fibre to the premises”, FTTP) broadband to all households across the country. In their 2019 manifesto the Conservative Party stated that “we intend to bring full fibre and gigabit capable broadband to every home and business across the UK by 2025”.⁵

Many providers are already rolling out full fibre across the UK. For example:

- Openreach’s Fibre First program aims to rollout full fibre to 3 million UK homes and small businesses by 2020, with a target of 10 million by 2025.⁶
- CityFibre and Vodafone announced plans to rollout full fibre to 5 million homes and businesses by 2025.⁷
- FibreNation is set to rollout full fibre to 3 million homes and businesses in medium sized towns across the UK.⁸
- Virgin Media plans to reach 15 million premises by 2021.⁹
- Hyperoptic plans to reach 5 million premises by 2025. In August 2018 it announced plans to extend its full fibre network to 50 towns and cities.¹⁰
- KCOM has achieved full fibre availability across its network.¹¹

However, despite these existing plans, question marks remain over the extent to which ambitions for nationwide full fibre broadband will be realised. Ofcom believes that without

regulation in the market there will not be sufficient investment, and has proposed a future regulatory framework aimed at encouraging full fibre rollout. As we discuss in this report there are questions to be asked around the adequacy of this regulatory framework, and the risk of consumer detriment in the broadband market from, for example, higher prices. Such risks are particularly pertinent if, as at present, lack of competition pervades elements of the broadband market.

Whilst the ambition of nationwide gigabit broadband coverage has been made clear by the Government, there are questions about how much this will cost and how this should be financed. To what extent should government foot some of the bill? Or should this largely be left in the hands of telecommunications companies and, ultimately, consumers who would pay for full fibre rollout in their telecom bills? Is there a risk that some financing proposals will undermine competition in the broadband market, leading to worse outcomes for households and businesses? This report aims to address these questions – examining the current policy landscape for rolling out gigabit capable connectivity, and considering the case for further policy innovation to meet government objectives in an equitable way.

The report is split into the following chapters:

- **Chapter 2** describes the current state of the broadband market in the UK.
- **Chapter 3** looks at current proposals and regulations to incentivise the rollout of full fibre broadband, including the likely cost of rollout.
- **Chapter 4** examines the international policy landscape, contrasting the UK's approach to full fibre rollout with that seen abroad.
- **Chapter 5** sets out recommendations for policymakers, informed by the preceding analysis.

CHAPTER 2 - THE CURRENT STATE OF THE BROADBAND MARKET

This chapter of the report focuses on the current state of the UK's broadband market – the service offered to consumers, access to “fast” broadband services and the average cost of broadband by different demographics.

Broadband speed and access

At present, not all households or businesses have the same quality of broadband available across the UK. The broadband available is highly dependent on where you live in the country, the quality of infrastructure and the main provider of services.

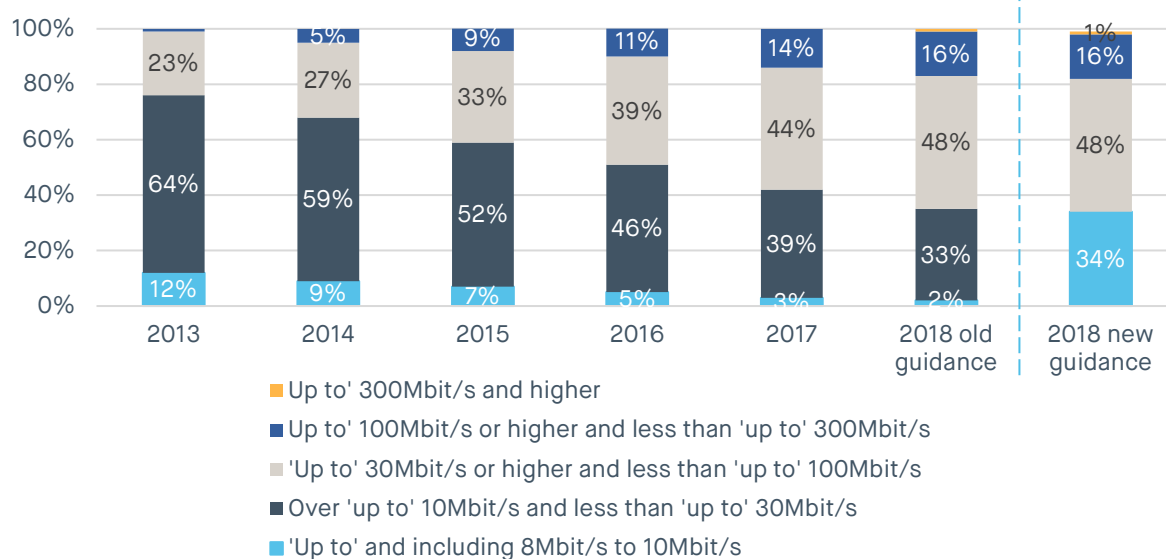
Broadband access

Broadband types are separated into several different categories, this includes standard broadband, superfast broadband, ultrafast broadband and full fibre broadband. The most common broadband type is superfast broadband, which is defined by download speeds of 30 Mbit/s and above. Superfast broadband is accessible in 95% of UK premises.

Table 1: Broadband type definitions

Type of broadband	Definition	Activities at each speed
Standard broadband	Download speed is less than 30MB/second	One person streaming Ultra HD videos
Superfast broadband	Higher speeds through either fibre optic or cable service - so the download speed is 30MB/ second or higher	
Ultrafast broadband	The download speed is 300MB/second or higher	Multiple people streaming UHD video
Full fibre broadband	Download speeds of up to 1 GB/second	

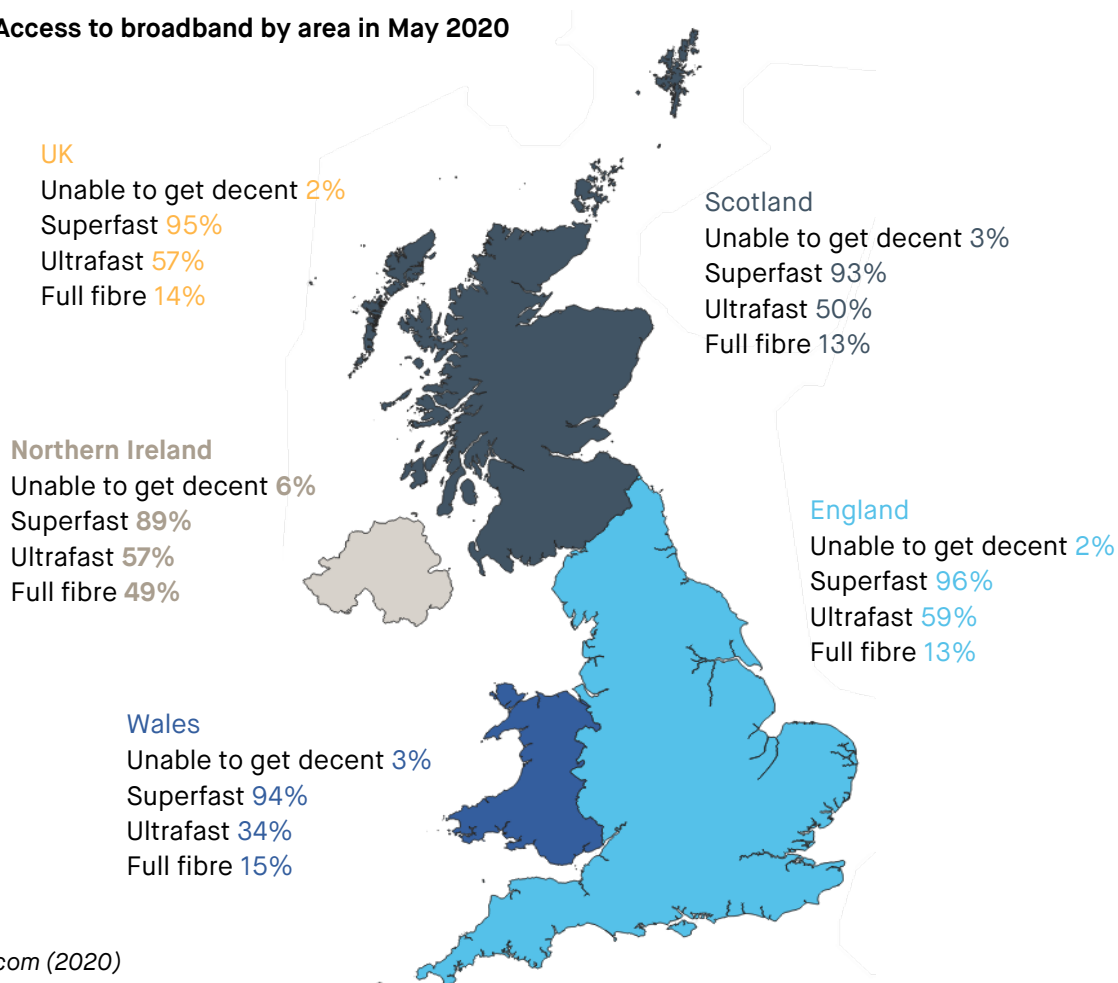
There has been a clear movement in recent years to broadband packages that provide higher speeds – partly due to changing behaviours.¹²

Figure 1: UK residential broadband lines, by advertised speed: 2013 to 2018

Source: SMF analysis of Ofcom data (2019)

Note: regulation change in 2018 has changed proportion of package advertised on less than 10 Mbit/s

The service demanded by consumers will be based on the services available to them. As is shown in the map below, this varies by nation of the UK.

Figure 2: Access to broadband by area in May 2020

Source: Ofcom (2020)

Superfast broadband is widely available across the UK. The Government previously set a target to reach 95% of premises in the UK by 2017 – which due to its definition of superfast as 24 Mb/s download speeds and above has been reached.¹³

One of the main issues with cable-based broadband schemes is being able to penetrate rural areas due to geographical constraints and population density. Evidence shows that two-thirds of areas which do not have access to superfast broadband are in rural areas.¹⁴

Ultrafast broadband is available to 57% of premises in the UK, according to the latest Ofcom data. Although, this hides the inequality between nations of the UK. Only 34% of premises in Wales have access to ultrafast broadband compared to 57% of premises in England. In some local authorities, nearly all premises are able to access ultrafast broadband – whereas in other areas less than one percent of premises can do so.

Figure 3: Percentage of premises with access to Superfast broadband by constituency, 2018

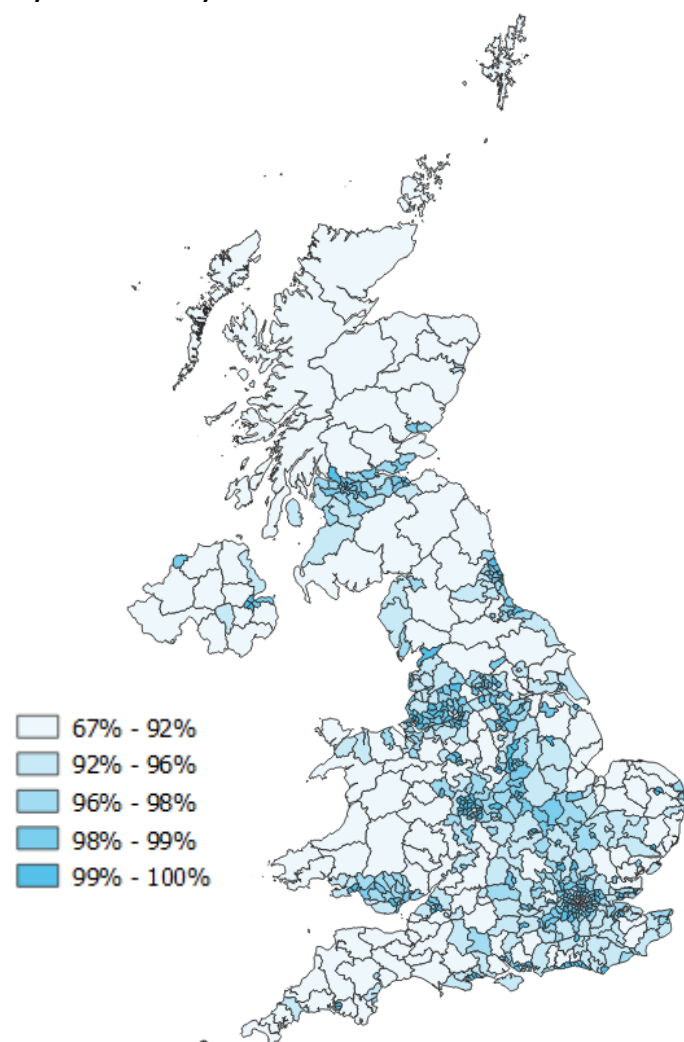
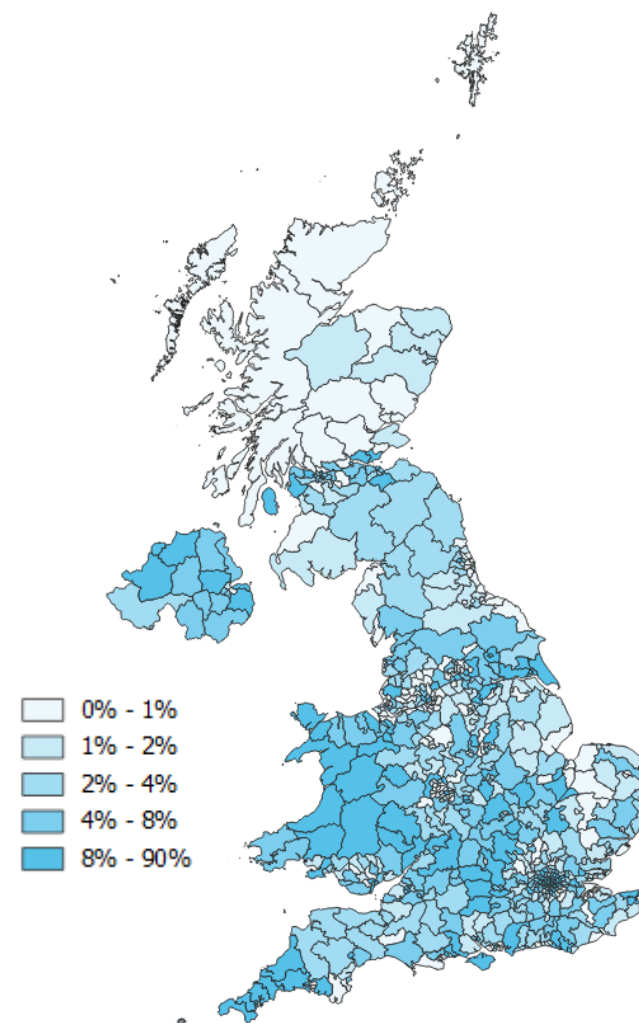


Figure 4: Percentage of premises with access to Full Fibre broadband by constituency, 2018



Source: SMF analysis of Ofcom data (2018)

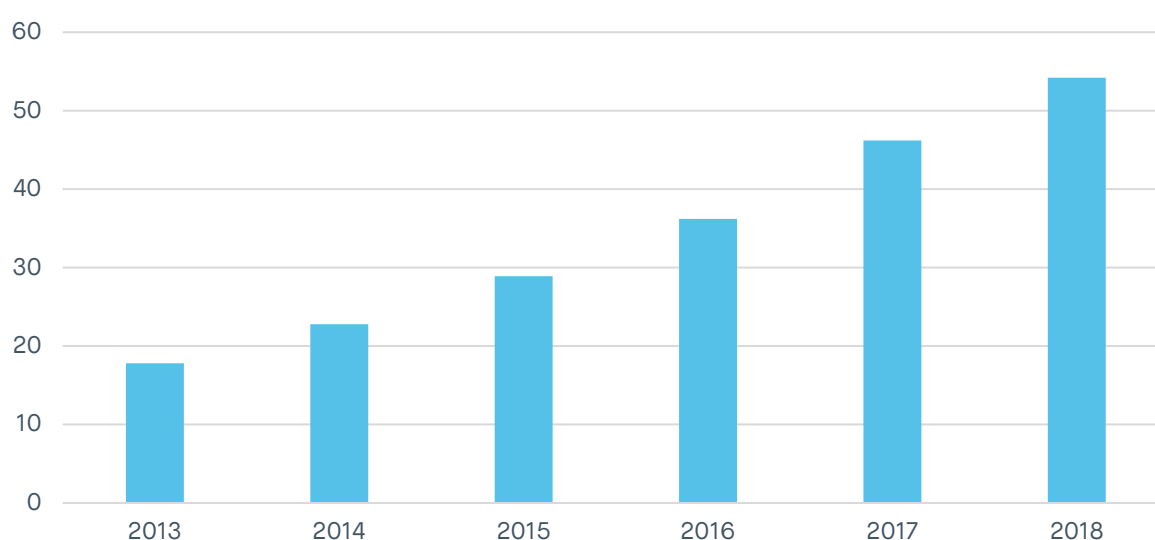
As stated earlier, government has committed to rolling out full fibre to the premises (FTTP) broadband which will enable faster internet connections for households and businesses in Britain. Full fibre will enable connection speeds of up to 1 Gbps. At present full fibre is covering around 14% of the UK, approximately 4.2 million premises.¹⁵ The majority of this coverage has been delivered by Openreach, which is owned by BT.¹⁶ The Government's policy has been to support new entrants into the infrastructure market and operators such as CityFibre and Hyperoptic now have significant build ambitions.

As we are in the early stages of roll-out, access to full fibre broadband varies significantly across the UK. Whilst four fifths of local authorities had access rates below 8.9% (quintile threshold) in 2018 (the latest year for which we have data), one fifth of local authorities had access rates between 8.9% and 91.9%. The City of Kingston upon Hull had the highest proportion of premises with access to full fibre broadband; access to fibre broadband there is more than 33 percentage points ahead of the next best local authority. This is due to the unique conditions within Hull which has a different broadband market to the rest of the UK. For historical reasons, the Hull area has no BT landlines, and the vast majority of residents and most businesses in Hull, Cottingham and Beverley are served only with telecoms services by KCOM.

Broadband speeds

There have been considerable changes in the way consumers are using their internet, with increased downloading and streaming, which brings with it larger demand for faster services. As a result of this demand and due to upgrades to infrastructure average broadband download speeds have increased in recent years – rising from 17.8 Mbit/s in 2013 to 54.2 Mbit/s in 2018 (as is shown in 5).

Figure 5: Average actual broadband download speeds: 2013 to 2018 (Mbit/s) (including 'up to' 2Mbit/s and less)

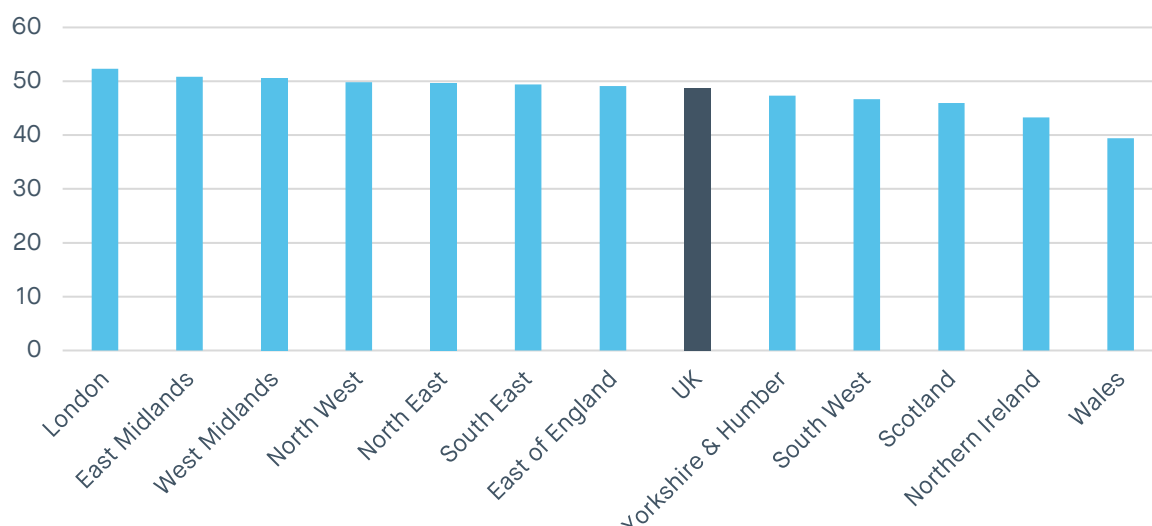


Source: Ofcom, using data provided by SamKnows

However, due to the variance shown in the type of broadband on offer in the UK there are wide inequalities in the speed being achieved by consumers.

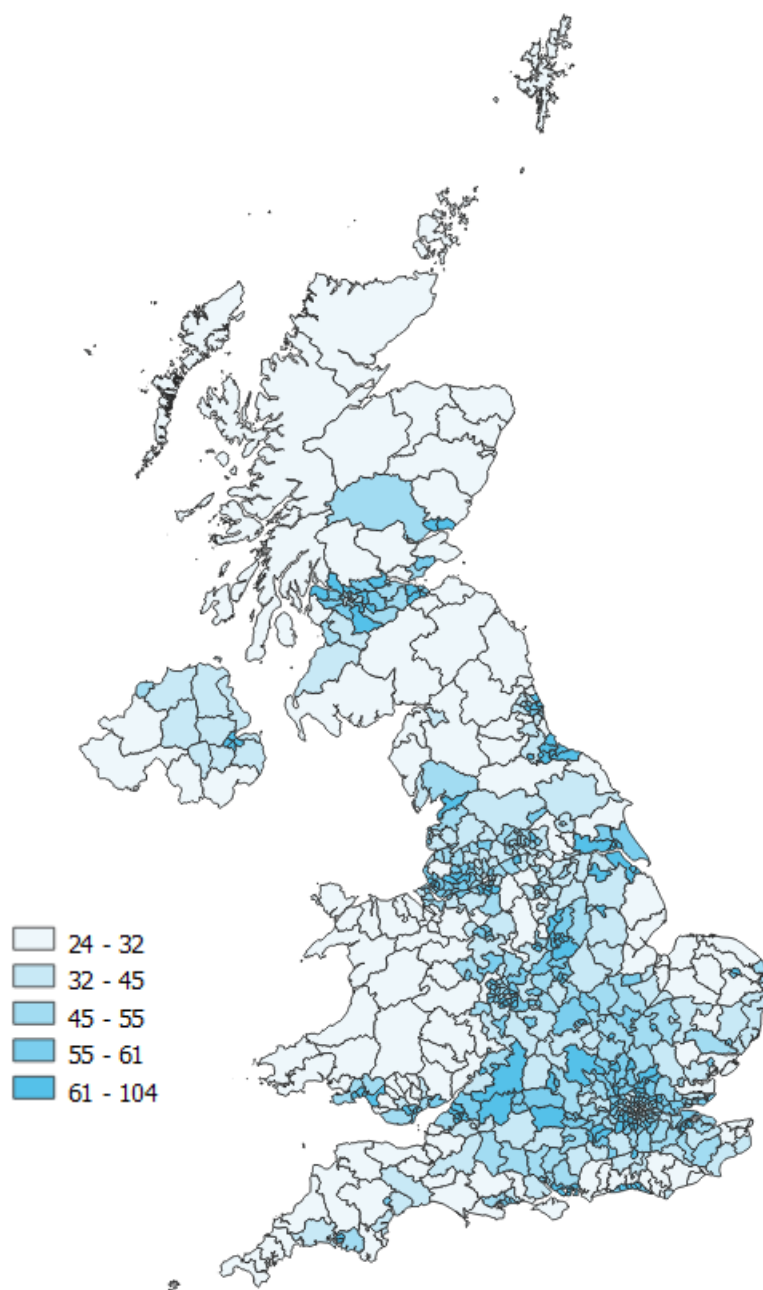
Figure 6 shows average download speed (Mbps) per region of the UK in 2018. Part of these differences may reflect consumer choice as well as line quality. The average download speed in the UK was 48.7 Mbps – in London the average increases to 52.4 Mbps. In contrast in Wales the average speed falls to 39.4 Mbps.¹⁷ This represents a difference between the highest and lowest region of 12.9 Mbps.

Figure 6: Average download speed (Mbps) by region, May 2018



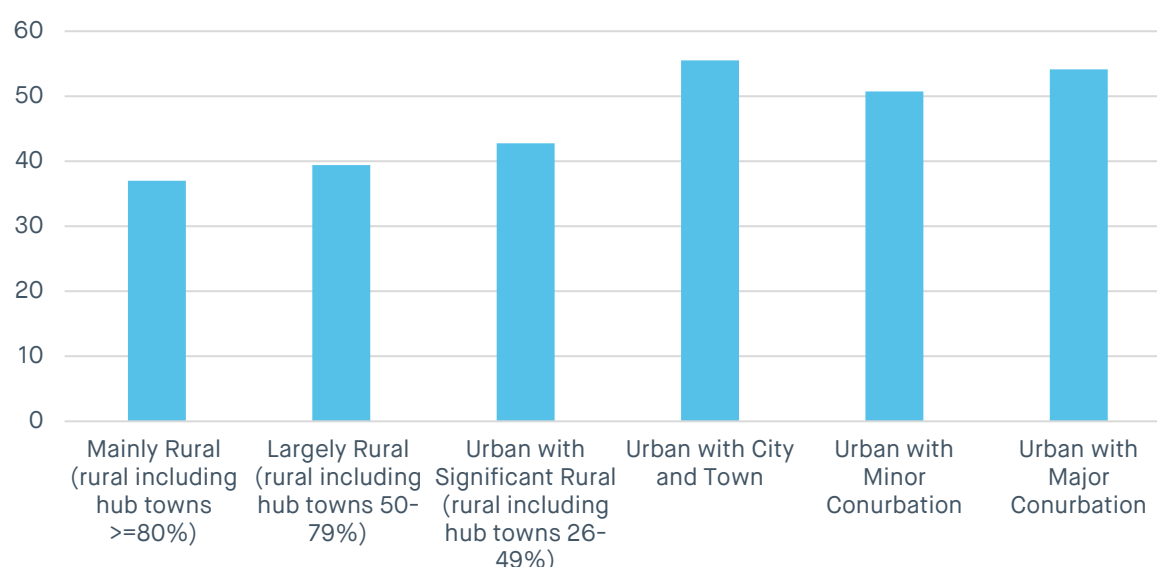
Source: House of Commons Library & Ofcom

Whilst there is a visible difference between the regions, the figures mask the differences within more granular local areas such as parliamentary constituencies – as is clear from Figure 7. Many of the areas with high levels of average broadband speeds tend to be clustered in and around the major cities of the UK.

Figure 7: Average download speed (Mb/s) by constituency, quintiles by count May 2018

Source: SMF analysis of Ofcom data

Part of the reason for the difference in broadband speed by region is likely due to the rural vs. urban makeup of the area. A lack of decent broadband is more common in rural areas where network roll-out can be more challenging due to the topography of the area.¹⁸ It is clear to see from Figure 8, that in England (data not available elsewhere) there is a clear relationship between the urban-ness of an area and average broadband speeds.

Figure 8: Average constituency download speed by rural urban classification, Mbps (England Only)

Source: SMF analysis of Ofcom data

Consumers in the broadband market

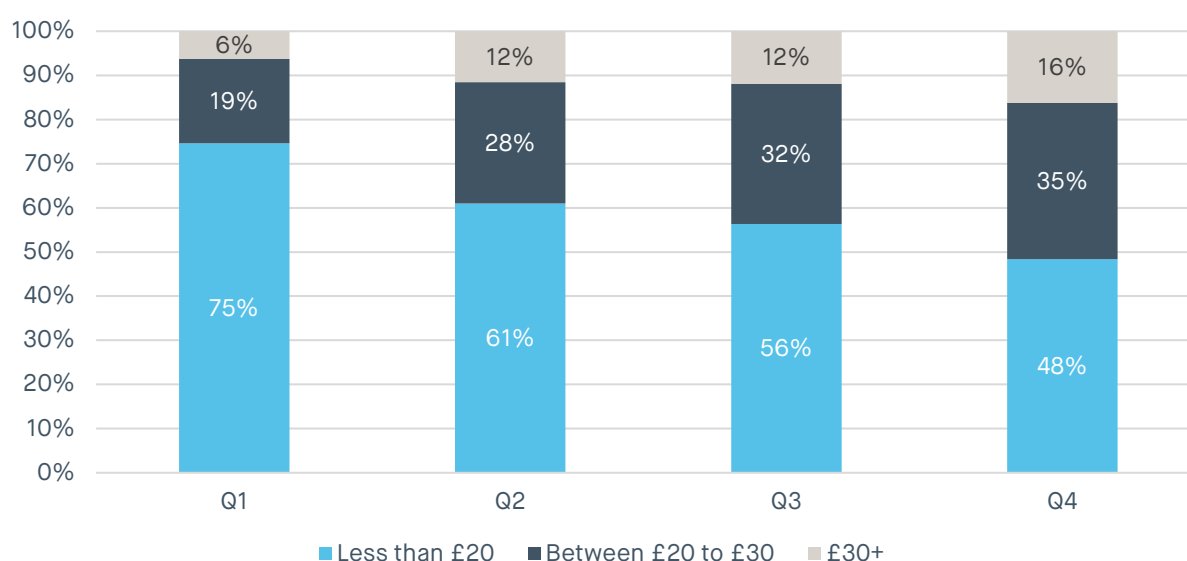
By using a variety of sources, we are able to focus on the experience of consumers in the broadband market, this includes looking at the cost of broadband, the products being offered to consumers and the level of the engagement in the market.

Average household broadband expenditure

Through analysis of the Living Costs and Food Survey 2017/18 we can compare household expenditure on internet services.

Of the households who have internet (and pay for it) the median amount per month spent on broadband was £19.63 – this related solely to the cost of internet as it does not include phone or television packages.ⁱ Our analysis finds that six in ten (60%) households reported spending less than £20 per month on broadband, three in ten (28%) spent between £20 and £30 and the remaining 11% spend more than £30 per month. However, our evidence shows this varies by income group and region of the country.

ⁱ All figures below relate to households who have internet access and report a cost of this above zero.

Figure 9: Household monthly expenditure on broadband by disposable income quartile

Source: SMF analysis of Living Cost and Food Survey 2017/18

As we might expect, households in quartile four (the highest disposable income quartile) are more likely to spend larger amounts on their broadband. Half of households (52%) in quartile four spent £20 or more per month of their broadband – compared to a quarter (25%) in quartile one.

Consumer segmentation

In 2017, EY published a survey on consumers in the broadband market.¹⁹ As part of this work EY segmented households into eight different categories based on their attitudes.

Table 2: Segmentation of households in the broadband market

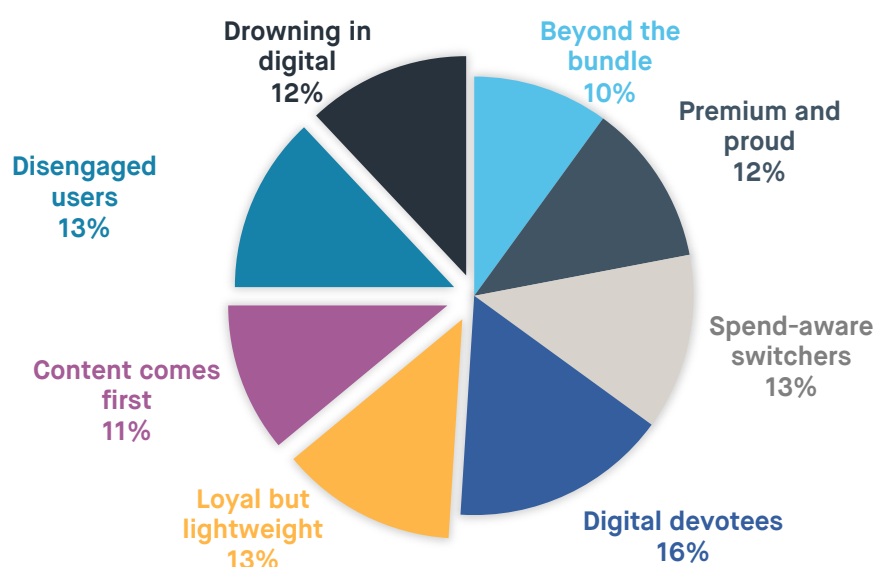
Consumer segmentation	Definition	Proportion of the market
Beyond the Bundle	Beyond the bundle consumers are the second-most affluent segment and heavy users of online services. They are heavy users of price comparison sites – their desire to pick and mix services means they are the most likely to switch.	10%
Premium and proud	Premium and proud view technology as a status symbol and are eager to adopt the latest gadgets on offer. They are not sticky consumers with more than one-third ready to leave in the next 12 months.	12%
Spend-aware switchers	This group is highly price conscious – 78% spend as little as possible on communication services and they are the most responsive to introductory offers, favouring basic bundles. They rank second for having switched in the past and doing so in the future. They are less driven by the latest technology, having the second lowest adoption of fibre broadband while also underscoring on streamed content usage.	13%
Digital devotees	The youngest segment in this year's survey, digital devotees are the most immersed in the internet. This group want faster broadband speeds and more flexible interactions with their	16%

	service providers and would be happy to pay a premium for better service levels.	
Loyal but lightweight	Loyal but lightweight are the oldest segment, they are fans of traditional TV channels and favour bundles with basic TV services. They are satisfied with their broadband speeds — despite low fibre take-up. Only 16% are likely to switch, half the proportion of other respondents.	13%
Content comes first	One of the older household groups - they are below average for watching video clips and multi-device streaming, ranking 7th for weekly time spent online. They are the second most loyal.	11%
Disengaged users	Disengaged users find frustration at every turn - they are by no means “anti-digital,” ranking fourth out of eight segments for time online, interest in the latest technology and awareness of smart home benefits. They are the second-most likely to switch service providers.	13%
Drowning in digital	Those who are drowning in digital believe there is too much choice and cannot find the right services to meet their needs. They have below average switching rates and they are the most likely to favour reliable over fast broadband connections.	12%

Source: EY (2017)

It is clear from this segmentation of the market that there a range of consumers for whom the faster speeds associated with full fibre would not be of interest – although the reliability that full fibre brings might be appealing. Research by Ofcom has shown that satisfaction with reliability and speed is high (83% and 80% respectively)- although there is a clear difference in satisfaction based on who provides the service.²⁰

Figure 10: Summary of market segmentation



Source: EY (2017)

There is a risk that approximately half of consumers would be adversely impacted if they were unable to continue to access “value” broadband at the speeds they desire for prices they are willing to pay. Whilst the government is seeking to future-proof the broadband market by enabling access to speeds that may not be needed for years this could lead to many consumers of today paying for a service they do not need or in a worst case scenario becoming digitally excluded – deciding not to have broadband rather than pay an excessive price for it. The EY market segmentation also highlights a number of groups that are “sticky” and might not switch service if shifted onto more expensive, faster broadband products – highlighting potential risks to consumer welfare going forward when Openreach looks to switch-off its current copper network.

As we discuss later in this report, it is crucial that the future regulatory regime for broadband provides sufficient consumer protection and a diversity of products to meet the needs to those with varying budgets and requirements.

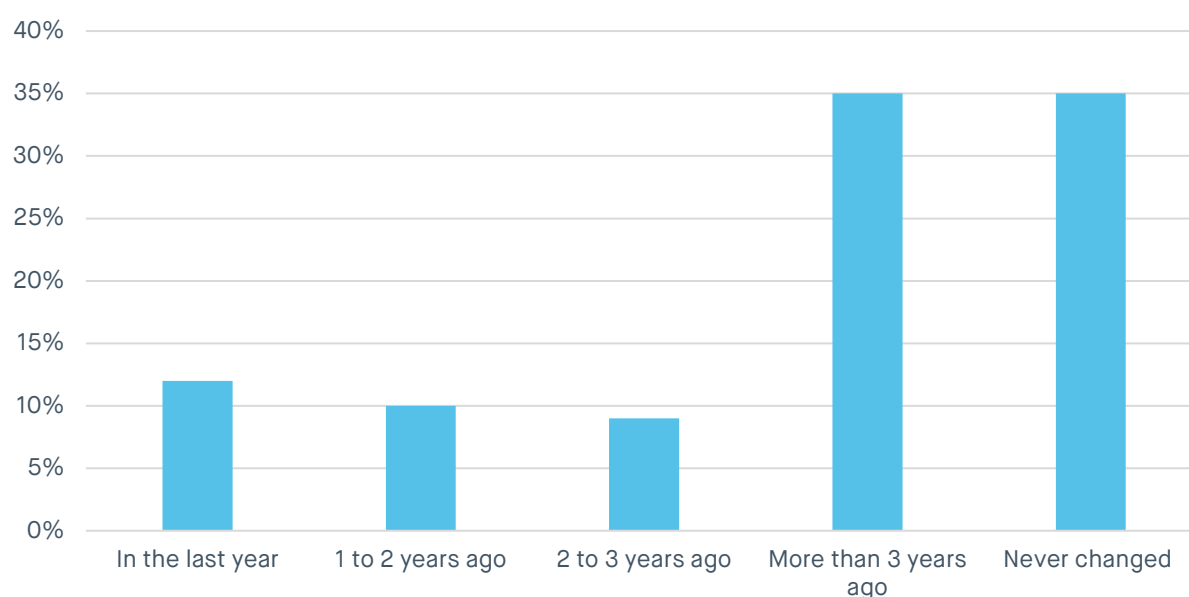
Competition and engagement in the market

Although great strides have been made in improving the level of competition in the broadband market, with more internet service providers, the market remains concentrated in the hands of larger providers. At the same time, customer switching rates suggest a high level of consumer inertia – in line with the consumer segmentation analysis undertaken by EY and described above.

Previous research conducted by the SMF on the level of competition in ten consumer markets showed fixed-line broadband to be relatively concentrated in the hands of the largest internet service providers, when using the CR4 measure (market share of the four largest firms).²¹ The only market less competitive than broadband was fixed line-only phone contracts.

Research conducted by Ofcom shows that consumers are relatively happy with their broadband services, with 83% of respondents to the Ofcom survey stating they are satisfied with their overall service.²² Satisfaction with the service may be one of the reasons why the level of shopping around and switching is low. However, this might also reflect more concerning factors – such as consumers not being aware of the existence of more appropriate services, or perceived and actual difficulties in switching internet service provider. Ofcom research showed that one quarter (24%) of survey respondents had been with their internet service provider for more than ten years and one in three (35%) reported never switching providers.

Figure 11: Have you or your household ever changed the company that provides your fixed broadband service?



Source: SMF analysis of Ofcom data

Not all consumers are satisfied with their service – of those who said they were not satisfied the top two reasons were poor or unreliable connectivity (55%) and slow speeds or speeds not as advertised (47%).²³ Research conducted by Which? found that although many consumers believe their broadband service is “fine”, some are either facing problems with the service or paying relatively high prices.²⁴

Summary

Although average broadband speeds have increased across the UK in recent years, full fibre broadband penetration rates remain low – highlighting the substantial headway that will need to be made over the coming years if the Government is to reach its targets.

At the same time, we note that users of broadband vary significantly across the country, with a high proportion of the customer base satisfied with their *current* service offer. With many households spending less than £20 per month on broadband and there is a high proportion of value-driven consumers that are likely to place a greater weight on being able to access good value broadband packages over being able to access the “latest and greatest” broadband possible. It is crucial that efforts to encourage rollout of full fibre broadband acknowledge the interests of this consumer demographic, and ensure that such consumers continue to be able to access good value broadband packages going forward.

CHAPTER 3 - FULL FIBRE ROLLOUT

This section of the report focuses on the rollout of full fibre broadband, exploring regulation, the cost and methods for change.

When the NIC made its recommendations for the rollout of full fibre broadband, it stated that in order to achieve a successful rollout, the following needed to occur:

- A nationwide plan to deliver full fibre to all businesses and homes by 2033, with approaches tailored to the needs of different areas;
- Making the most of fibre deployment to support improved mobile coverage;
- Allowing for switch-off of the copper telecommunications network;
- Tackling the barriers that delay deployment and increase costs.²⁵

Ofcom's regulatory regime

The broadband market is regulated by Ofcom. Its regulatory remit covers many sections of the communications market and includes internet service providers (ISPs) and Openreach.

Current regime

There are a range of components to Ofcom's current regulatory regime in the broadband market. One area of interest is regulated prices or price controls. Communication providers who use Openreach's network to offer broadband services to customers must pay Openreach a fee. The fee is regulated by Ofcom, with copper and FTTC40/10 prices regulated in essentially all of the country, and FTTP40/10 regulated in areas where FTTC services have been withdrawn. This price cap varies for current copper and part-fibre services – for residential customer homes, these are Metallic Path Facility (MPF or standard broadband)ⁱⁱ and for Generic Ethernet Access 40/10Mbps (download/upload) service – what is normally referred to as superfast broadband.ⁱⁱⁱ

Openreach is also regulated against a range of 'quality of service' metrics. This includes measures such as the need for 88% of fault repairs to be completed within one or two working days of being notified and to reduce the amount it charges for its services to account for improvements in the reliability of its network.²⁶

Ofcom's proposed regulatory changes

In 2016, Ofcom published its Strategic Review of Digital Communications, which set out its guidance for how it will adjust its regulatory framework for the next decade.²⁷ In the review Ofcom set out six key proposals, which were:

- Strategic shift to large scale investment in more fibre
- Step change in quality of service
- Reforming Openreach

ⁱⁱ Used to provide broadband and voice services over BT's copper local access connections

ⁱⁱⁱ Used to provide broadband services over BT's fibre connections.

- The right to broadband
- Empowering customers to make informed choices
- Deregulate and simplify whilst protecting consumers

The ambition to increase investment in fibre broadband is key a part of Ofcom's approach going forward. In March 2019, Ofcom consulted further on how to increase investment in fibre across the UK, with the aim of increasing investment from both Openreach and alternative network operators ('altnets').

Ofcom set out its proposals, which vary based on the level of broadband infrastructure competition expected in an area. This creates a new geographic regulation which will see different regulated prices in different areas in the country. It used three distinct categories: Area 1 (with two or more networks competing with Openreach); Area 2 (with one network currently or planned to compete with Openreach) and Area 3 (where there are no competing networks of sufficient scale to compete with Openreach).

1. In **Area 1** Ofcom would assess whether there is sufficient competition that the current level of regulation can be relaxed.
2. In **Area 2** regulation would be needed to ensure a smooth transition to fibre. Area 2 is defined as those areas where there is already an altnet network present (whether a DOCSIS^{iv} network such as Virgin Media or FTTP provided by another builder), where an altnet network is being built, or where there are specific plans for an altnet to build. Area 2 covers 21.3m premises across the UK.
3. **Area 3** comprises areas where there are no competing networks at present, and where no operator has specific plans to construct such networks.²⁸ Non-competitive areas represent 9.2m premises, largely in rural areas.

Area 2

An area is deemed potentially competitive if any of the following conditions are met:

- Alternative FTTP or DOCSIS networks are present; or,
- Alternative providers have specific plans to build.

As these areas are not currently competitive Ofcom's view is that regulation is needed to protect consumers, but at the same time to be balanced so as not to undermine investment in fibre networks in these areas. A table summarising the proposed regulation can be found in Appendix A.

The main areas of interest are on network access and charge control.

Network access

Since 2018 Openreach has been subject to new regulations to let competing providers access its network of ducts and poles to lay their own fibre cables. This measure can cut the upfront cost of building full fibre for other operators by around half.²⁹ This step has been broadly welcomed by alternative providers but concerns remain about how

^{iv} Data Over Cable Service Interface Specification

effectively it is being implemented, with Openreach still able to maintain a considerable degree of control over how the product is operated.³⁰

Charge control

The basis of regulation on Openreach is that it has Significant Market Power (SMP) in various economic markets and therefore there is a risk that without effective regulation BT (which opens Openreach) would be incentivised to raise prices in the wholesale market to weaken retail competition and exploit consumers. Ofcom has the ability to set price caps to ensure Openreach is unable to exploit its market power in this manner.

In the future regulatory model, Ofcom proposes to continue applying price controls to the “anchor products” services which offer standard and superfast broadband. However, while in the past these products had been regulated in line with cost, Openreach will now be able to charge higher prices in line with CPI inflation. Residential and business consumers with broadband products will see a price rise for their current services from April 2021. There will be no price control on new full fibre services in areas where FTTC products remain available, in order to incentivise both Openreach and altnet providers to build FTTP networks.

Area 3

An area is defined as non-competitive if all the following are true:

- Openreach is the only network present; and,
- No alternative providers have specific plans to build.

As Openreach holds SMP, Ofcom proposes to impose charge controls to protect consumers from excessive prices.

Ofcom’s traditional approach to regulation involved allowing BT to recover the costs of new services from the customers who demanded them. Ofcom believes this approach may not be enough to stimulate fibre investment in some non-competitive areas. Therefore, Ofcom is proposing allowing BT fibre investment to be partly funded through higher charges for copper services.³¹ Ofcom’s proposed approach is described in the table in appendix A.

Ofcom is considering a version of the “regulatory asset base” (RAB) approach. Under this approach Ofcom would allow BT’s FTTP build to be cross-subsidised from charges levied on copper and FTTC products across Area 3, creating both geographic and inter-product cross-subsidies. The investment creates an “asset base”, and Ofcom sets charge controls at a level which will allow BT to recover its efficient costs. Ofcom’s view is that this approach would preserve BT’s incentive to invest in fibre networks by allowing them to recover their costs more widely from their customer base in the area (including customers of both fibre-based services and copper services), while maintaining price caps that would protect consumers from excessive pricing.

The proposal to allow Openreach to cross-subsidise FTTP rollout has been justified on the basis that this will support higher levels of investment in FTTP. However, a number of broadband ISPs including TalkTalk, Hyperoptic, Cityfibre and Gigaclear have argued that

this might undermine competition in the retail broadband market.³² This could occur if the easing of price controls leads to higher retail broadband charges from companies other than BT that use the Openreach network. With BT and Openreach owned by the same parent company, BT's broadband charges could be kept down, hindering the ability of other firms to compete and retain retail market share.

Copper retirement proposition

Post the full rollout of gigabit capable technology, there will come a time when the copper network can be retired. One of the benefits of copper retirement is that it provides certainty to Openreach (although not to altnets) that there will be demand for its FTTP broadband investments.

Ofcom has proposed retiring the copper network through an exchange area by exchange area approach – this means that once Openreach has deployed ultrafast services to 75% of premises within an exchange area, for those premises where fibre is available, the obligation to provide new copper services will be removed.³³ Once an area has complete ultrafast coverage Ofcom will remove charge controls on copper/ FTTC services and instead impose a charge control on an FTTP anchor product.

The charge control proposed on FTTP 40/10 is a price uplift from FTTC 40/10 charges of £1.50 to £1.85 per month. This is to reflect the additional value that FTTP brings, such as greater reliability.

Public fibre rollout schemes

Alongside the proposals put forward by Ofcom there are a range of public interventions occurring in the market. These include:

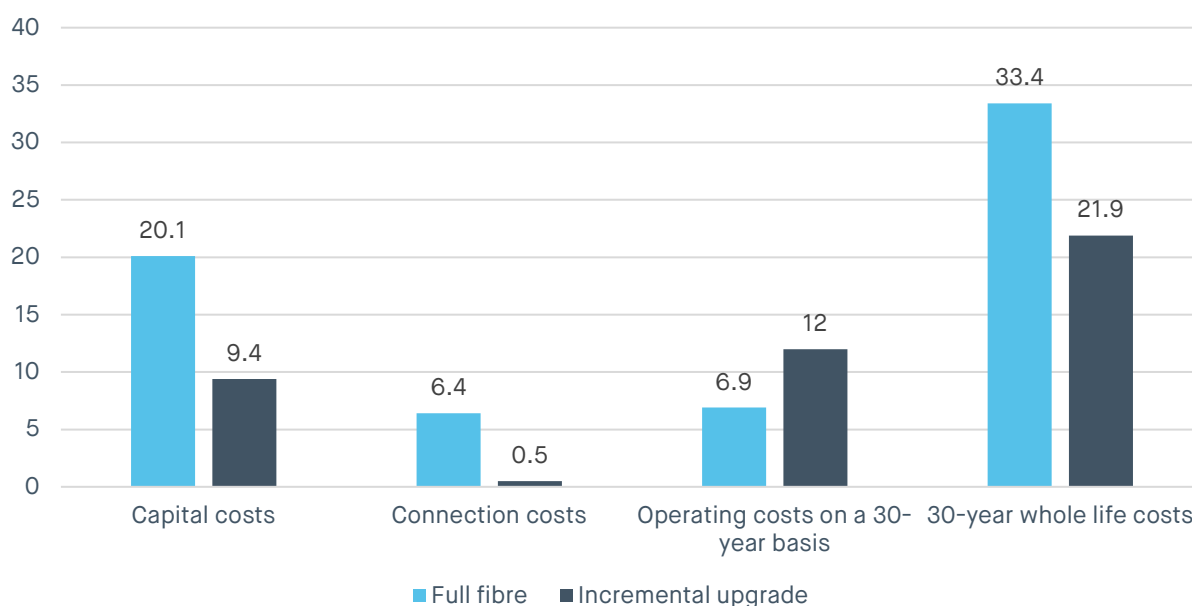
- The Broadband Delivery UK (BDUK) scheme which aims to extend the 24Mbit/s broadband coverage from the current 95% by at least 2%.³⁴
- The Reaching 100% programme (R100) which aims to extend the availability of superfast broadband to 100% of premises in Scotland.³⁵
- The Gigabit Voucher Scheme which will make £5,500 vouchers available to businesses in Wales and £800 vouchers available to residential consumers in Wales to get gigabit-speed broadband.³⁶
- The proposed investment in the Future Telecoms Infrastructure Review (FTIR), which aims to fund fibre build in rural areas simultaneously with commercial investment in urban locations.³⁷
- The government has committed £5 billion to help with the rollout of gigabit capable technology in hard to reach areas.³⁸

The cost of full fibre

The cost of nationwide full fibre penetration is likely to be significant.

Analysis produced by PRISM and TACTIS for the NIC estimated that, over a 30-year period, building and maintaining a full fibre network would cost £33.4 billion (in 2020 prices). They estimate this to be approximately £11.5 billion more than incrementally upgrading the existing infrastructure.³⁹

Figure 32: Estimated costs of deploying full fibre vs upgrade of copper / cable (£s billion)



Source: National Infrastructure Commission (2018)

Note: Present value in 2020

Costs of full fibre rollout are particularly high for hard-to-reach households and businesses in remote and rural areas. The Government has estimated that this represents approximately 10% of UK premises (equivalent to 3 million premises).⁴⁰ In these areas the Government will support the deployment of full fibre broadband. It has been estimated for these premises the cost will be approximately £4,000 per premises. This compares to costs of £300-£400 for the first 50% of premises.⁴¹ In the 2020 Budget the Government confirmed that it will provide £5 billion of public funding to support the rollout of gigabit-capable broadband in the most difficult to reach 20% of the country.⁴²

Notably, although much of the political discussion has focused on fibre broadband as the means for delivering faster connectivity across the country, the Government's stated aim is less specific, referring to a desire to deliver nationwide "gigabit capable" connectivity. This suggests that government commitments could be met through the use of alternatives to fibre broadband, such as 5G and coaxial cables. As we discuss later in this report, it is important for government to remain open-minded about these alternative approaches, which might be more efficient in some geographies including "hard-to-reach" rural areas.

CHAPTER 4 - CROSS- COUNTRY COMPARISONS

Many countries are actively striving to seize the economic advantages of widespread access to, and use of, full fibre broadband. Different countries are finding their own way to achieve these goals.⁴³ A consequence of the pursuit of full fibre broadband by multiple countries is that each one, unintentionally, ends-up acting as a policy laboratory, helping illustrate to others what approaches work well and which ones do not.

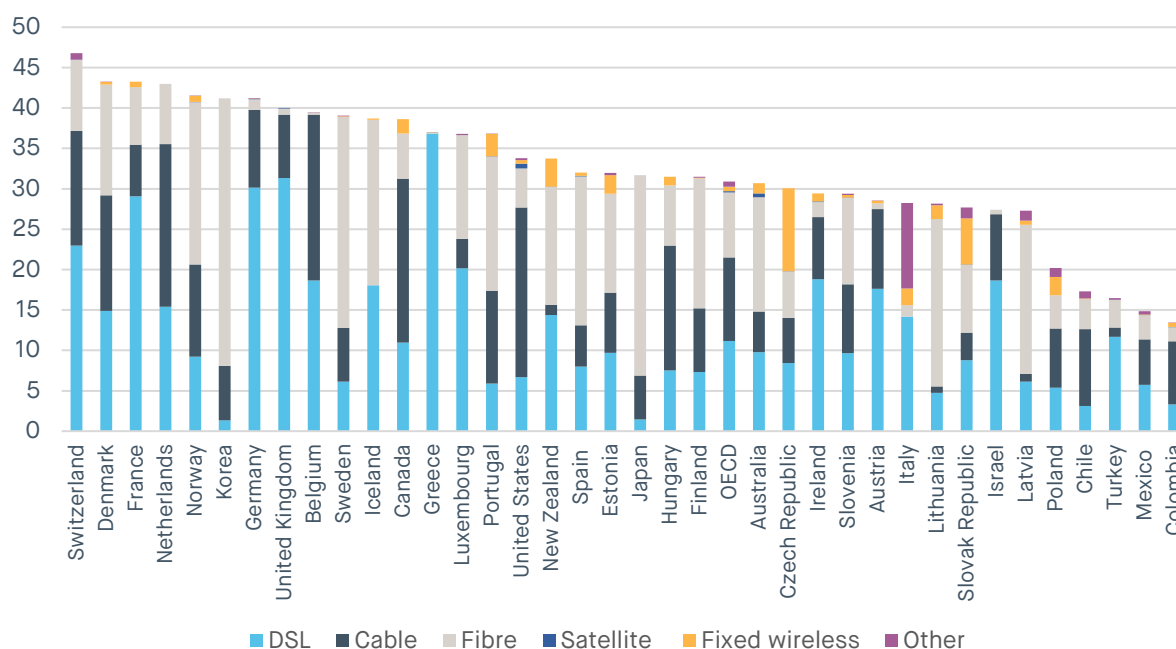
This chapter looks at the comparative full fibre rollout experience of a number of countries who have had more success than the UK in increasing access to and take-up of full fibre broadband. From those example, it attempts to identify common “success factors” among the sample examined.

With the UK in the early stages of embarking on a programme of rolling-out full fibre across the country, learning lessons from the countries that have achieved significant success, will help the UK avoid mistakes and adopt an effective approach. To that end, after reviewing which countries have been most successful at installing full fibre infrastructure in both urban and rural areas, this chapter will seek to identify the most salient aspects of the approaches taken by different countries that led to their successful broadband roll out records. By highlighting these “policy success factors” it will be possible to understand what improves the chances of successfully delivering full fibre broadband connectivity on a large scale to as much of the population of a country as possible. The chapter will finish by briefly examining where policy in the UK is currently either heeding or failing to heed the lessons from other countries.

Ultimately, identifying similarities or differences between current UK practice and those in countries who are ahead of the UK, may be useful to UK policymakers as they contemplate what is the most effective policy mix for delivering widespread full fibre coverage across the country.

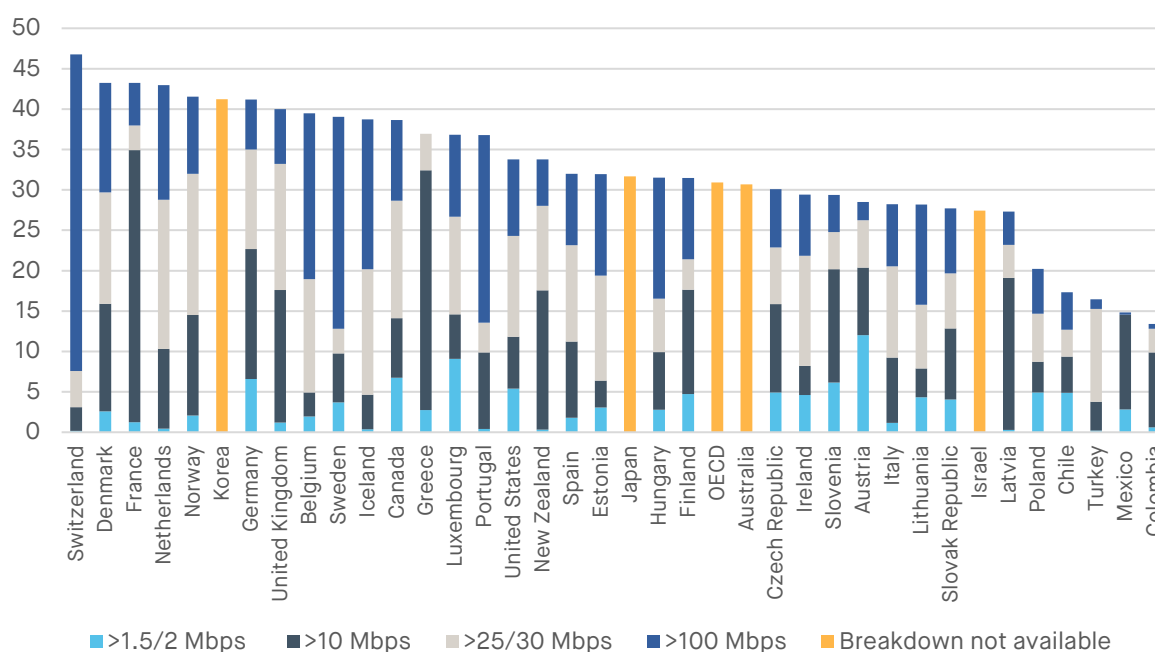
Comparative broadband penetration

There are a number of international comparative measures of broadband access and use and full fibre broadband coverage. A common measure of broadband use is the number of fixed broadband subscriptions per 100 inhabitants in a country. As Figure 13 illustrates, in 2018, there were 40 fixed broadband subscriptions per 100 inhabitants in the UK. The UK sat in 8th place in the OECD’s ranking. Switzerland, the highest ranked, had almost 47 subscriptions per 100 inhabitants in 2018.

Figure 43: Fixed broadband subscriptions per 100 inhabitants, 2018

Source: OECD

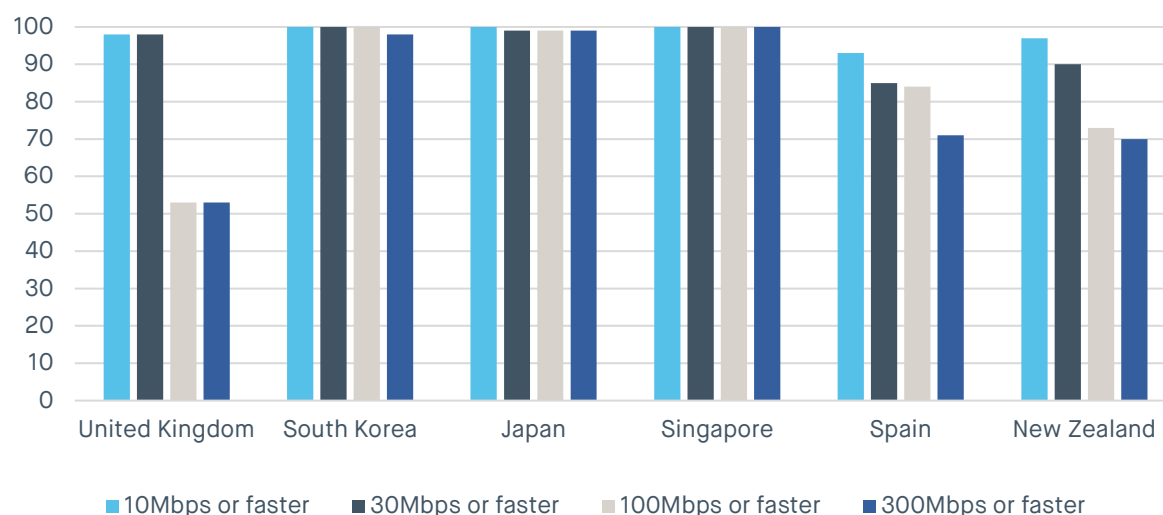
The UK, therefore, performs comparatively well on the fixed broadband subscriptions per 100 households measure, suggesting a comparatively healthy market for a range of broadband services reaching large numbers of households. However, a closer look at the broadband speeds being accessed by UK consumers, shows a comparatively less positive picture. Figure 14 highlights, for example, that in 2018 less than 10 per cent of subscribing households in the UK were accessing broadband with a speed of 100Mbps or more.

Figure 54: Fixed broadband subscriptions per 100 inhabitants broken down by speed, 2018

Source: OECD

In contrast to the UK (where the OECD data in Figure 14 suggests that less than one in five inhabitants with a connection are accessing broadband at 100Mbps or more) in Switzerland more than 80% of the fixed broadband subscriptions are 100Mbps or faster. Therefore, Switzerland is ahead of the UK in both the proportion of its inhabitants that have broadband and the speed of that broadband.

Figure 65: Percentage of households passed^v by fixed broadband networks, by available advertised speeds, 2017

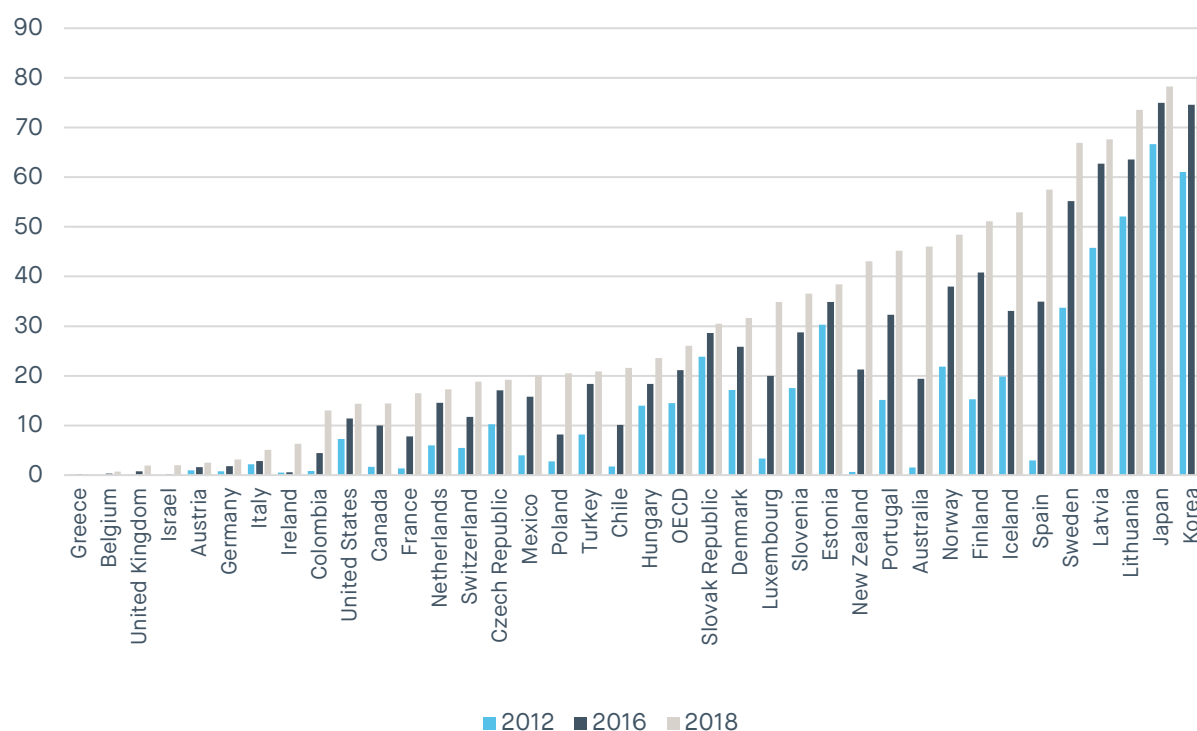


Source: Ofcom

Figure 15 highlights Ofcom data which suggests that at least one proximate reason for the UK's underperformance in the provision of higher speed broadband (Figure 14) is likely to be a comparative deficit in the provision of higher speed broadband infrastructure in the UK. Ofcom found that the UK is substantially behind South Korea, Japan, Singapore, Spain and New Zealand in the proportion of households who can access a fixed broadband network that can provide services at speeds of 100Mbps or faster. In South Korea, Japan and Singapore, almost 100% of households were "passed" by fixed broadband networks that could deliver speeds of 100Mbps or more. In Spain the figure was around 80% of households, and New Zealand approximately 70%.

Reinforcing the message of the Ofcom data in Figure 15 is more OECD data presented in Figure 16 below. It shows the trends in the rollout of full fibre broadband connections, as a percentage of the fixed broadband infrastructure, in each OECD country, between 2012 and 2018. The UK is ranked third from bottom among OECD members. The substantial gap in full fibre penetration between the UK and the best performing countries provides further evidence of why UK broadband speeds are, for many households, comparatively slow, relative to what is available in other advanced industrial countries.

^v "Passed" in this context refers to households that have fixed broadband infrastructure available to them i.e. the requisite "cables" pass the property.

Figure 76: Percentage of fibre connections in fixed broadband infrastructure, 2018

Source: OECD

The countries at the top of the international “fibre connections” rankings are South Korea and Japan:

- In South Korea, for example, around 80% of fixed broadband connections are fibre connections. South Korea managed to increase their full fibre coverage from just over 60% of connections in their fixed broadband infrastructure in 2012 to over 80% in 2018. A growth of around a third in six years.
- Among the countries trailing the two East Asian nations, but nevertheless doing better than the UK, are Spain, Sweden, New Zealand and the United States. In Spain for example, fibre connections account for around 58% of their fixed broadband infrastructure. This percentage is up from below 10% in 2012. An increase of approximately a thousand per cent.

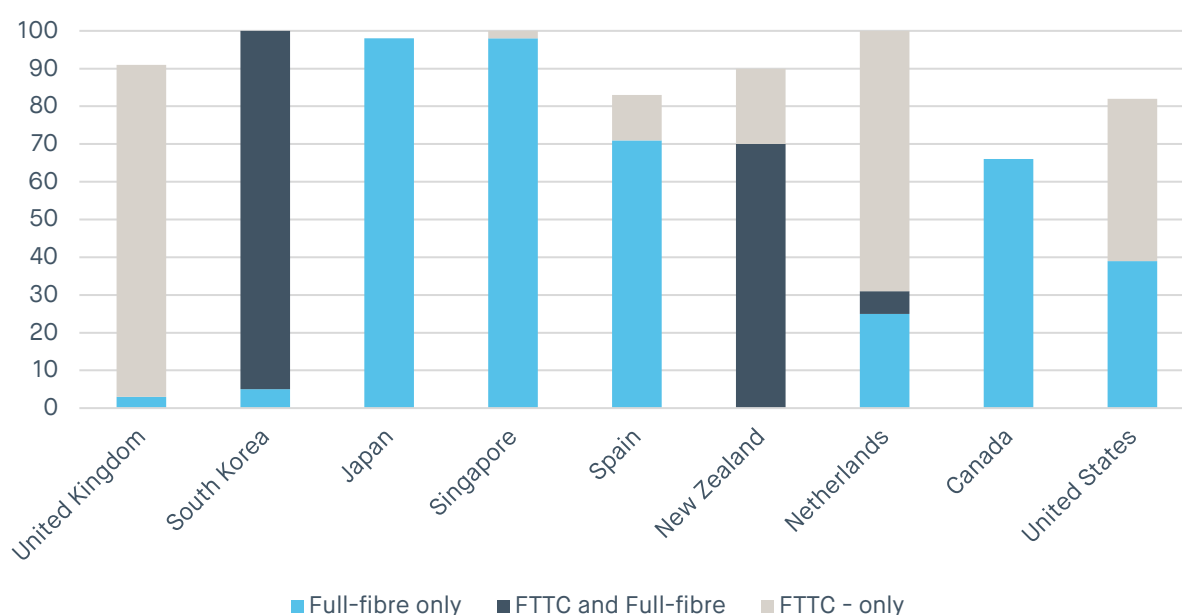
The OECD full fibre average in 2018 was approximately 25%. The proportion of the UK’s total fixed broadband infrastructure accounted for by fibre connections was still in single figures in 2018.^{vi}

Ofcom research examining the scale of the deployment of different kinds of network technologies across 18 different countries confirms the veracity of the OECD data highlighted in Figure 16, which showed the UK near the bottom of the rankings for full fibre connections. Ofcom found that the UK ranked 18th out of 18 countries for full fibre coverage according to Ofcom.⁴⁴ Figure 17 presents selected findings from Ofcom’s comparative

^{vi} However, it should be noted that the proportion of fibre connections in the UK did grow between 2012 and 2018.

analysis, by reproducing the household coverage data for 9 countries with varying reputations for full fibre coverage.

Figure 87: Percentage of households in areas served by fibre based broadband networks, 2017



Source: Ofcom

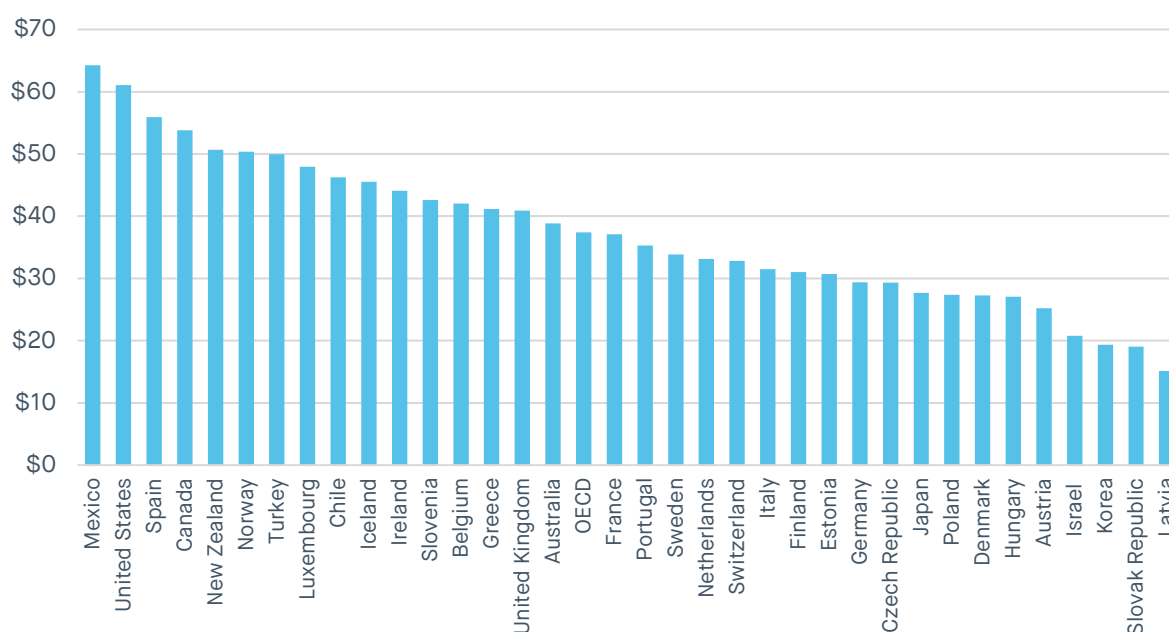
While the UK does well in fibre-to-the-cabinet (FTTC) coverage, the Ofcom research is clear that, less than 10 per cent of UK households in 2017 were covered by full fibre. This has increased to 14% according to the latest Ofcom data. The UK is a long way behind the countries at the broadband frontier. The comparative poor levels of deployment of full fibre illustrate, again, why the UK is found low down the comparative international rankings in broadband speeds and fibre coverage. In contrast to the UK, Singapore and Japan for example, provide full fibre to almost their entire populations.

The three countries whose policy-mix for full fibre roll out comes under scrutiny in the second part of this chapter are Spain, South Korea and New Zealand. In Spain, 71 per cent of households in Spain have access to full fibre only. All households in South Korea are covered by FTTC and full fibre infrastructure. Approximately 70 per cent of New Zealand households have access to FTTC and full fibre.

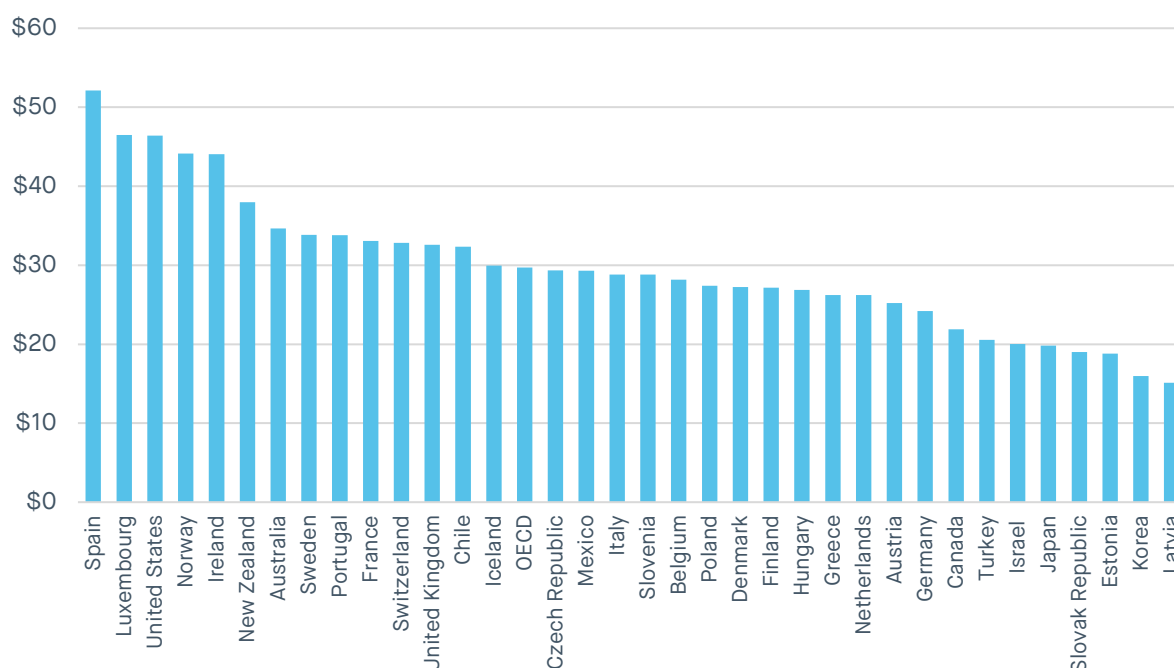
International prices

Fixed broadband price differentials between OECD countries

A comparative examination of the total monthly price faced by “high” and “low” users of fixed broadband services across OECD countries, shows that the cost of broadband in the UK is higher than the OECD average. Figure 18 shows the cost of fixed broadband for “high-users” in OECD states. Figure 19 compares the costs faced by “low-users” in OECD countries.

Figure 98: Total comparative cost of fixed broadband (high user) in 2017 US\$ PPP

Source: OECD

Figure 109: Total comparative cost of fixed broadband (low user) in 2017 US\$ PPP

Source: OECD

Table 3 highlights the monthly and annual cost of 25Mbps (or faster) fixed broadband to “high” and “low” users in the UK. Table 4 highlights how much the annual price in the UK of fixed broadband in 2017 (for both “high” and “low” users) differs from the OECD average and the costs experienced by similar “high” and “low” users in South Korea, a country consistently at, or near, the top of the international ranking for full fibre coverage.

Table 3: Estimates of monthly and annual (US\$ PPP) expenditure on (25 Mbps or greater) fixed broadband services – United Kingdom

United Kingdom		
	High-user	Low-user
Monthly cost (US\$ PPP)	40.89	32.57
Annual cost (US\$ PPP)	490.68	390.84

Source: OECD and SMF calculations using OECD data

Table 4: Estimates of annual (US\$ PPP) expenditure on (25 Mbps or greater) fixed broadband services – OECD average and South Korea

	OECD average		South Korea	
	High-user	Low-user	High-user	Low-user
Annual cost (US\$ PPP)	448.56	356.26	232.20	191.52
Annual cost difference with the UK (US\$ PPP)	- 42.12	- 34.58	- 258.48	- 199.32

Source: SMF calculations using OECD data

As the tables above illustrate, the costs for “high” and “low” fixed broadband users in the UK are greater than the OECD average. Further, costs in the UK are considerably higher than those faced by similar users in South Korea.⁴⁵

Efforts to measure the price of fixed broadband relative to average wages in individual countries⁴⁶ found that South Korea was ranked number one among OECD countries i.e. had the lowest cost broadband as a proportion of average earnings.⁴⁷ The UK was ranked 13th, behind countries like Switzerland (7th), Japan (8th), Australia (9th) and Sweden (12th) although ahead of New Zealand (19th), the United States (21st) and Spain (26th).⁴⁸

Whether measured cross-country on a PPP basis or as a proportion of average wages in OECD countries, the cost of broadband in the UK does not perform well when compared to the cost borne by users in many other countries.

The cumulative evidence outlined so far in this chapter suggests that the UK lags-behind on access to higher speed broadband and on full fibre penetration. At the same time UK users are paying higher prices than users elsewhere. Overall, the UK performs, on these key metrics outlined in this chapter, poorly. With the UK’s ranking across each dimension falling short of those countries at the “broadband frontier”.

Factors driving price differentials

A range of factors affect the price of fixed broadband within countries and by extension the kinds of pricing differentials between countries observed in Figures 18 and 19 and Table 4. Scholars have suggested that price differences are driven by six factors.⁴⁹ These are: supply, demand, governmental policy and regulation, average price level throughout

the economy as a whole, and physical/infrastructural factors.^{50 51} Further detail about how each factor contributes to price differences between countries are set out in Table 5.

Table 5: Factors which influence the price of broadband in countries and the price differentials between OECD members

Influencing Factor	Method through which the factor impacts prices
Supply	Market structure (i.e. the number of firms operating in the sector, the presence and intensity of wholesale and/ or retail competition, the extent of any economies of scale) has considerable consequences for the prices, through its implications for industry competitiveness and efficiency.
Demand	<p>Income levels drive the ability to afford broadband. Low demand is associated with higher prices because the provision of broadband involves significant fixed costs, leading to higher prices for those consumers using such services if overall demand is low.</p> <p>However, lower incomes may mean greater price sensitivity among consumers to price increases. Conversely, higher income consumers may be less price sensitive consumers because they are better able to afford “higher-end” services.</p>
Government policy/ regulation	Laws, taxes, subsidies and the activities of (relevant) regulators in a country influence the ease of starting a broadband business and the cost of running one, the levels of competition in the industry and to some extent the profitability of firms all of which, in-turn, affect the prices paid by consumers.
Price levels across the economy	The aggregate level of prices in a country help determine the consumer price of broadband in two ways. Input prices are likely to be reflective of broader price levels. These costs will ultimately need to be covered by the retail price of broadband. Secondly, aggregate inflation rates will often be the benchmark by which broadband prices increase, from time-to-time.
Physical/ infrastructure	<p>Topography and population density, as well as the design of buildings, are direct influences on the cost of providing broadband infrastructure and the ease with which it can be maintained and upgraded.</p> <p>Existing telecommunications (and cable TV) infrastructure provide readymade alternative networks that ensure competition in infrastructure provision. Further it can be cheaper to upgrade legacy systems or at least repurpose existing equipment and infrastructure such as ducts.</p>

Source: Grechyn and McShane (2016)

The various factors (described in Table 5) behind the broadband price differentials that exist between countries help explain why prices in South Korea and the UK (see Table 4) are so divergent. Specifically:

- South Korea and the UK have different levels of population density. South Korea is more densely populated than the UK.

- Internet usage (i.e. demand) is very high in South Korea. Around 95% of the population are internet users, 93% use it every day, 85% are active social media users, 91% stream video and 23% are gamers.⁵² Encouraging high demand has been a deliberate policy in South Korea (as described in more detail below). In contrast to the UK, where there is no substantive and sustained policy to bolster demand for broadband based services. High demand for new technologies helps infrastructure providers rapidly achieve economies of scale by enabling them to spread their construction and running costs over larger numbers of users and rapidly identify and implement operating efficiencies.
- The structure of the broadband industry in South Korea is different to that in the UK. The South Korean rollout of full fibre was managed more actively by the South Korean state. An important element of that management was encouraging infrastructure competition between alternative infrastructure providers, wherever possible. Helping avoid any potential monopoly issues arising as a result of the network infrastructure being concentrated in the “hands” of one business. The consequence of infrastructure competition is a strong incentive among those competing to bear down on costs and find efficiencies both down and upstream.

Finally, it is also worth noting that once full fibre is installed it brings its own cost savings for operators, and in-turn, users. It has been estimated that full fibre results in five times fewer faults than copper networks and in the UK could save £5 billion in operating costs over 30 years.⁵³ Therefore, those countries, such as South Korea, who have a broadband network infrastructure that contains a considerable amount of fibre, are going to be gaining from those long-term reductions in cost that come from extensive deployment, as described. Under the right competitive conditions, such cost savings will filter down into user prices.

Factors behind differences in inter-country full fibre network infrastructure deployment

In each country there are a multiplicity of factors that influence the availability of, and access to, full fibre broadband, which result in differences in the extent of full fibre coverage between countries. For analytical purposes, these numerous factors can be divided, broadly, into two categories: “non-policy factors” and “policy factors”. After a brief description of the main non-policy factors that help explain the differences in access to and take-up of, full fibre broadband, this section will describe some of the key policy factors that influence the levels of deployment of full fibre in three “case study” countries. These are three countries that have been very successful out rolling out full fibre infrastructure. This section will show that while detailed policies might differ, there are some common “policy principles” that under lie the approach of those countries. The section ends with a brief discussion of the extent to which the UK is basing their approach on the same principles and, by implication, whether the UK can expect to be as successful as them in rolling out full fibre.

Non-policy factors

Non-policy factors are important influences on fibre broadband penetration. Their importance derives from how they impact the risks and costs (and in-turn the profitability)

of constructing and operating a full fibre network. There are five that stand out as the most influential:

- Building new full fibre networks is a more expensive than alternatives e.g. boosting the capabilities of existing copper wires. Consequently, the economics of full fibre are unavoidably more challenging than those of enhancing legacy infrastructure. The higher up-front costs of deployment play an influential role in assessments of the financial viability of the construction of full fibre infrastructure. The implications of these costs for business risk calculations and the rate of return on investments can and do reduce the attractiveness of investment decisions and constrain the expansion of full fibre networks.
- Access to full fibre has proven easier to deliver in some countries such as the United States, because of the “accidental” endowment of an extensive, parallel to the traditional telecommunications network, cable network.⁵⁴ The cable network provided a ready-made alternative infrastructure and thus the potential for infrastructure competition without the need to lay new networks.
- The geography of a country and the geographical spread of a population is linked closely to the costs of building fibre networks. If a population is spread widely over large areas it will be more expensive to provide infrastructure, compared to the cost of infrastructure for a more concentrated population. Therefore, in a densely populated country like South Korea it is less expensive (and thus more cost-effective) to rollout full fibre than it is, for instance, in more sparsely populated countries such as the United States. Costs will increase further if the topography of a country (or parts of a country) is challenging. Having to lay infrastructure where, for example, there are mountainous areas, hills and valleys, forests, farmland, rivers, streams and lakes or deserts (to name some kinds of topographical features) will significantly increase the costs of deployment.
- The types of properties within which populations live also plays a role in the economics of broadband. While closely linked to issues of population density the nature of the properties within which a population lives can be seen as a separate factor. The example of Spain illustrates the point. In Spain for example, where full fibre rollout has been comparatively successful, the process has been aided by the nature of much of the housing in urban areas.⁵⁵ High-levels of multi-occupancy buildings in Spain made it relatively easy to provide broadband access to multiple households while incurring not too much more than the cost of providing infrastructure to a single building, resulting in considerable savings for infrastructure providers and enabling more households to be reached for any given amount of investment. Deploying broadband infrastructure to different kinds of property, such as detached housing, will be less economical.
- The relative ease of rolling out full fibre in highly urbanised areas in some countries has provided opportunities for infrastructure providers to “learn-by-doing”, i.e. finding and implementing efficiencies in the deployment process that, in-turn, helped reduce the costs of laying infrastructure outside of dense urban centres⁵⁶ i.e. in the suburban, semi-rural and rural areas.⁵⁷

Policy factors

Analysis carried out for DCMS suggested that there are examples of successful policies, from other countries, which have stimulated infrastructure development and improved access to broadband networks.⁵⁸ While the specific policy measures utilised vary between countries, it is, nevertheless possible to discern from the international landscape a number of key “lessons” about the kinds of policy factors that effective approaches are based upon, and therefore offer UK policy-makers a clear idea of how the UK might achieve similar results to some of the better performing countries.

Below, the lessons that South Korea,^{vii} Spain and New Zealand can teach the UK about full fibre broadband roll out, are explored. These three countries have been chosen for three reasons:

- All three have been successful in rolling out full fibre and are far ahead of the UK in coverage.
- Each falls into a different category of political-economic model, which provides a useful spread of “policy traditions” in which to examine different approaches.
- The three countries have distinct (from each other) geographies and population spreads providing an opportunity to observe full fibre success in the face of a range of non-policy circumstances.

South Korea

South Korea has taken a long-term and activist approach to broadband policy, consistent with its East Asian Developmental State model of political economy.⁵⁹ The ground work for South Korea’s extensive full fibre coverage in the present day was laid in the 1980s. Seeing the potential of communications technologies the South Korean state initiated a series of rolling policy-strategies aimed at enabling South Korea to take advantage of such technologies, central to which was investing in building up its domestic engineering capability in digital telecommunications. This was complemented, in subsequent decades, by a slew of measures focussed on making South Korea a leading “information economy”. For example:

- In 1996, the South Korean government instigated the first of a series of multi-year plans that included ensuring the whole of South Korean society was (and remains) “digitally connected”. These plans coordinated policy across different domains, in order to deliver on the overarching goal.
- Government led initiatives have been important stimuli for the upgrading South Korea’s communications networks. Some of these have been demand-side (see below) initiatives. While others aimed at directly encouraging the supply-side through vehicles such as public – private funding partnerships. The latter were

^{vii} In the sub-section on rural broadband rollout, below, South Korea is replaced by Sweden. Limited information about South Korea’s rural broadband experience and any specific rural broadband initiatives by the South Korean state made it difficult to offer South Korea up as an example of effective rural focussed broadband policy. Therefore, an alternative country that might have useful lessons, about rural broadband policy, for the UK, was sought. Sweden was chosen from a menu of alternative countries because of its very challenging topography, its population sparsity and extreme climate, which makes it a good candidate for illustrating how significant geographical challenges in particular, can be overcome with appropriate policy.

established to help finance the “information economy” programmes such as broadband roll out, that would deliver the end goal of making South Korea a leading “information economy”. As a result of state backed contributions, large amounts of private sector capital have been leveraged in, to fund network capacity building. One estimate suggests that, while the South Korean state invested just over a \$1 billion in the UBcN (Ultra-Broadband Convergence Network) initiative, the private sector invested around 30 times that amount in the programme.⁶⁰

- Competition (including infrastructure competition) and a responsive regulatory environment have been important elements in South Korea’s success. Analysis from the International Telecommunications Union (ITU) showed that the Korean market is served by three major broadband infrastructure providers, plus a cluster of smaller cable companies with about 15% of market share.⁶¹ Policy has ensured the relevant regulator had the scope to adapt the regulatory environment in the face of an evolving market to ensure there was fair competition. The approach to regulating the telecommunications sector in South Korea has oscillated between more liberal and less liberal approaches depending on circumstances.⁶² This has – at the appropriate times – given the market a boost by allowing free competition to be the prime driver of activity. For example, between 1993 and 2002 Korea Telecom was privatised⁶³ and between 1997 and 2005, entry barriers into the broadband market were kept low through the categorisation of broadband services as “value-added services”, with all types of broadband access technology permitted in order to encourage innovation and rollout of infrastructure and services. At other times, the regulator has been more active – utilising an enhanced competition and fair-trading framework⁶⁴ – in order to prevent the broadband market from becoming dominated by a single provider. For example, after 2005 a more interventionist approach was taken (including price controls and reclassification of broadband as a “facilities-based service”) when Korea Telecom became a dominant market player. Finally, in more recent times there has been a shift back towards a more liberal approach with, for example, rules around “bundling” eased in order to facilitate innovation. An important facilitator of competition in South Korea has been the approach taken to transparency. This has involved the development of extensive performance monitoring schemes based upon key metrics like connection speeds. Accountability has also been central to the South Korean approach, which has been ensured through the use of service level agreements (SLA) for broadband services.
- In addition to the supply-side, the South Korean government looked to stimulate the demand-side.⁶⁵ One measure the South Korean government implemented to help foster sufficient demand for fibre broadband particularly early-on, when the market was nascent, was to phase out the use of copper wires between public institutions and buildings and replace connections with fibre ones. Such a policy guaranteed a degree of demand for fibre connections at the riskiest time and “seeded” the start of the installation and expansion of fibre networks.

Spain

Of the three case study countries examined in this section of the chapter, Spain has taken the most market liberal approach to full fibre rollout. Policy in Spain has not focussed on rolling-out full fibre per se. Rather, it has relied upon reducing barriers to competition which in-turn has resulted in full fibre broadband infrastructure being made available to large parts of the population.

Spain identified the need to upgrade their telecommunications infrastructure early and decided to do this by largely focussing on enabling infrastructure competition.⁶⁶ To that end, Spanish policymakers and regulators implemented a number of specific measures:

- The introduction of rules, in 2000, that required those building dwellings to include telecommunications ducts or to install fibre cabling directly into what they were building, in order to facilitate future access.⁶⁷ The availability of such ducts or the provision of built-in fibre cabling improved the economics of providing full fibre in Spain and in-turn the ability of broadband providers to offer full fibre.⁶⁸ Research for DCMS highlighted the contrast between Spain and Germany, where a lack of access points into accommodation (in-part as a result of the absence of any obligations on landlords for example to provide for any) has been identified as a significant barrier to full fibre roll out.⁶⁹
- A requirement for Telefonica (the owner of Spain's legacy telecoms network) to open-up their duct infrastructure to competitors to lower the costs, to new entrants to the market, of laying infrastructure.⁷⁰
- Allowing operators to decide where they deployed their networks and not placing geographical requirements on providers, enabling them to achieve 'scale' in the most efficient ways.⁷¹
- Taking an *ex ante* approach to regulation in most areas.⁷²
- Allowing co-investment by providers in order to help share the risk of building network infrastructure.⁷³ The co-investment arrangement of Vodafone and Orange (agreed in 2013 in Spain) involved each provider building full fibre in different areas of the country then agreeing to share access to each other's new network infrastructure.⁷⁴ Concurrently, Telefonica entered into a co-investment arrangement with challenger provider Jazztel, which meant that Jazztel and Telefonica would share the cost of fitting in-building wiring to four and a half million homes.

In addition, Spanish infrastructure providers were also helped by the existence of legal "rights of way" over public and private land, which reduced the costs of building the network by increasing the ease with which it could be deployed.⁷⁵

The "last drop" is the most expensive and time-consuming part of the network infrastructure. The combination of measures taken in Spain to mandate the installation of ducts or fibre cabling in buildings, the mandating the incumbent telecoms provider to open up their ducts to competitors, and the existing "rights of way" over public and private land (which simplified the process of installing and maintaining infrastructure) together helped to cut the cost of deploying the "last drop" of the fibre network, and consequently made it more economical for infrastructure providers to install full fibre in more places.⁷⁶

New Zealand

In New Zealand, plans for full fibre rollout began in 2010 with a programme called Ultrafast Broadband (UFB).⁷⁷ As with Spain and South Korea, New Zealand's approach relied mainly on private enterprises undertaking the construction of the fibre infrastructure. However, somewhat unusually for New Zealand – which has operated a liberal market economy model of political economy since the de-regulation of the Labor and National governments of the 80s and early 90s – the state has played (and continues to play) an important organising and facilitating role in New Zealand's full fibre rollout. One of the key focusses of the New Zealand government's policy has been mitigating the risks associated with building full fibre infrastructure to the private infrastructure providers, in order to minimise barriers and maximise incentives for private sector investment.⁷⁸ In addition, the approach in New Zealand has been designed to ensure an open and competitive broadband market at the end of the infrastructure deployment process. To these ends, New Zealand's full fibre policy has involved a number of elements:⁷⁹

- The government established Local Fibre Companies (LFCs), which enabled the state and private infrastructure providers to share risks. LFCs allowed the government to take-on the “uptake risk” of rolling-out fibre infrastructure, while the private sector partner undertake the “network deployment” and “business execution”. As customers take up full fibre, the ownership of the infrastructure network being used transfers to the private sector. LFCs change the cost-benefit calculation associated with building fibre networks faced by private suppliers. LFC's make it more economical to take the risk of building extra miles of infrastructure, particularly in places where it previously was not considered financially viable.⁸⁰
- State investment in the UFB programme has been in the order of NZ\$1.5 billion, which private partner organisations are expected to at least match if they want to be involved. Notably, a competitive tendering process is used to recruit the private partners to the UFB. It has been, and continues to be, administered by a specialist arms-length government owned company to ensure the process is fair and rigorous.
- Imposing strict requirements on those who successfully bid to build the networks, such as non-discriminatory access by service providers to the networks and other restrictions on LFCs providing retail services themselves. For example, commercial providers are prevented from controlling a UFB network. Famously, these limitations led to Telecom NZ splitting its retail and network arms, removing the risk of a vertically integrated incumbent dominating the sector.
- Reforming planning laws and other regulations to reduce the costs of accessing property and installation in, for example, shared properties (by introducing principles such as “deemed consent”)⁸¹, to allow fibre providers to access “passive infrastructure” and existing utility infrastructure and reduce the administrative hurdles associated with installing additional infrastructure such as cabinets, poles and aerials.⁸²

The demand side

The demand side of the full fibre market is, as in any other market, an indispensable part of the picture for and full fibre broadband penetration can only be maximised if there is demand for it.⁸³ Sufficient demand for full fibre services will ultimately determine whether investment in full fibre network infrastructure is profitable. As such, a degree of certainty over future demand for fibre services reduces the risks associated with building the network infrastructure and therefore helps the business case for undertaking such investment.

Not every country has taken direct measures to stimulate the demand side for full fibre. However, some, such as South Korea have made it a central plank of their package of interventions to stimulate the roll out of broadband networks. South Korea's demand side interventions have taken a number of forms, including:⁸⁴

- Ensuring public bodies and buildings installed and used fibre broadband services.
- Promoting e-commerce among consumers.
- Computerising Government activity and delivering greater amounts of government services online (e-Government).
- Moving Government procurement online.
- Integrating e-learning into education and making substantial efforts to increase digital literacy across the adult population.

By using the public sector to have full fibre connections installed, encouraging d private actors to use digital technology in their interactions with the state and improving e-literary among the population, the South Korean government gave a significant fillip to demand for full fibre services. Consequently, the investment by infrastructure providers, in full fibre networks was made less risky than it otherwise would have been, making it more economical to undertake.

Tackling the 'rural dimension'

One of the most difficult aspects of ensuring ubiquitous access to full fibre broadband in any country is the challenge posed by rural areas. The economics of broadband provision for rural areas are significantly more challenging for providers than those they face when supplying urban, suburban and semi-rural places. The challenges of technology, distance, population concentration and housing density etc, (described earlier) and topography are much greater in a rural context. As a result, investment incentives for providers are much weaker. To tackle this problem, governments around the world have introduced measures aimed at making it economic, often through some form of subsidy. For example:⁸⁵

- In Spain a programme called PEBA was established in 2013 to provide financial support to projects aiming to "lay" fibre infrastructure in areas not able to access next generation networks. It is estimated just over 10 per cent of the Spanish population live in areas that the project covers. Operators in Spain are not under any obligation to cover particular areas. Monies are allocated in response to specific project applications. Projects may provide partial or full coverage to population centres. However, those receiving subsidy are expected to provide

wholesale services. PEBA prioritises those rollouts that require the least subsidy.. Between 2013 and 2016 the programme provided around \$144 million in subsidies to broadband operators which enabled full fibre access to 3 million households and businesses.

- In New Zealand the Rural Broadband Initiative (RBI) runs separately from the New Zealand government's main full fibre initiative Ultra-fast Broadband. The former doesn't focus specifically on FTTP (fibre-to-the-property) but rather looks to support technologies that most effectively overcome the challenges of "rurality". It is, in-part, funded by a levy on the broadband industry raising around NZ\$430 million to connect rural households and businesses to the internet or upgrade their existing connectivity. Companies tender for the contracts from an arms-length government agency. Any subsidised infrastructure has to be open access. Data produced by the New Zealand government suggest that since its inception the RBI has reached over 300,000 households and businesses in rural New Zealand.⁸⁶
- In Sweden about 15 per cent of the population live in rural areas. As part of the "Completely Connected Sweden" programme, with the support of the Rural Development Programme, the Swedish Government subsidises the rollout of full fibre to rural areas, where provision is not commercially possible. According to analysis, the share of full fibre connected households not in urban areas rose from under 5 per cent in 2010 to just under a quarter in 2016. More recently, the rural subsidy programme has been complemented by European Agricultural Fund for Rural Development (EAFRD) money which co-funds half of the investment by broadband providers in network infrastructure that connects urban areas across Sweden's northern provinces.

International policy lessons

Drawing on the international examples described in the preceding section, Table 6 sets out a number of "policy success factors" that have been influential in the comparative success of the "case study" countries. Highlighting these "elements of success" driving better roll out performance in other countries, could be helpful to UK policymakers as the latter contemplate the best "policy mix" for propelling the UK's roll out of full fibre over the coming years.

Table 6: Policy success factors

Factor	Lesson for the UK
Prioritisation	Rolling-out full fibre has to be made a top-level priority for government. Further, policy has to be coherent and long-term. Lack of commitment, short-termism and frequent alterations in policy direction (and details) will undermine the ability to achieve desired objectives. The success of South Korea in particular, but Spain and New Zealand too, is testament to prioritisation and taking a long-term approach.
Risk-sharing	The risks of undertaking big capital investments such as those required to build a full fibre broadband network are significant. Uncertainty over the likely return on such investments hold back rollout. Therefore, in order to ensure the private sector has the requisite incentives to make the socially optimal investment, governments should, where practical to do so, design full fibre

<p>Rural subsidy</p> <p>Demand-side</p>	<p>policies which help to mitigate such risks. This could take the form of public “seed” money to encourage private sector investment as the South Korean government has done, or creating new organisational structures to manage the roll out in order to share some of the risks (e.g. “uptake risks”) facing providers. This has been the case in New Zealand. Another approach is to allow joint infrastructure ventures between alternative infrastructure providers (e.g. Span) to spread the financial risk over multiple organisations.</p> <ul style="list-style-type: none"> Rural rollout is particularly challenging because of the costs of it and the associated risks this creates for infrastructure providers and investors. The lesson from other countries is that subsidies are almost certainly going to be needed to make ensure rural areas are not left out of the full fibre rollout. The experiences of Sweden, Spain and New Zealand suggest that a targeted programme can deliver results. The New Zealand approach for example, utilises an open tendering process, with robust project management and performance indicators (to ensure targets for rollout are hit). Another way of managing the risks associated with large capital investments such as full fibre rollout, is to help ensure a minimum degree of demand for full fibre broadband, especially in the early years of trying to roll it out. “Assured demand” will ensure providers who make the investment in the necessary infrastructure can obtain a return on their investment sufficient to make taking the risks associated with such investment worthwhile. South Korea implemented a comprehensive demand-side policy (utilising the state’s ability to direct public spending towards purchasing full fibre services, migrating public procurement online, fast-tracking the growth of e-government, encouraging e-literacy and e-learning and e-commerce, etc) to ensure that the communications companies that rolled out full fibre broadband across the country would find their efforts to be economical.
<p>Competition</p>	<p>Competition is a key mechanism that helped drive forward rollout in all the examples cited in this chapter. Further, in all three examples in this chapter, all the countries deliberately aimed to ensure that, not only was competition utilised, wherever possible, to deliver full fibre roll out, but that at the end of the process of infrastructure laying, a competitive broadband market would be left behind.</p> <p>The principle of “maximising competition” wherever possible, as South Korea, Spain and New Zealand have, has a number of implications for full fibre rollout policy in the UK. It suggests:</p> <ul style="list-style-type: none"> Infrastructure competition should be encouraged where practical to do so. Where contracts or subsidy are being offered out by the government transparent competitive tendering processes, for those contracts, should be in-place. Potential impediments to retail competition once the infrastructure is in-place, should be avoided. This might require guarding against the emergence of vertically integrated suppliers that have excessive market power in both wholesale and retail, and closely monitoring existing examples of such integrated ownership for risks to competition in the market. This will require a preparedness to take regulatory action if problems manifest themselves. Exemptions from competition rules should generally be avoided.

Holistic approach	<p>Many other areas of policy impact the incentives for investing in and building a full fibre network. The lessons from other countries is that changes which can increase the incentives to invest by reducing some of the obstacles (and thus costs) to laying network infrastructure e.g. those associated with obtaining permits to undertake “works”, access to dwellings and “passive utility infrastructure”.</p> <p>A key ingredient in Spain’s full fibre success has been a permissive property law environment as well as pro-active planning and building regulations. Similar factors have been important in New Zealand too. Specific areas that need to be calibrated in the right way to facilitate full fibre rollout, include:</p> <ul style="list-style-type: none"> • Planning rules, including minimising hurdles for obtaining construction and works permits. • Building regulations, which place positive obligations on construction companies and landlords to, if not build full fibre Infrastructure into properties, then, at a minimum, build-in access, which can be utilised at a later date by a provider. • ‘Rights of way’ over property including existing telecoms infrastructure such as cabinets and poles, that enable providers laying or maintaining networks to access and utilise property for telecoms equipment.
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Source: various and SMF analysis

Comparing international examples to the current UK approach

A detailed overview of the current approach being taken in the UK towards rolling-out full fibre broadband is set out in Chapter 3. The extent to which the UK’s approach, so far, has utilised any of the international policy lessons described in Table 6, is briefly explored below.

At the national policy-level, the UK has not followed the lessons offered up by other countries, who have had considerable success with full fibre roll out. The UK has not prioritised full fibre, as other countries have done. Historically consumer prices, bolstering the capabilities of traditional copper wires and rolling-out superfast (fibre-to-the-cabinet - FTTC) fixed broadband services have been prioritised over building new full fibre infrastructure to the premises.⁸⁷ Further, national full fibre policy in the UK has not had the long-term focus and profile that it has had in, for example, South Korea. The latter prioritised digital infrastructure as a key element of a wider, multi-decade approach to making South Korea one of the leading “information-based” economies in the world. UK governments have not shown the ambition or the policy coherence of South Korean governments. For example, in the UK, targets which are aimed at driving policy effort in a particular direction and benchmarking success against have changed on a frequent basis. The May Government, Future Telecoms Infrastructure Review, set a 2033 target for nationwide full fibre coverage and an interim target of 15 million premises by 2025 (which was itself was an update of a previous target of 10 million homes).⁸⁸ The current Boris Johnson led government changed the target to “nationwide gigabit broadband” coverage by 2025, which was, seemingly, a “watering down” of an initial promise of nationwide full fibre coverage by that same date.⁸⁹ Such a “changeable” approach to policy is detrimental to the kind of long-term planning needed to deliver large scale infrastructure programmes, such as nationwide full fibre connectivity.

Ofcom's new approach revolves around competition. Sustaining competition where it currently exists and a desire to see it emerge where it does not already. As described in detail earlier in this report, the Ofcom approach looks to divide the UK into different zones, based upon the intensity of the competition already taking place or likely to emerge over time in each designated part of the country. The actual or potential competitive intensity in each location will in-turn dictate the details of the regulatory approach taken towards broadband provision in the relevant part of the country. Ofcom's approach might best be classified as "partially liberalising" because it looks to facilitate private incentives to provide broadband services in areas designated as being "competitive" or "potentially competitive", for example, through the lifting of regulatory measures currently in-place. Nevertheless, the approach continues to rely (to a substantial degree) on Openreach as the main provider of much of the full fibre infrastructure, across much of the UK.⁹⁰ As a consequence, infrastructure competition is unlikely to have as central a role in the UK's full fibre roll out as it has in the successful international examples, described earlier in this chapter.

To ameliorate some of the risk of laying new full fibre network infrastructure by competitors to large incumbent providers, countries such as Spain have encouraged large-scale joint venture projects. In contrast, in the UK such approaches have played a more limited role so far. One of the more notable examples of co-investment in the UK has been the city-wide scheme in York where TalkTalk and Cityfibre (and initially Sky) undertook a joint venture to connect-up York to ultrafast broadband.⁹¹ Currently, despite its success in other countries, there are few signs that joint ventures are going to become an important mechanism for enabling the construction of new fixed full fibre broadband infrastructure in Britain.

Further, outside of specific measures aimed at supporting rural rollout, the UK government has not invested in public-private partnerships (PPP), to help deliver full fibre roll out, on any significant scale.⁹² PPP's can be useful way of reducing some of the risks associated with investment in full fibre broadband infrastructure. They have been utilised successfully in South Korea. There the government invested public money to "seed" private sector investment in broadband networks. In New Zealand, the government has taken a more elaborate approach and designed a system where the public authorities take-on the some of the "take-up" risk until the market has matured.

The UK's approach to stimulating demand for full fibre broadband has also fallen short of the best international practice. As described earlier in this chapter, assuring a degree of demand for full fibre broadband, especially in the early years where uncertainty for infrastructure providers is greatest, can help take away some of the risks associated with such significant infrastructure investments and in-turn encourage more such investment, leading to greater levels of full fibre coverage. South Korean governments acted across a number of dimensions to increase demand for full fibre, including making efforts to increase awareness among their population of the benefits of digital technologies and "nudge" individuals and businesses into taking full fibre services up. In contrast, UK governments have made limited efforts to improve awareness and encourage take-up of full fibre broadband by consumers and businesses. A demand side measure the UK has implemented is the Gigabit Voucher Scheme. This programme offers homes and small businesses in rural areas a grant to cover some of the costs of having gigabit-capable

broadband installed.⁹³ However, it is narrowly focussed and time-limited. In previous years, schemes such as the Broadband Connection Voucher Scheme aimed to stimulate demand for superfast broadband.⁹⁴ This scheme was similarly narrowly focussed and time limited. Further, such schemes, especially those aimed at SMEs are seen as having fallen short of making any notable impact.⁹⁵ In addition, efforts have been made to encourage public sector take-up of full fibre, through the Challenge Fund.⁹⁶ However, as with the efforts to stimulate up-take among individuals and businesses, such schemes fall short of the ambition and scale of the efforts of the South Korean government for example. The latter's measures were extensive, implemented over a sustained period and mutually reinforcing.

Until very recently, the UK had taken a less holistic approach to broadband policy than South Korea, Spain and New Zealand. In stark contrast to those three countries, the UK had failed to aggressively pursue measures to ease the practical obstacles to laying full fibre network infrastructure. These obstacles are often outside the purview of the lead department for broadband policy, i.e. the Department for Digital, Culture, Media and Sport. Tackling such problems, therefore, needs a degree of cross-government coordination. Other countries have, for a long time, been much more pro-active in dealing with the practical obstacles that increase the costs of constructing full fibre broadband network infrastructure. By being so, countries like Spain and New Zealand have helped reduce the costs of roll out and consequently helped incentivise quicker roll out across a greater number of properties. For example, Spain has in-place legal "rights of way" over private property, which makes access easier for providers laying or maintaining infrastructure and has had connectivity obligations in-place on those constructing new buildings for 20 years. New Zealand has been similarly pro-active, introducing legislation for example, to speed up planning and "works permissions" to reduce the costs of laying broadband infrastructure. In the UK, property access (e.g. wayleaves), public works permissions⁹⁷ and other legal obstacles have been highlighted by the communications industry on numerous occasions, as significant barriers to rolling out full fibre across the UK.⁹⁸ Many years after Spain and New Zealand implemented reforms, some efforts are being made in the UK to ease some of these difficulties. For example, reforms to the Building Regulations 2010 are due to be implemented by the current Government. These changes will place requirements on those building new homes to have infrastructure "in-built", which supports gigabit-capable connection.⁹⁹ Changes are also afoot to the Electronic Communications Code (ECC) in order to make it easier to connect up tenanted properties in residential buildings to full fibre.¹⁰⁰ Currently, it is estimated around 40% of requests to access such dwellings, to update infrastructure, do not receive any response.¹⁰¹ Further, it is suggested that the current process for obtaining a wayleave can take 6 months or more and cost £14,000.¹⁰² Changes to the ECC to speed up and cut the costs of connecting up tenanted properties will be brought-in through the Telecommunications Infrastructure (Leasehold Property) Bill.¹⁰³

Although the extent to which the ambition behind the UK's proposals meets the efforts that the Spanish and New Zealand government have made in recent decades is yet to be seen. Certainly, on the face of it, the proposed changes by the UK government appear timid, compared to those that took place in Spain and New Zealand. For example, the plans to make the process of obtaining wayleaves may shave some time off current timescales and reduce the cost of the current process, nevertheless, the new process is

still lengthy, with several formal stages to be gone through including multiple requests, albeit with a 6 week limit on how long a landlord has to reply before further steps are able to be taken.¹⁰⁴ Those further steps include a Tribunal process to get to the point of being able to compel access.¹⁰⁵

The area where the UK government is most aligned with successful international practice is in its approach to dealing with the problems of extending communications infrastructure into rural areas. Previous governments have subsidised rural rollout of broadband. The current government is continuing this approach by subsidising the roll out of “gigabit capable” networks, by committing to a £5 billion package to help ensure the 20% “hardest to reach” areas of the country are able to access full fibre or equivalent speed alternatives such as 5G.^{106 107} The example of New Zealand in particular, suggests that subsidy should be offered on the basis of a transparent competitive tendering process. Hard lessons about open competitive tendering for contracts were learnt by the UK under Phase 1 of the rollout of superfast broadband.¹⁰⁸ It is to be hoped that those lessons and proven effective practices from other countries inform the UK’s plans for supporting the rolling out of full fibre broadband to the UK’s “hard to reach” areas.

CHAPTER 5 - POLICY RECOMMENDATIONS

The previous chapters of this report have explored the state of the UK's broadband market, the current and proposed regulatory environment and how this contrasts with other countries.

Notably, the UK currently lags behind other countries in terms of access to full fibre broadband. This is despite likely long-term economic benefits from the rollout of full fibre across the country. An SMF roundtable discussion with experts convened as part of this research found widespread consensus that it is in the UK's long-term economic interests to provide nationwide coverage of gigabit-capable broadband, to meet growing demand and future-proof the country's telecommunications infrastructure.

However, our desk research, as well as arguments from roundtable participants, revealed disagreement around the appropriate way of achieving nationwide coverage of gigabit-capable connectivity. This includes concerns with the policy and regulatory stance currently proposed in the UK, both in terms of achieving nationwide coverage and ensuring that it is financed in an equitable way. This chapter sets out a series of policy recommendations for consideration by government and regulators, aimed at enhancing the current policy environment.

Ensuring consumer welfare in the transition to full fibre broadband

We are concerned that the current regulatory framework set out by Ofcom provides insufficient safeguards for UK consumers going forward.

In particular, we are concerned with the criteria which Ofcom is using to define potentially competitive broadband areas, and in turn using to justify an easing of wholesale price controls in such geographies.

Firstly, the *potential* for competition does not *guarantee* the emergence of competition in an area, meaning that price controls could be lifted prematurely before consumers and retailers (ISPs) have sufficient choice of broadband infrastructure provider.

Furthermore, the presence of genuine broadband competition in an area is not guaranteed even in localities where there are alternative networks beyond Openreach. Ofcom's approach for determining competition in an area, and setting the regulatory environment, focuses on the number of network providers without consideration for the complexities of what makes a market competitive and effective.

Critically, the number of infrastructure providers in an area is a poor gauge of underlying retail competition in the broadband market and likely impacts on consumer outcomes. As discussed earlier, consumer switching rates in the broadband market are low, suggesting a high proportion of disengaged consumers. Such a market lends itself to poor consumer outcomes, where consumers are unlikely to switch provider even in the face of price rises or "unfair" practices by some market participants. Indeed, recent research by Citizens Advice has identified a substantial "loyalty penalty" for broadband due to customers remaining on poor value tariffs rather than switching to alternative providers.¹⁰⁹

In such a market where customer switching rates and levels of engagement are relatively low, an easing of charge controls is likely to be more detrimental to consumer outcomes than is the case in a market with more engaged consumers and higher rates of switching between internet service providers. In a more engaged consumer market, we would be less concerned about the easing of charge controls, as consumers would presumably switch to better value products on better value networks.

In its approach to potentially competitive markets, Ofcom is relying on competition to protect consumer outcomes, but low customer switching rates suggest that this is likely to be an ineffective mechanism for ensuring consumer welfare (as consumers are less likely to switch provider in the face of price rises). Indeed, it is noteworthy that recent developments in the energy market, which is also characterised by low consumer switching rates, have seen government and regulators question the extent to which competition alone can guarantee consumer welfare. Retail prices for energy are now subject to a retail price cap, in an effort to protect consumers.

It is crucial that price protections and consumer safeguards for broadband are not eased prematurely, and we recommend a stronger approach to safeguarding consumers than is the case at present.

In practice this means a more dynamic approach to regulation that monitors the emergence of competition in potentially competitive areas – ensuring price controls are not eased too soon. It also means reflecting on consumer switching rates in assessments of the competitiveness of a broadband market in an area. If consumers are highly inert, and tend not to switch provider in the face of price rises, they are more likely to lose out in the event of wholesale price controls being relaxed.

Distributional outcomes in the broadband market need to be carefully considered and Ofcom needs to ensure that customers – particularly low and middle income customers – are able to access affordable broadband as the market continues to evolve.

Recommendation 1: Dynamic regulation

Ofcom should adopt a more dynamic approach to regulation, that proactively monitors the effectiveness of broadband competition in an area, and ensures that price controls are not eased prematurely.

In addition, assessments of the strength of broadband competition in an area should reflect the behaviour of consumers, including customer switching rates. If consumer engagement remains relatively low, as is the case at present, the easing of wholesale charge controls risks translating into higher prices and a loss of consumer welfare.

Recommendation 2: Equalities and affordability impact assessment

Ofcom should set out how it will protect customers in a new broadband regime and publish an equalities impact assessment illustrating how the new regime will impact households at different points of the income distribution. This must be based on realistic assumptions around customer switching rates, and reflect the fact that a significant segment of consumers are unlikely to switch even in the event of higher prices.

The assessment should show clearly how the affordability of broadband, for households of different incomes, is likely to change under the new regime.

Reducing fibre rollout costs

The focus of Ofcom's proposed regulatory regime is on providing Openreach and altnet providers with the right financial incentives for rolling out full fibre broadband. In non-competitive areas dominated by Openreach, this means Ofcom's proposed RAB approach to wholesale broadband prices, whereby Openreach can recover the costs of investment in full fibre broadband through greater charges for existing copper-based services. In potentially competitive areas, wholesale price caps are eased further, to provide stronger incentives for altnet providers (who are likely to face higher costs than Openreach) to rollout infrastructure.

This approach ultimately leaves households and businesses footing the bill for full fibre rollout, even if they are unlikely to ever want gigabit-capable broadband for their own use. There are also questions over the strength of investment incentives under this proposed approach; there is huge uncertainty over the extent to which an easing of price controls will translate into significantly greater investment in fibre. Indeed, there is also a risk of Openreach being incentivised, from higher prices and profits, to sweat its existing copper network – which would actually undermine investment in fibre.

Given this, policymakers should consider ways in which the costs of rolling out full fibre broadband can be minimised, reducing the extent to which charge controls need to be eased to incentivise fibre rollout. This requires collaboration between government and Ofcom, the regulator.

The Government has stated that road and street works account for 70% of fibre deployment,¹¹⁰ suggesting that reducing costs and inefficiencies associated with this could significantly curtail the cost of fibre rollout. The National Infrastructure Commission has recommended that local authorities appoint a “digital champion” acting as a single point of contact for telecommunications companies, in turn streamlining the process around permissions for street works. It has also been suggested that better coordination of street works between telecommunications and other utility providers (such as energy and water) could generate efficiency savings.¹¹¹

As discussed in the previous chapter, Spain provides insights into the role government can play in encouraging the rollout of full fibre broadband, through a built environment that makes it easy to build telecommunications infrastructure and repair it. Requiring (new) building accommodation to include telecommunications ducts would reduce the

costs of fibre rollout through reducing issues associated with a lack of access points to premises.

Recommendation 3: Digital champions

Local government should adopt the approach suggested by the National Infrastructure Commission of appointing local authority digital champions. These champions would act a single point of contact for telecommunications companies in local areas, and create efficiencies in processes such as granting permission for street works. The Digital Champion should also seek to coordinate broadband infrastructure work with other street work such as those related to the water and gas networks. The potential for street work cost sharing should bring down some costs of fibre rollout.

Recommendation 4: New build policy

Government should require new buildings, such as apartment blocks, to have easy-access telecommunication ducts, reducing barriers to accessing premises and providing fibre connectivity. In addition, the Government should pursue its intention to legislate to ensure that new homes are built with gigabit-capable broadband from the outset, as reiterated in the March 2020 Budget.

Another consideration in containing the cost of gigabit broadband rollout is the extent to which the focus should be on fibre broadband over other ways of delivering ultrafast connectivity such as 5G. While much of the public and political debate has focused on fibre connectivity, it has been acknowledged that alternative approaches might be better in some instances. 5G might be an effective way of connecting homes in remote areas, for example, though the nano-masts used for 5G are typically reliant on being themselves connected by fibre¹¹². Virgin Media has suggested, that it will soon be able to provide gigabit download speeds over copper-based coaxial cables¹¹³. It is important that the approach by government and regulators is technology agnostic, and considers the most efficient means of providing gigabit capable broadband across the country.

Recommendation 5: Technology agnosticism

Government and regulators should maintain a technology agnostic approach to gigabit-capable rollout, which acknowledges the potential case for alternative technologies such as 5G and coaxial cables to provide high speed connectivity more cost effectively than fibre, in some instances.

Demand management

Another concern that we have with the proposed policy framework is the lack of focus on demand management with respect to fibre broadband. This is despite the fact that stimulating demand for full fibre broadband reduces the rollout risk for infrastructure providers and therefore strengthens investment incentives.

Research by Frontier Economics has highlighted that the lack of certain demand for higher bandwidth broadband may undermine the investment case for fibre, given the high up-front costs associated with network deployment.¹¹⁴

There is much that government could do to strengthen underlying demand for gigabit broadband. This includes through central and local government itself committing to using the service. The case of South Korea highlights the benefits that can be realised from government being proactive in encouraging demand for broadband services. A nationwide campaign raising awareness among the business community of the commercial benefits of gigabit connectivity could go a long way in providing network providers with the reassurance of uptake for fibre broadband services. Highlighting the benefits of e-government services would also support fibre demand among government, businesses and households.

It has been argued that demand-side subsidies, such as temporary voucher schemes, might be an appropriate and justifiable way of building demand for fibre broadband. Part of the government's rationale for the Broadband Connection Voucher Scheme for businesses that ran from 2014 to 2016 was that it would capture "value that is not accounted for in an individual SME's assessment of the benefits of the investment, such as the value of improved industry collaboration and spill-over effects in the supply chain." The existence of such positive economic externalities from full fibre uptake strengthen the case for government subsidies. This is because, without subsidy, businesses and consumers would only consider the benefits to themselves from better broadband connectivity, rather than the wider societal benefits. Such a situation would lead to sub-optimal uptake on fibre, and in turn likely underinvestment in full fibre rollout.

Having said that, it is crucial that any such voucher or subsidy scheme is well-targeted and efficient. With respect to the Broadband Connection Voucher Scheme, which aimed to encourage businesses and third sector organisations to pay for the installation of improved internet connections, the Federation of Small Businesses has argued that the scheme was inefficient and failed to bring benefits to a significant number of businesses.¹¹⁵

The case of New Zealand discussed in the previous chapter highlights the role that government can play in managing the uptake risk faced by network providers, until demand for fibre broadband products become more established. If government is willing to bear some of the financial risk associated with rolling out fibre broadband, with a view to recouping costs upon nationwide rollout and retirement of the copper network, this could significantly increase the speed and prevalence of rollout across the country. It has been suggested that such an approach has not been possible in the UK due to stringent EU State aid rules¹¹⁶ – something that could change as the country diverges from EU laws and regulations following Brexit.

Recommendation 6: Government purchasing of full fibre

Central and local government should commit to purchasing full fibre broadband services, as a means of providing some certainty of demand for such products. This should be complemented with efforts to demonstrate the benefits of full fibre broadband to businesses and consumers. Government should also use full fibre to push forward household and business use of e-government services.

Recommendation 7: Expanded role for government

Examine the case for an expanded role for government in managing the uptake risks of rolling out full fibre broadband, including through adopting an approach similar to the Local Fibre Companies of New Zealand, where government and the private sector have shared risks. Departure from EU rules following Brexit, including state aid rules, opens up the possibility for such models to play a role in the rollout of fibre broadband across the UK. This would strengthen government support for full fibre rollout beyond current initiatives, such as the £5bn of package of funding recently announced to help build gigabit-capable connectivity in rural areas and other “hard to reach” geographies.¹¹⁷

Beyond copper – retiring the legacy network

Question marks remain over consumer outcomes if and when the copper telecommunications network is retired. Ofcom has stated that it wants “our regulation to support a smooth transition from the legacy copper network to the new fibre network while protecting consumers and ensuring that there are not households left behind”.

As discussed in this report, Ofcom’s proposed approach would see charge controls eventually lifted for the copper network once complete coverage of ultrafast services is achieved. At the same time a new charge control would be introduced for fibre services – specifically the Openreach 40/10 service viewed as an “anchor product” by Ofcom.

Critically, Ofcom proposes that a 40/10 product would be the only charge control in an exchange area where copper controls have been removed following ultrafast deployment to an exchange. Openreach would also be *required* to provide a wholesale 40/10 Mbit/s service on its fibre network – ruling out the possibility of this simply not being offered.

Ofcom has acknowledged that the retirement of the copper network carries potential risks to consumer welfare. This includes risks to those reliant upon analogue telephony services, such as care alarms. In addition, broadband customers affected by the retirement of copper might have to migrate to a faster service, which may be more expensive. As we have shown in this report, a significant proportion of broadband customers in the UK are driven more by price/good value than by the need to have the “latest and greatest” internet connectivity.

It is crucial that the market provides appropriate products for such value-conscious customers once the copper network is retired. While continued charge controls for 40/10

broadband will protect some consumers, the approach currently proposed arguably does not provide sufficient safeguards for those that currently use faster copper-based broadband services, and do not wish to pay more for faster, full fibre internet. Going forward, Ofcom should consider the case for higher speed anchor products, subject to charge controls and a requirement for Openreach to provide such anchor products. This would ensure more consumers are protected following migration to the fibre network.

Recommendation 8: Strengthening of consumer safeguarding following retirement of the copper network

Current proposals to safeguard consumers following the retirement of the copper network need to be strengthened, with Ofcom requiring Openreach to provide new anchor products at speeds greater than 40/10 Mbit/s. Providing more anchor products will ensure consumers are able to access the right broadband services, at the right price points following copper retirement – and prevent consumers being “pushed” onto more expensive ultrafast broadband services.

APPENDIX A

Proposed regulation in potentially competitive areas

	Network access	Charge control	Quality of service ^{viii}	Equivalence of inputs / non-discrimination ^{ix}	Prohibition of geographic discounts
MPF – metal path facility	Yes. Remove General Access Requirement for new copper services	Inflation-adjusted from 2021 levels	As of 31 March 2021	Yes	Yes
Copper 40/10 (FTTC)	Yes	Inflation-adjusted from 2021 levels	As of 31 March 2021	Yes	Yes
Copper (FTTC higher bandwidths)	Yes	No	As of 31 March 2021	Yes	Yes
Fibre broadband	Yes	No	No	Yes	Yes
Leased lines up to 1 Gbit/s	Yes	Inflation-adjusted from 2021 levels	As of 31 March 2021	Yes	Yes
Leased lines above 1 Gbit/s	Yes	Inflation-adjusted from 2021 levels	As of 31 March 2021	Yes	Yes
Dark Fibre	No	No	No	No	No

Source: Ofcom (2019)

^{viii} Ofcom is aware that in some instances BT has significant market power – therefore their initial view is that quality of service requirements are likely to be necessary to support competition and provide customer benefits.

^{ix} A non-discrimination obligation is a complementary remedy to the network access obligation, primarily to prevent the dominant provider from discriminating in favour of its own downstream divisions in a way that would harm competition and competing telecoms providers.

Proposed regulation for non-competitive areas

	Network access	Charge control	Quality of service^x	Equivalence of inputs / non-discrimination^{xi}	Prohibition of geographic discounts
MPF – metal path facility	Yes. Remove General Access requirement for new copper services.	Charge control based on RAB approach	As of 31 March 2021	Yes	No
Copper 40/10 (FTTC)	Yes	Charge control based on RAB approach	As of 31 March 2021	Yes	No
Copper (FTTC higher bandwidths)	Yes	Charge control based on RAB approach	As of 31 March 2021	Yes	No
Fibre broadband	Yes	No	No	Yes	No
Leased lines up to 1 Gbit/s	Yes	Inflation-adjusted from 2021 levels	As of 31 March 2021	Yes	No
Leased lines above 1 Gbit/s	Yes	Inflation-adjusted from 2021 levels	As of 31 March 2021	Yes	No
Dark Fibre	Yes	Yes – Cost based	Yes	Yes	No

Source: Ofcom (2019)

^x Ofcom is aware that in some instances BT has significant market power – therefore their initial view is that quality of service requirements are likely to be necessary to support competition and provide customer benefits.

^{xi} A non-discrimination obligation is a complementary remedy to the network access obligation, primarily to prevent the dominant provider from discriminating in favour of its own downstream divisions in a way that would harm competition and competing telecoms providers.

ENDNOTES

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- ³⁴ <https://www.gov.uk/guidance/building-digital-uk>
- ³⁵ <https://www.gov.scot/publications/reaching-100-superfast-broadband/>
- ³⁶ <https://gigabitvoucher.culture.gov.uk/>
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- ³⁸ HM Treasury, *Budget 2020: delivering on our promises to the British people* (2020)
- ³⁹ PRISM & TACTIS, *Costs for digital communications infrastructures* (2017)
- ⁴⁰ DCMS, *Future telecoms infrastructure review* (2018)
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- ⁴² HM Treasury, *Budget 2020: delivering on our promises to the British people* (2020)
- ⁴³ It should be noted that EU member states operate within a supranational communications regulatory framework, which creates a considerable degree of uniformity among the policies of member states towards telecommunication issues. Most recently there has been the BEREC (Body of European Regulators for Electronic Communications) Regulation and the European Electronic Communications Code Directive. Older EU legislation shaping the policies of the member states include the 2002 Framework Directive for Electronic Communications Networks and Services, among numerous others.
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- ⁴⁵ The UK and South Korea are countries with similar GDP per Capita (on a US\$ PPP basis). Source: <https://www.imf.org/external/datamapper/PPPPC@WEO/OEMDC/ADVEC/WEOWORLD>
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- ⁵⁷ Being able to hone rollout methods and find small efficiencies in the deployment of full fibre in the early stages of rolling out the network in more densely populated areas can help reduce costs and improve incentives for rollout into more marginal areas. Source: Soria, B et al. Telecommunications Infrastructure International Comparison: A Report for the Department for Digital, Culture, Media and Sports. (2018).
- ⁵⁸ Falch, M. Penetration of Broadband Services: The Role of Policies?. Telematics and Informatics. Vol 24. No 4. (2007).
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⁸⁰ According to the New Zealand Government the project is ahead of schedule, with more than 1 million households and businesses having access to full fibre with 79 per cent of New Zealanders 'benefiting' from the UFB programme. Source: Crown Infrastructure Partners. Quarterly Connectivity Update: Q3: to 30 September 2019. (2019).

⁸¹ Under New Zealand law, 'deemed consent' applies differently depending on the nature of the installation:

Category 1 installations are ones with no lasting impacts on the shared property, e.g., a fibre cable buried in grass on the side of a driveway. For such installations, network providers installing fibre won't need consent but must provide neighbours with no less than 5 working days' notice.

Category 2 installations are those which have lasting impacts, e.g., digging into and resealing a small part of a concrete drive to conceal a cable. In such circumstances local residents will be provided a high-level design of what is proposed and have 15 working days to object, based on a limited number of grounds.

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⁹⁴ The Broadband Connection Voucher Scheme ran from 2013 to 2015. According to government sources it distributed over 50,00 vouchers to SMEs during the schemes time. Accessible at: <https://www.gov.uk/guidance/building-digital-uk#programmes-closed-to-new-applicants>

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¹¹⁰ DCMS, DfT, *Street Works Toolkit*, 23 May 2019.

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