

# CONNECTED NATIONS 2016



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NORTHERN IRELAND



# About this document

The United Kingdom depends on various infrastructures, and none is more important than the nation's communications.

Fast, reliable communications enable businesses to generate prosperity and employment, and our countries to compete. They empower every citizen to take a full part in society and benefit from life's opportunities.

Communications also save lives, bind families and friends together, and bring us content ranging from the urgent and vital to the wonderfully trivial.

Part of Ofcom's role is to make sure that, as far as possible, we can make the calls we want to, where we need to. And that the internet can serve us at speeds that give everyone a good experience at the very minimum.

This annual report tracks the communications providers' progress in growing the availability of good communications, and how the UK is working towards a robust and visionary next generation of services.

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## Section 1

# Connected Nations – Northern Ireland

## Introduction

- 1.1 Access to high quality fixed-line and mobile communications services is increasingly vital for consumers and businesses.
- 1.2 Over the last decade there has been extensive development of networks in Northern Ireland but some areas still don't have an acceptable level of service.
- 1.3 While challenges remain in extending coverage to harder to reach areas, continued investment by communications providers and government means more people in Northern Ireland now have access to high speed fixed-line and mobile services than ever before.
- 1.4 This latest Connected Nations report for Northern Ireland shows:
  - Fixed-line superfast broadband (SFBB) coverage in Northern Ireland has increased six percentage points (pp) to 83% over the last year
  - Across Northern Ireland, 92% of premises can receive 10Mbit/s (which leaves just over 63,000 premises unable to support these speeds). Of these, around 59,000 are in rural areas.
  - The percentage of premises that can't get 2Mbit/s has fallen two pp to 3% (or just over 24,000 premises)
  - 80% of premises in Northern Ireland have indoor voice coverage from all four operators, while 70% have data coverage from all four.
  - 4G indoor premises coverage for all four operators has increased by 27pp to 64%, giving Northern Ireland the second highest coverage of the UK constituent nations behind England (76%).

## Improving fixed-line broadband availability

- 1.5 Despite the increase in the availability of superfast broadband and mobile services over the last year, challenges remain.
- 1.6 Availability of these services, not just in Northern Ireland but right across the UK, is lower in rural areas. This is because of the increased costs of deploying communications infrastructure to serve areas where there are few customers or where the costs of building infrastructure are high.
- 1.7 A major challenge to the roll out of fixed superfast broadband services is the longer line lengths in more rural parts of the UK - the distance between the premise and the nearest fibred cabinet or exchange.
- 1.8 These distances cause serious deterioration of the physical properties of the broadband signal resulting in slower data speeds, meaning that even when fibre-connected cabinets are built, superfast speeds are not always available to the end

user. Customers further than 300m from a cabinet can expect their speeds to be less than half the maximum possible.

- 1.9 The effect is most keenly felt in Northern Ireland where the rural population is more evenly spread and where average line lengths are the longest in the UK. This is partly the result of differences in local planning regulations which have permitted a proliferation of single dwellings in rural areas.
- 1.10 The best way to improve fixed broadband speeds to these more rural properties is to shorten the distance between them and their nearest exchange or fibre enabled cabinet. This can be done in different ways but, in all cases, entails deploying more fibre, which in rural areas comes at a higher cost per premise than in urban areas.
- 1.11 In these circumstances, such investment is unlikely to deliver a commercial return. As a result, a number of government funded UK-wide and regional initiatives have been undertaken to help fill this gap. These include several schemes in Northern Ireland, with the Executive's Superfast Broadband Roll-out Programme ongoing and due to be completed by the end of 2017.

## Next steps

- 1.12 The completion of the Superfast Broadband Roll-out Programme will see the number of premises able to receive these higher speeds continue to increase and further initiatives are in the pipeline both in Northern Ireland and at a UK-wide level.
- 1.13 "Improving internet connectivity" was included as a performance indicator in the Northern Ireland Executive's Draft Programme for Government Framework 2016-2021, which may lead to further investment in Northern Ireland's broadband infrastructure.
- 1.14 The UK Government announced in November 2015 that a new right to broadband (or 'universal service obligation') will be introduced by 2020. The universal right should be set initially at 10Mbit/s for everyone, and then rise in line with consumer demand over time. Ofcom is working with the government to make this happen.
- 1.15 Given that Northern Ireland, along with Wales, has the highest proportion of premises that are unable to receive 10Mbit/s presently (92% versus 95% for the UK as a whole), the USO will be of significant benefit in Northern Ireland.

## Improving mobile coverage

- 1.16 Coverage of mobile services in Northern Ireland has improved in recent years. Over the last year alone, the percentage of premises with access to 4G services from the four main mobile network operators has improved 27pp to 64%. However, as with broadband, coverage is less extensive in rural areas.
- 1.17 The decision to provide mobile coverage in a particular area is a commercial judgement by the mobile network operators but a number of industry, government, and regulatory initiatives should see coverage increase from present levels.
- 1.18 As already indicated, roll-out of 4G networks in Northern Ireland, which support higher speed mobile data services, has accelerated over the last year and will continue over the coming years.

- 1.19 A key factor in ensuring that consumers and businesses in Northern Ireland enjoy the benefits of 4G at the same time as those in other parts of the UK is the specific nations coverage obligation that Ofcom attached to the 4G spectrum licence won by Telefonica UK (O2).
- 1.20 This requires it to provide indoor reception to at least 98% of the UK population and at least 95% of the populations of Scotland, Wales and Northern Ireland by the end of 2017. Other operators are at least likely to match this coverage.
- 1.21 Ofcom is already assessing how we can impose new obligations on future wireless spectrum auctions airwaves to increase mobile coverage further, especially in rural areas.
- 1.22 The 700 MHz spectrum band is particularly well suited to providing better coverage. This band will be available for mobile use by the end of 2021 and potentially up to two years earlier. Again, this is likely to be especially relevant in Northern Ireland, where a greater percentage of the population live in rural areas.

## Section 2

# Fixed broadband in Northern Ireland

## Scorecard for 2016

| Fixed broadband networks   | Northern Ireland | UK       |
|--|------------------|----------|
| <b>Coverage of broadband faster than:</b>                              |                  |          |
| >=2Mbit/s  | 97%              | 99%      |
| >=5Mbit/s  | 94%              | 98%      |
| >=10Mbit/s   | 92%              | 96%      |
| <b>Superfast broadband coverage (% of premises with &gt;=30Mbit/s)</b> | 83%              | 89%      |
| <b>Superfast broadband coverage in rural areas (% of premises)</b>     | 52%              | 59%      |
|  |                  |          |
| <b>Fixed broadband take-up (% of premises)</b>                         | 78%              | 78%      |
| <b>Superfast take-up (% of premises)</b>                               | 34%              | 31%      |
|  |                  |          |
| <b>Average broadband speed (download)</b>                              | 34Mbit/s         | 37Mbit/s |
| <b>Average broadband speed (upload)</b>                                | 4Mbit/s          | 4Mbit/s  |
|  |                  |          |
| <b>Average broadband download speeds by settlement type:</b>           |                  |          |
| Urban  | 39Mbit/s         | 40Mbit/s |
| Rural  | 21Mbit/s         | 23Mbit/s |
|  |                  |          |
| <b>Data use (Average monthly)</b>                                      | 125GB            | 132GB    |

## Key points

- 2.1 The quality and reach of fixed broadband infrastructure in Northern Ireland has improved considerably over the last few years, both in terms of technology and services offered. Superfast broadband is now available to more than 80% of homes and small businesses and continuing investment by industry and government will ensure further increases in coverage over the next few years.
- 2.2 We note, however, that many consumers still cannot access adequate broadband speeds and have highlighted government and industry initiatives to improve the quality of broadband services further.
- 2.3 This year's Connected Nations report shows:
  - 2.3.1 Superfast broadband ( $\geq 30$ Mbit/s) is available to 83% of premises in Northern Ireland, up from 77% last year.
  - 2.3.2 Superfast broadband is available to 52% of premises in rural areas, up from 40% last year.
  - 2.3.3 Across Northern Ireland, 92% of premises can receive 10Mbit/s (which leaves just over 63,000 premises unable to support these speeds). Of these, around 59,000 are in rural areas.
  - 2.3.4 Average broadband speeds in Northern Ireland have increased to 34Mbit/s, up from 28Mbit/s in 2015.
  - 2.3.5 Average data use per broadband line in Northern Ireland is up 34% to 125GB.

### How is superfast broadband delivered?

*Fibre to the cabinet (FTTC):* This describes a superfast broadband connection that uses a fibre optic connection from the exchange to the street cabinet and a copper cable to connect the cabinet to the home or office. Providers such as BT, Sky and TalkTalk offer FTTC services.

*Cable:* This is a similar concept to FTTC, but the connection between the cabinet and the home or office is made of a particular type of copper cable that can offer very high speeds. Virgin Media offers this kind of service, delivering superfast broadband and television services over its cable network.

*Fibre to the premises (FTTP):* This describes a service that uses fibre from the exchange directly to the consumer's home or office. FTTP, or "full fibre" networks can deliver very high speeds.

*Wireless:* This describes a service that uses a wireless connection between the consumer's home or office and the provider's network. This kind of service is often based on similar technologies to those used in mobile networks and can deliver superfast speeds.

## Government interventions

- 2.4 A Superfast Broadband Roll-out Programme is currently under way to lift broadband speeds for up to 39,000 premises across Northern Ireland to 24Mbit/s or higher. The

£17m scheme is jointly funded by the Department for the Economy (DfE), the Department of Culture, Media & Sport (DCMS), and BT.

- 2.5 The main elements of the scheme include: some re-engineering of BT's network; additional fibred cabinets; and new fibre to the premises nodes. The roll-out is due to be completed by December 2017.
- 2.6 The scheme will utilise existing technologies such as Fibre to the Cabinet (FTTC) and Fibre to the Premise (FTTP). The scheme will also be able to be upgraded and evolve to take advantage of new technologies and delivery techniques, as and when they become available, such as Fibre to the Remote Node (FTTRN) and Vectoring, both of which are still in the development and trial stages.
- 2.7 This programme builds on the £23.7m NI Broadband Improvement Project, completed in Q1 2016, which was aimed mainly at improving speeds for around 45,000 premises that were previously only able to achieve download speeds of less than 2Mbit/s.
- 2.8 Prior to these schemes, the £52m Next Generation Broadband Project, completed in 2012, helped raise broadband speeds by laying fibre to more than 2,400 street cabinets, considerably expanding Northern Ireland's fibre footprint.

### Subsidised satellite services for rural areas

- 2.9 As well as deploying more fibre to rural areas, the Department for the Economy (DfE) is promoting alternative solutions to fixed-line services, such as satellite, which is especially effective in providing broadband to more remote rural areas.
- 2.10 A subsidised satellite broadband scheme aimed at homes and businesses that are still unable to get a broadband service of at least 2Mbit/s was launched in Northern Ireland in January 2016. The UK-wide scheme, administered by DfE in Northern Ireland, provides a code to eligible homes and businesses. The code can be used with a selected number of providers to obtain a subsidised satellite broadband service including, in most cases, a free satellite dish and installation worth up to £350. The scheme is due to run until the end of 2017.

### Superfast broadband available to more than 80% of premises

- 2.11 Superfast broadband services ( $\geq 30$ Mbit/s) are now available to 83% of premises in Northern Ireland, compared to 77% in 2015.

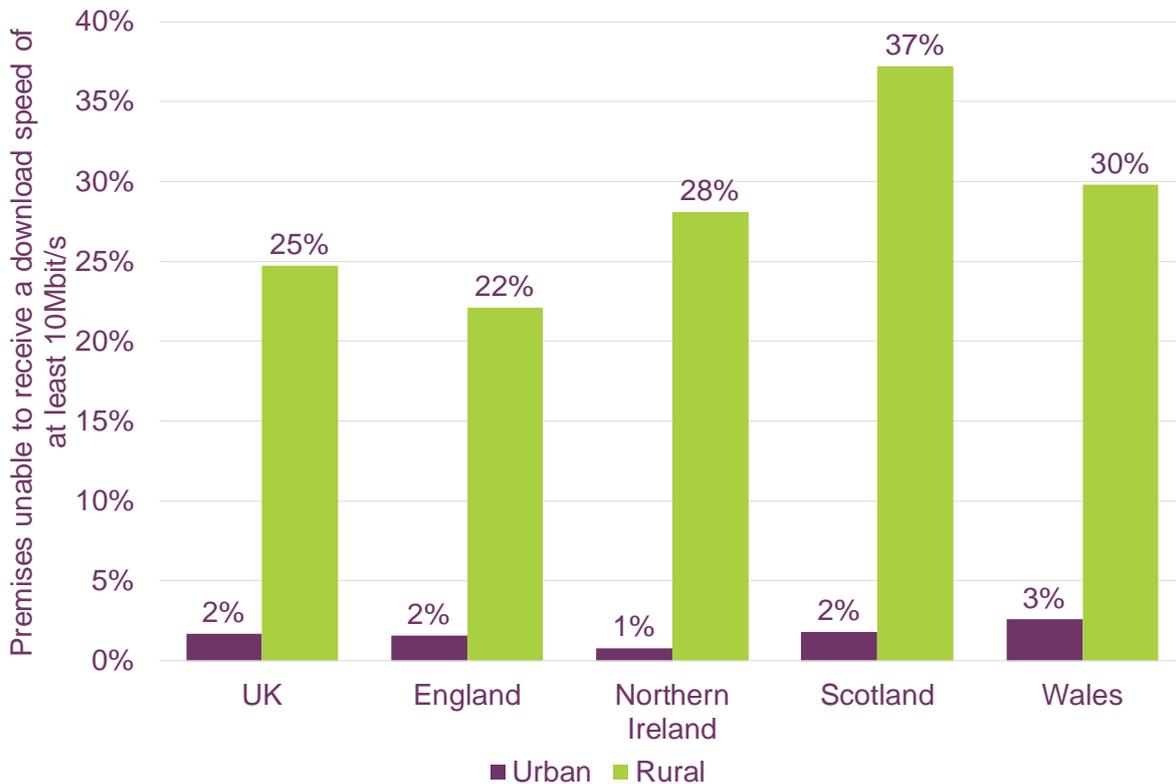
**Figure 1: Coverage of superfast broadband ( $\geq 30$ Mbit/s)**

|          | 2016 | 2015 | 2014 |
|----------|------|------|------|
| UK       | 89%  | 83%  | 75%  |
| England  | 90%  | 84%  | 77%  |
| Scotland | 83%  | 73%  | 61%  |
| Wales    | 85%  | 79%  | 55%  |
| NI       | 83%  | 77%  | 77%  |

Source: Ofcom analysis of operator data

- 2.12 Despite the increase in coverage of superfast services, many homes and small businesses still are unable to receive broadband speeds that are adequate to perform a range of common online activities. Just over 24,000 premises in Northern Ireland, around 3% of the total, cannot get a download speed of more than 2Mbit/s and over 41,000 premises (6%) cannot get 5Mbit/s. Some 63,000 premises (8%) cannot get a download speed of 10Mbit/s, which is the level the UK Government has indicated it will set for its proposed Universal Service Obligation.
- 2.13 As Figure 2 shows, the problem is more acute in rural areas, not just in Northern Ireland but right across the UK. More than a quarter of premises in rural areas of Northern Ireland can't get a service with a download speed of 10Mbit/s.
- 2.14 Of the 63,000 premises that cannot get a download speed of 10Mbit/s, around 59,000 are in rural areas.
- 2.15 As we explain below, one of the main reasons for poor broadband speeds in rural areas is the length of the connection to the property.

**Figure 2: Premises unable to receive a download speed greater than 10Mbit/s, by rurality**



Source: Ofcom analysis of operator data

### Why are broadband speeds lower in rural areas?

The distance between the premises and the exchange has an impact on the quality of service received, and in particular the speed of a consumer's connection. Consumers who live in less densely populated parts of the UK are more likely to live further from the exchange, and therefore achieve lower broadband speeds.

The resistance of copper wire increases with the length of the wire, so speeds decay as the distance between the premises and the exchange increases. Speeds typically start to decrease between 1 and 2km from the exchange and are reduced considerably at distances more than 3.5km.

FTTC-based broadband uses optical fibre to the cabinet and therefore the length of copper wire is reduced. It can currently support superfast speeds up to 80Mbit/s. However, as some copper wire remains between the cabinet and the premises, there can be some decay in speeds for customers located a long way from a cabinet. Customers further than 300m from a cabinet can expect their speeds to be less than half the maximum possible.

The effect is most keenly felt in Northern Ireland where the rural population is most evenly spread. The result is that Northern Ireland has the longest average line lengths and four times the UK average number of telegraph poles per capita.

### More than a quarter of premises can get 100Mbit/s broadband services

- 2.16 Alongside the continuing roll-out of superfast services, a new range of broadband services are now increasingly available that offer download speeds of several hundred Mbit/s or higher. These services are enabled via upgrades to the capacity of existing networks or by new technologies such as FTTP.
- 2.17 The coverage of these services in Northern Ireland and across the UK is broadly unchanged from 2015.

**Figure 3: Coverage of faster broadband services with download speeds of 100Mbit/s or higher**

|                  | Coverage of premises, %              |                                      |                                    |
|------------------|--------------------------------------|--------------------------------------|------------------------------------|
|                  | Download speed of at least 100Mbit/s | Download speed of at least 300Mbit/s | Download speed of at least 1Gbit/s |
| UK               | 46%                                  | 1.7%                                 | 0.8%                               |
| England          | 49%                                  | 1.9%                                 | 1.0%                               |
| Northern Ireland | 27%                                  | 0.2%                                 | 0%                                 |
| Scotland         | 36%                                  | 0.2%                                 | 0.2%                               |
| Wales            | 22%                                  | 0.7%                                 | 0.2%                               |

Source: Ofcom analysis of operator data

## Fixed line broadband speeds in urban and rural areas

- 2.18 The average download speed delivered to premises in Northern Ireland is 34Mbit/s. This has increased from 28Mbit/s last year and reflects increasing availability and take-up of superfast services.
- 2.19 For reasons already outlined above, average download speeds are lower in rural areas (21Mbit/s).

**Figure 4: Download, upload and data usage in urban and rural areas of Northern Ireland**

|                        | Average download sync speeds (Mbit/s) | Average monthly data usage (GB) | Average upload speeds (Mbit/s) |
|------------------------|---------------------------------------|---------------------------------|--------------------------------|
| Northern Ireland       | 34                                    | 115                             | 4                              |
| Northern Ireland Urban | 39                                    | 122                             | 4                              |
| Northern Ireland Rural | 21                                    | 96                              | 4                              |

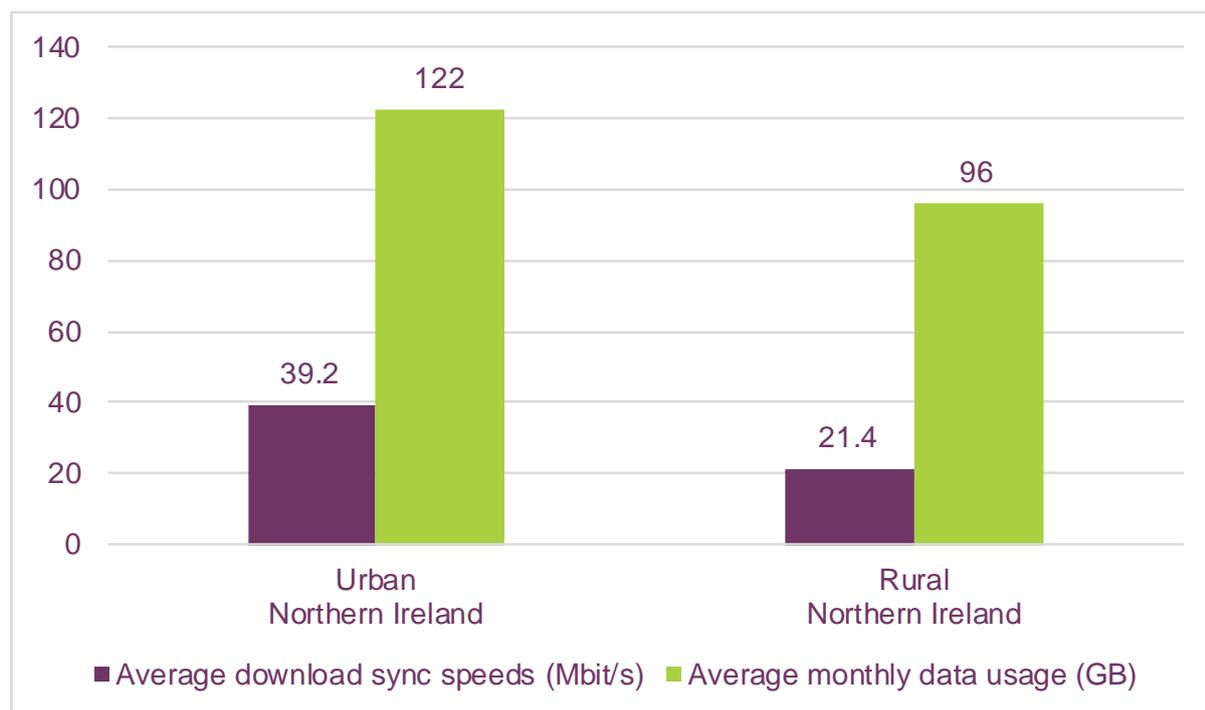
Source: Ofcom analysis of operators' data

- 2.20 Average broadband download speeds in rural areas of Northern Ireland are around half of those achieved in urban areas. This situation is similar to rural parts of England, Scotland, and Wales and is caused by the longer distances between premises and their nearest fibred cabinet or exchange.
- 2.21 While download speeds have increased, upload speeds have remained static. This is a concern, as an increasing number of popular online services require good upload, as well as download, speeds, such as social media sites and cloud backup services.

### Data usage declines with sync speeds

- 2.22 On average, households in Northern Ireland consumed 115GB of data per month over the past year, up from 77GB in 2015. As in previous years, there is evidence that households with higher speed connections are consuming significantly more data, especially those with superfast speeds.

**Figure 5: Download speeds and data use in urban and rural areas**



Source: Ofcom analysis of operator data

2.23 Consumers who take up superfast broadband will find that the faster download and upload speeds will enable them to use a much wider range of multimedia applications than they could with slower connections. They include:

- 2.23.1 Online video services, such as You Tube, iPlayer and Netflix. These services offer video for download or streaming in standard, high and, increasingly, ultra-high definition formats;
- 2.23.2 Video calling services, such as Skype or Apple’s FaceTime; and
- 2.23.3 Cloud-based services for back-up of data or sharing content with friends or colleagues.

**Figure 6: Superfast availability in urban and rural areas by operator**

|                        | Virgin Media SFBB | BT SFBB |
|------------------------|-------------------|---------|
| Northern Ireland       | 29%               | 86%     |
| Northern Ireland Urban | 41%               | 98%     |
| Northern Ireland Rural | 0%                | 56%     |

Source: Ofcom analysis of operator data

- 2.24 BT’s broadband network covers the whole of Northern Ireland. Virgin Media’s footprint is smaller and focussed in Greater Belfast and Derry / Londonderry. Its services are available to 29% of premises across Northern Ireland, rising to 41% in urban areas. In the last year, Virgin Media has begun expanding its network again, primarily around the edges of its existing coverage footprint.

## USO for Broadband

- 2.25 Ofcom has been asked<sup>1</sup> by the Department for Culture, Media and Sport to provide technical analysis and recommendations to support the design of the broadband Universal Service Obligation (USO).
- 2.26 The Government has said that its ambition is for a download speed of 10Mbit/s to be available to all on reasonable request. We have published a detailed report on the USO which examines how the provision of USO could work in practice. It also considers how the specification of the USO could affect both the number of premises that are eligible and the costs that could result in meeting the specification if the Government makes a decision to implement it.
- 2.27 Currently around 5% of premises in the UK cannot receive a download speed of 10Mbit/s, a figure which has come down significantly over time - it was 15% in 2014. While small in percentage terms, it should be remembered that 5% represents around 1.4m premises. Furthermore, a far greater proportion of rural premises are unable to receive a speed of 10Mbit/s than urban premises, and Wales, Scotland and Northern Ireland have a greater proportion of premises unable to do so.

## Access to broadband for small businesses in Northern Ireland

- 2.28 Providing all SMEs with access to superfast broadband services is vital for improving efficiencies of business and providing equal opportunities to participate and utilise the benefits of a digital economy.
- 2.29 SMEs in Northern Ireland, Scotland and Wales experience relatively low levels of superfast coverage, compared to the UK as a whole. This reflects the lower availability of superfast broadband in these areas overall. More generally, many SMEs are based in rural areas or in business parks, areas that to date have not been targeted for network upgrades.

**Figure 7: Analysis of superfast broadband coverage for SMEs in Northern Ireland**

|  | 2016 | 2015 |
|--|------|------|
| Total superfast coverage, premises                             | 83%  | 77%  |
| Superfast coverage for SMEs with 1 or more employees, premises | 71%  | 66%  |

Source: Ofcom analysis of operator data

- 2.30 With Government funded interventions continuing in tandem with ongoing operator investment, we expect the availability of superfast broadband to further increase for SMEs, and for all consumers more generally over the coming years.

<sup>1</sup> [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0027/53676/dcms\\_letter.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0027/53676/dcms_letter.pdf)

2.31 It is worth noting that while lower, on average, the availability of higher speed services to SMEs in Northern Ireland has increased over the last year.

**Figure 8: Analysis of superfast coverage for SMEs in Northern Ireland, by business size**

|  | 2016 | 2015 |
|--|------|------|
| Superfast coverage for SMEs with 1 or more employees, premises | 71%  | 66%  |
| Micro (excluding sole traders)                                 | 70%  | 64%  |
| Small  | 77%  | 71%  |
| Medium   | 77%  | 75%  |

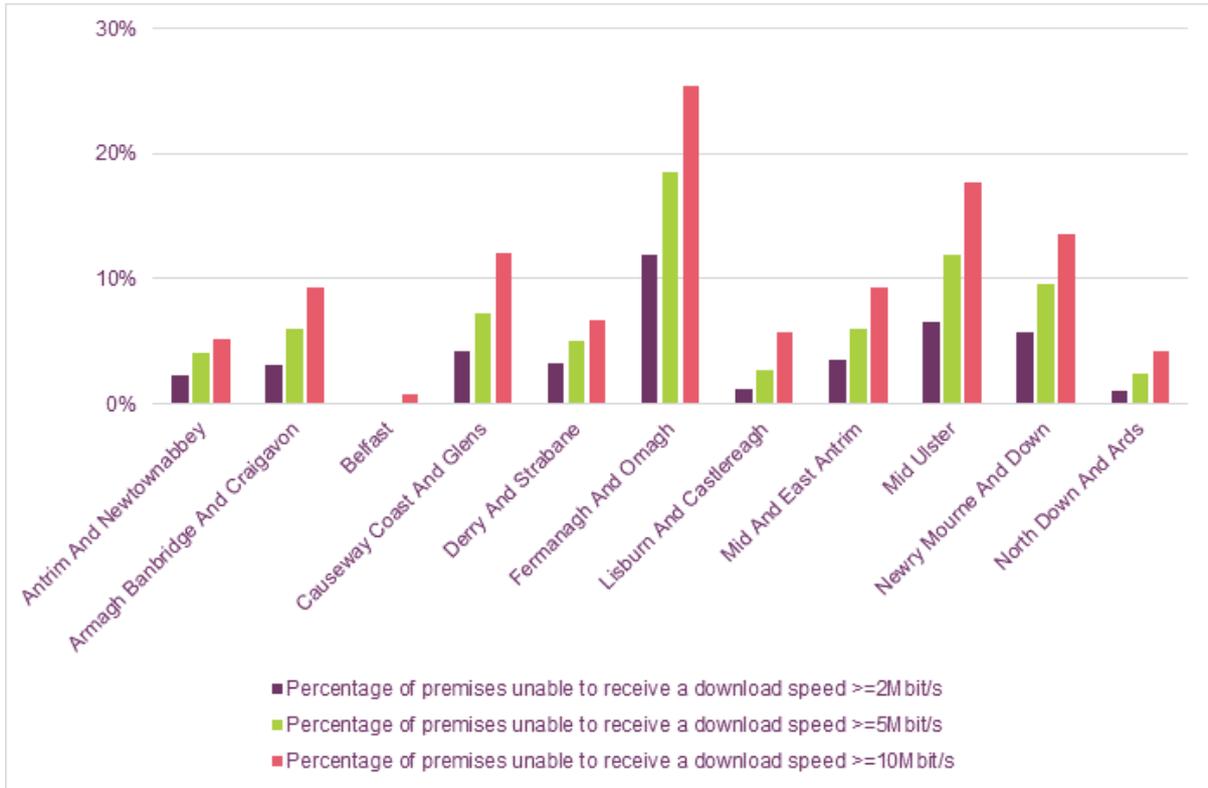
Source: Ofcom analysis of operator data

### Data at a Local Authority Level in Northern Ireland

2.32 This section provides an overview of some of the data available at local authority level in Northern Ireland. Maps which cover more data at a local authority are available on our website <http://maps.ofcom.org.uk/check-coverage>

2.33 Following the Review of Public Administration, Northern Ireland’s new council structures came into effect in April 2015. This saw the number of councils reduced from 26 to 11. The new councils have taken on additional responsibilities in areas such as planning and economic development. As a result, the new councils are taking an active interest in the current availability of, and future development plans for, the telecoms infrastructure in their districts.

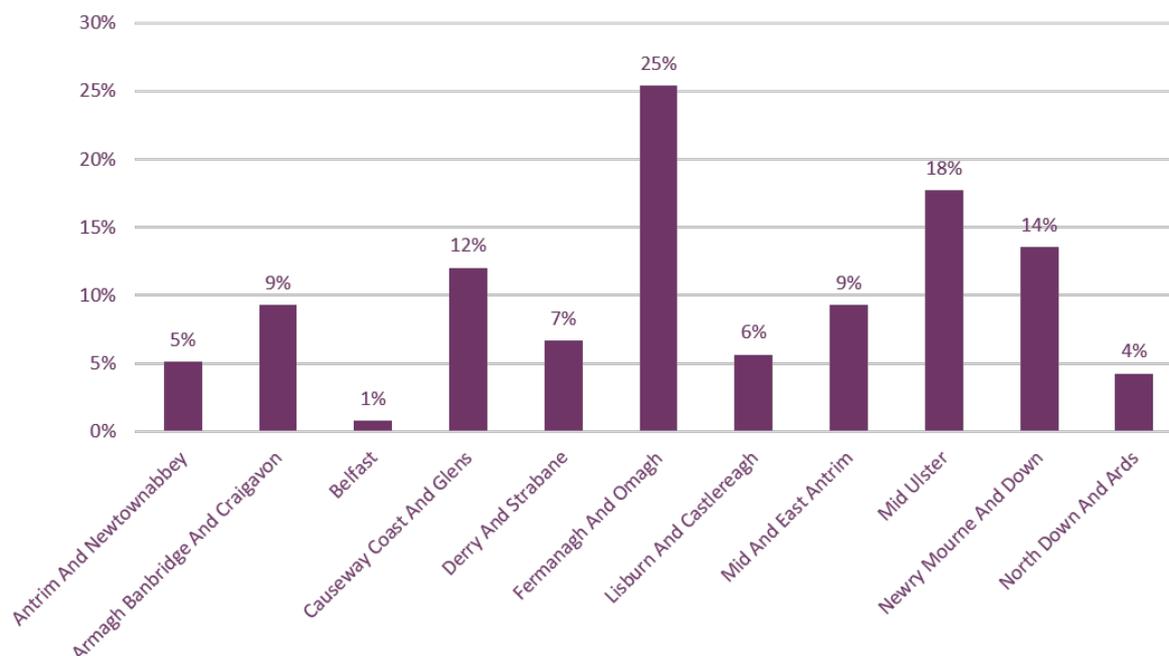
**Figure 9: The percentage of premises unable to get 2, 5 and 10Mbit/s by local authority**



Source: Ofcom analysis of operator data

- 2.34 One of the measures we consider to be of interest to local authorities is how far each area could be from reaching the planned 10Mbit/s universal service obligation.
- 2.35 Fermanagh and Omagh, Mid Ulster, and Newry Mourne and Down see the greatest deficits in coverage at speeds that would fulfil the USO. In these areas, around 15% or more of premises would need to see speed enhancements to reach the proposed USO level.
- 2.36 It should be noted these council areas are among the most rural in Northern Ireland, with high numbers of dispersed dwellings. Availability of faster broadband services is likely to be lower in these areas for reasons outlined earlier in this section.

**Figure 10: The percentage of premises unable to get a download speed greater than 10Mbit/s**



Source: Ofcom analysis of operator data

## Take-up of fixed broadband services

- 2.37 Of those premises with a broadband connection in Northern Ireland, 33% are taking a superfast service capable of delivering speeds of more than or equal to 30Mbit/s.
- 2.38 Nearly a quarter of premises in rural area (24%) are taking a superfast service, nearly 5pp higher than last year.

**Figure 11: Percentage of premises with a SFBB connection by rurality**

|                         | Rurality | 2016                           | 2015                           |
|-------------------------|----------|--------------------------------|--------------------------------|
|                         |          | % premises with a SFBB service | % premises with a SFBB service |
| <b>UK</b>               | Overall  | <b>31%</b>                     | <b>27%</b>                     |
| <b>Northern Ireland</b> | Overall  | <b>33%</b>                     | <b>29%</b>                     |
|                         | Urban    | 37%                            | 33%                            |
|                         | Rural    | 24%                            | 19%                            |

Source: Ofcom analysis of operator data

## Section 3

# Mobile services in Northern Ireland

## Scorecard for 2016

| Mobile networks   | UK   | NI   |
|---|------|------|
| Indoor voice premises (coverage by all four operators)  | 89%  | 80%  |
| Geographic voice (coverage by all four operators)       | 66%  | 81%  |
| Indoor data premises (coverage by all four operators)   | 80%  | 70%  |
| Geographic data (coverage by all four operators)        | 52%  | 71%  |
|   |      |      |
| Indoor voice premises (complete not-spots)              | 1%   | 1%   |
| Geographic voice (complete not-spots)                   | 10%  | 2%   |
| Indoor data premises (complete not-spots)               | 1%   | 2%   |
| Geographic data (complete not-spots)                    | 16%  | 3%   |
|   |      |      |
| Outdoor voice premises (coverage by all four operators) | 97%  | 95%  |
| Outdoor data premises (coverage by all four operators)  | 93%  | 90%  |
| Outdoor voice premises (complete not-spots)             | 0.1% | 0.1% |
| Outdoor data premises (complete not-spots)              | 0.3% | 0.2% |

## Key points

- 3.1 Mobile services are playing an increasingly important role in our daily lives. We expect that mobile devices will work reliably wherever we are, whether at home, at work, or on the move. In this section we provide an update on the levels of mobile voice and data coverage being achieved and data consumption in Northern Ireland.
- 3.2 This year's Connected Nations report shows:
- 80% of premises in Northern Ireland have indoor voice coverage from all four operators, while 70% have data coverage from all four.
  - Mobile data coverage (combined 3G and 4G) from all four operators has increased by 28pp to 71%, giving Northern Ireland the second highest coverage of the UK nations behind England (72%). Four per cent of premises in rural areas have no mobile voice coverage from any operator.
  - 4G coverage from all four operators now extends to 60% of the Northern Ireland landmass, compared to just 17% in 2015, and is the highest among the UK nations.
  - Of the four main operators in Northern Ireland, Vodafone has the best coverage for voice services, both indoor and geographic. EE has the best 4G coverage, both indoor and geographic.

## Our assessment of coverage is representative of how consumers use their mobiles

- 3.3 In previous years, we have reported on mobile coverage in terms of the number of premises where a signal can be received outdoors. We will continue to report on outdoor coverage in this way but, from this year, our focus will be on reporting on mobile coverage in a way that we believe better reflects how and where consumers use their mobile phones – both indoors and outdoors.
- 3.4 For indoor coverage, we will report on the percentage of premises where a good mobile signal is likely to be available indoors. This metric is useful to describe the coverage that a consumer will experience when using their phone at home, at work or in a shop. It is more challenging to deliver reliable mobile coverage indoors than outdoors, as walls, buildings and doors reduce the strength of, or even block, mobile signals as they pass through.
- 3.5 The levels of mobile coverage provided in this report are based on data supplied by the operators which has been adapted to show where a good consumer experience is likely to be available. These adaptations are based on our own field testing of the minimum mobile signal levels needed to provide a good consumer experience. These signal levels are generally higher than those used in existing mobile operator licence agreements and, as a result, levels of coverage shown in this report are generally lower than the target coverage levels set out in these agreements.
- 3.6 While our use of these metrics may make it difficult to compare our coverage figures with those from other sources, we believe that using these metrics is important for two reasons:
- They offer a more realistic view of current coverage levels
  - They provide an important baseline against which future improvements in coverage can be measured
- 3.7 In the remainder of this section, we summarise the levels of coverage from all operators for both mobile voice and data networks, i.e. we consider an area or property to be in coverage if a mobile signal can be received from all operators. In addition, we highlight the coverage of 4G networks, given operators' ongoing focus on deploying these networks.

### Mobile delivery technologies

There are three generations of technology used to deliver mobile services.

**2G** was the first digital mobile technology, launched in the UK in 1992. It is used to deliver voice, text services and low-speed data services.

Mobile data services are delivered over **3G** and **4G** networks. Launched in 2003, 3G can provide download speeds of over 5Mbit/s. 3G supports voice, text and data services, and services are operated by *O2*, *Vodafone*, *EE* and *Three*.

**4G** is the latest generation of mobile technology, launched in 2012, and provides mobile data connection speeds of over 10Mbit/s. These services are operated by *O2*, *Vodafone*, *EE* and *Three*. There has been a significant roll-out of additional 4G services by all operators over the past year. *Three* and *EE* have also upgraded their 4G networks to support voice services. Other operators may introduce similar services over the coming months.

## Mobile voice services cover around 80% of Northern Ireland’s landmass

- 3.8 Mobile voice services (2G) from all operators are available to around 81% of the landmass of Northern Ireland, which is higher than the total for the UK (66%). Coverage has improved by 15pp year-on-year.
- 3.9 There has been a 13pp increase in indoor mobile voice coverage for premises over the same time to 80%. This is lower than the UK average (89%), reflecting the fact that Northern Ireland’s population is more rurally dispersed.

**Figure 12: Coverage of mobile voice services**

|                         | Geographic coverage, % landmass |      | Indoor coverage, % premises |      |
|-------------------------|---------------------------------|------|-----------------------------|------|
|                         | 2016                            | 2015 | 2016                        | 2015 |
| <b>UK</b>               | 66%                             | 58%  | 89%                         | 85%  |
| <b>England</b>          | 84%                             | 77%  | 91%                         | 87%  |
| <b>Northern Ireland</b> | 81%                             | 66%  | 80%                         | 67%  |
| <b>Scotland</b>         | 36%                             | 29%  | 84%                         | 79%  |
| <b>Wales</b>            | 52%                             | 46%  | 73%                         | 65%  |

Source: Ofcom analysis of operator data

## Mobile data coverage now extends to more than 70% of Northern Ireland

- 3.10 Mobile data coverage (Combined 3G and 4G) from all four operators has increased by 28pp to 71%, giving Northern Ireland the second highest coverage of the UK nations behind England (72%). The improvements reflect the ongoing roll-out of 4G services by operators.
- 3.11 A key factor in ensuring that consumers and businesses in Northern Ireland enjoy the benefits of 4G at the same time as those in other parts of the UK is the specific nations coverage obligation that Ofcom attached to the spectrum licence won by Telefonica UK (O2).
- 3.12 This requires it to provide indoor reception to at least 98% of the UK population and at least 95% of the populations of Scotland, Wales and Northern Ireland by the end of 2017. Other operators have said they intend to at least match this coverage. This will mean further significant improvements in coverage over the next two years.

**Figure 13: Coverage of mobile data services (Combined 3G and 4G)**

|                         | Geographic coverage, % landmass |      | Indoor coverage, % premises |      |
|-------------------------|---------------------------------|------|-----------------------------|------|
|                         | 2016                            | 2015 | 2016                        | 2015 |
| <b>UK</b>               | 52%                             | 38%  | 80%                         | 77%  |
| <b>England</b>          | 72%                             | 57%  | 82%                         | 80%  |
| <b>Northern Ireland</b> | 71%                             | 43%  | 70%                         | 57%  |
| <b>Scotland</b>         | 21%                             | 10%  | 75%                         | 70%  |
| <b>Wales</b>            | 27%                             | 17%  | 57%                         | 47%  |

Source: Ofcom analysis of operator data

- 3.13 Figure 14 shows 4G coverage in Northern Ireland has improved considerably over the last year as operators continue to roll-out their networks. Coverage from all four operators now extends to 60% of the Northern Ireland landmass, compared to just 17% in 2015, and is the highest among the UK nations.
- 3.14 Indoor premises coverage has similarly increased over that time, with 64% of premises now covered, up from 37% in 2015.

**Figure 14: Coverage of 4G mobile services**

|                         | Geographic coverage, % landmass |      | Indoor coverage, % premises |      |
|-------------------------|---------------------------------|------|-----------------------------|------|
|                         | 2016                            | 2015 | 2016                        | 2015 |
| <b>UK</b>               | 40%                             | 8%   | 72%                         | 29%  |
| <b>England</b>          | 59%                             | 11%  | 76%                         | 31%  |
| <b>Northern Ireland</b> | 60%                             | 17%  | 64%                         | 37%  |
| <b>Scotland</b>         | 12%                             | 2%   | 62%                         | 22%  |
| <b>Wales</b>            | 13%                             | 2%   | 34%                         | 10%  |

Source: Ofcom analysis of operator data

- 3.15 Of the four main operators, Vodafone has the best coverage for voice services in Northern Ireland, both indoor and geographic. EE has the best 4G coverage, both indoor and geographic.

**Figure 15: Indoor and geographic mobile coverage in Northern Ireland, by operator**

|                              | O2  | Vodafone | EE  | Three |
|------------------------------|-----|----------|-----|-------|
| <b>Indoor voice premises</b> | 93% | 95%      | 90% | 90%   |
| <b>Indoor data premises</b>  | 91% | 92%      | 90% | 78%   |
| <b>Indoor 4G premises</b>    | 87% | 86%      | 89% | 76%   |
| <b>Geographic voice</b>      | 92% | 94%      | 91% | 90%   |
| <b>Geographic data</b>       | 89% | 93%      | 90% | 79%   |
| <b>Geographic 4G</b>         | 80% | 86%      | 89% | 73%   |

Source: Ofcom analysis of operator data

#### **Some 4G networks have been upgraded to support voice calls**

Until recently, the 4G networks deployed in the UK only supported high-speed data services; in order to make or receive a voice call, a mobile phone connected to a 4G network needed to automatically switch to a 2G or 3G network, switching back to the 4G network once the call is complete.

However, in the past year EE and Three have upgraded their 4G networks to support voice calls, using a technology known as 4G Voice or VoLTE. Combined with the ability, supported by all operators, to make voice calls over Wi-Fi, this development means that consumers should be able to make and receive phone calls in more places than before.

In calculating voice coverage, we include data from the 2G and 3G networks of all operators, plus the 4G networks of EE and Three. We understand that Vodafone and O2 are undertaking trials of 4G Voice and will include their networks in the future if commercial services are launched.

#### **Four per cent of premises in rural areas have no mobile voice coverage from any operator**

- 3.16 Four out of five premises in Northern Ireland have indoor voice coverage from all four operators. The remaining premises have coverage but from fewer operators (partial not-spots) or have no coverage at all (complete not-spots).
- 3.17 Voice services are currently unavailable from any operator in around 1% of premises in Northern (complete not-spots). These are mainly in rural areas, where 4% of premises are in complete not-spots.

**Figure 16: Indoor premise and geographic mobile not-spots, by rurality**

|  |              | Indoor Voice<br>(premises) | Indoor Data<br>(premises) | Voice<br>(geographic) | Data<br>(geographic) |
|--|--------------|----------------------------|---------------------------|-----------------------|----------------------|
| <b>Partial Not-Spots</b>                 |              | 19%                        | 28%                       | 18%                   | 27%                  |
|  | <b>Urban</b> | 8%                         | 16%                       | 1%                    | 4%                   |
|  | <b>Rural</b> | 44%                        | 59%                       | 18%                   | 27%                  |
| <b>Complete Not-Spots</b>                |              | 1%                         | 2%                        | 2%                    | 3%                   |
|  | <b>Urban</b> | 0%                         | 0%                        | 0%                    | 0%                   |
|  | <b>Rural</b> | 4%                         | 6%                        | 2%                    | 3%                   |
| <b>Premises covered by all operators</b> |              | 80%                        | 70%                       | 81%                   | 71%                  |
|  | <b>Urban</b> | 92%                        | 84%                       | 99%                   | 96%                  |
|  | <b>Rural</b> | 51%                        | 36%                       | 80%                   | 70%                  |

Source: Ofcom analysis of operator data

## Challenges remain in delivering mobile coverage in rural areas and to consumers on the move

- 3.18 Mobile operators face significant challenges in delivering high levels of geographic coverage, as it is often difficult to install network equipment in very rural areas. These challenges can be the result of:
- 3.18.1 Terrain, e.g. steep mountains making it harder to reliably deliver coverage deep into valleys;
  - 3.18.2 Policy, e.g. planning restrictions on where mobile base stations can be built, especially in areas of natural beauty; or
  - 3.18.3 Practical factors, such as difficulties in securing and maintaining a reliable power supply for the base station.
- 3.19 As a result of this, and the focus on first deploying networks where population density is highest, levels of mobile coverage in rural areas are significantly lower than in urban areas. Figure 17 below shows the voice service coverage from all operators in rural areas.

**Figure 17: Coverage of voice services from all operators in rural areas**

| Rural areas in   | Indoor   | Outdoor    |          |
|------------------|----------|------------|----------|
|                  | Premises | Geographic | Premises |
| UK               | 49%      | 64%        | 84%      |
| England          | 52%      | 83%        | 88%      |
| Northern Ireland | 51%      | 80%        | 86%      |
| Scotland         | 40%      | 35%        | 71%      |
| Wales            | 32%      | 50%        | 66%      |

Source: Ofcom analysis of operator data

3.20 Figure 17 highlights two important themes of rural coverage:

3.20.1 Firstly, indoor coverage of voice services across the all of the UK’s rural areas is poor, with just one half of premises in these areas served by all operators; and

3.20.2 Coverage is particularly poor in Scotland and Wales, both in terms of indoor and geographic coverage.

**Planning rules changes will allow faster upgrades to mobile phone masts**

The Department for Infrastructure has confirmed that changes to legislation will be introduced that will make it easier for operators to undertake smaller scale development in Northern Ireland without the need for planning permission. This will speed up necessary works such as replacing, altering or extending an existing mast or installing antenna on a mast or building.

**Further planned improvements in coverage will not meet the needs of all consumers**

3.21 Coverage has improved over the past year as operators have continued their commercial deployments and the picture will continue to improve over the coming years. These plans are underpinned by licence obligations which require:

3.21.1 O2 to provide indoor coverage to 98% of UK premises by the end of 2017 and which other operators have indicated that they will match; and

3.21.2 Each operator to provide a mobile voice service to 90% of the UK’s landmass by the end of 2017 (following a voluntary agreement between the UK Government and operators to do so).

3.22 Despite this, we know that consumers will continue to face issues with the quality and coverage of service they receive, particularly in more rural areas. Our field tests indicate that consumers will continue to experience intermittent problems when making calls, such as call drops, particularly when in the outer reaches of coverage areas (i.e. furthest from the masts). This variation in service quality is reflected on our

interactive coverage maps, which use green and amber to reflect variation in likely consumer experience when making voice calls.

- 3.23 Indoor coverage is more challenging to provide and this is a particular issue for rural consumers, where there are large areas without strong mobile signals outdoors. Consumers using their phones indoors may be able to make voice calls over Wi-Fi, but at present this service is not consistently offered by all operators and it is contingent on there being access to in-building Wi-Fi networks.
- 3.24 Moreover, we know that there are areas where consumers want mobile services that will not be met under current plans. We are therefore working on how to extend the reach of mobile services so as to meet this need. We will work closely over the coming year with industry and UK and national devolved governments to explore the various technical and public policy solutions for doing so.