Connected Nations 2015

Wales
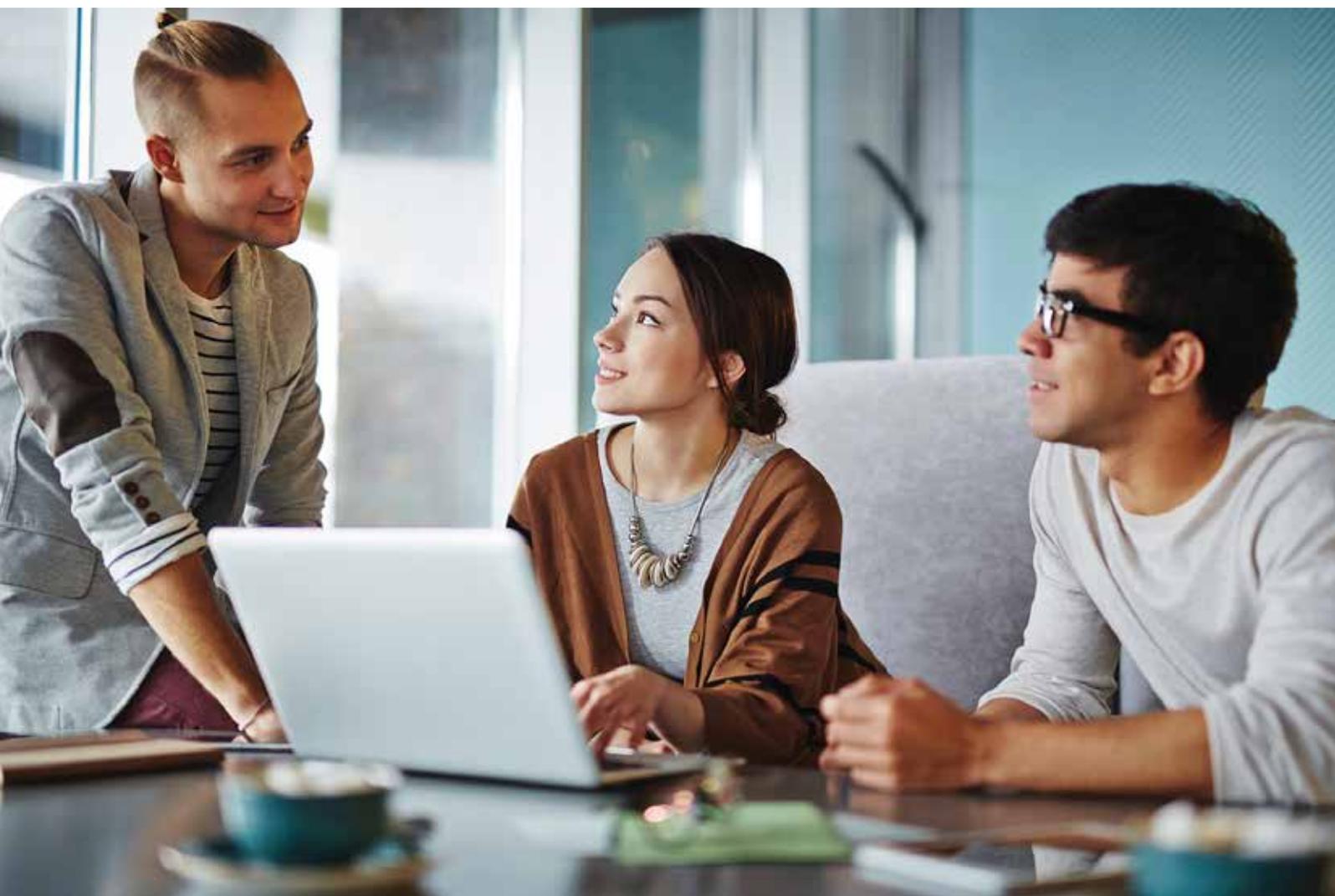
Contents

Section 1

Connected Nations – Across the UK

Introduction

1.1   Under section 134A of the Communications Act 2003 ('the Act') Ofcom is required to submit a report to the Secretary of State every three years, describing the state of the electronic communications networks and services in the UK.

1.2   Full reports were published in 2011 and 2014 and this year we are publishing an update – The Connected Nations Report - focussing on those areas seeing the most rapid change, including the coverage of fixed, mobile and broadcast networks and the capacity of fixed and mobile broadband networks.

1.3   For the first time, we are also publishing individual reports for each of the constituent nations of the UK where availability of communications services varies and where devolved administrations play a leading role in public interventions.

1.4   The key developments across the nations are:

    1.4.1   Wales and Scotland have seen significant increases in next generation access and superfast broadband availability. This increase has benefitted rural areas in particular. Northern Ireland has not seen such substantial increases but this reflects the early intervention that took place which realised increases in previous years;

    1.4.2   Households in Wales with access to superfast services have not taken up superfast packages as readily as the rest of the UK and along with Northern Ireland use less data than the UK average;

    1.4.3   The difference between broadband speeds that are available in urban and rural areas has remained unchanged, largely due to the focus of intervention programmes in rural areas. The gap will ultimately increase as urban areas progress towards ultrafast speeds; and

    1.4.4   Whilst the availability of 2G voice services has remained static, there have been modest increases in the availability of 3G voice and data and 4G services have begun to roll out in urban areas.

1.5   Access to high quality fixed and mobile internet services is vital to our increasingly online social and economic lives. In the last year, all nations across the UK have seen some increase in the coverage of these services. However, there are many areas of the UK where fast broadband services remain unavailable and where mobile coverage is poor.

1.6   It remains the case that the individual nations of Scotland, Wales and Northern Ireland as well as rural England see lower availability of communications services than the UK as a whole. The comparative lack of disruptive market forces and competition mean that the usual channels to create increased coverage in many of the more remote areas of the UK are absent and partly publicly funded intervention programmes have been used to help reach these areas.

1.7   Fixed broadband and 4G services have seen the largest increases in the number of premises now able to access services. In the case of 4G this has been as a result of commercial rollout. For fixed broadband, this has been a result of a blend of

commercial and publicly supported rollout of services under the joint BDUK[1] and devolved government programmes in the nations.

1.8   The remainder of this Wales report then describes in more detail the state of fixed and mobile network coverage.

Summary of fixed and mobile coverage in the UK

1.9   Figure 1 and Figure 2 below offer an 'at a glance' picture of connectivity in the nations of the UK.

Figure 1: Coverage of Next Generation Access (NGA) and Superfast Broadband (SFBB) has increased between 2013 and 2015

	2015 SFBB	2015 NGA	2014 SFBB	2014 NGA	2013 NGA
UK	83%	90%	75%	78%	73%
England	84%	90%	77%	80%	76%
Scotland	73%	85%	61%	63%	52%
Wales	79%	87%	55%	58%	48%
NI	77%	95%	77%	94%	96%

Source: Ofcom analysis of operator data

Figure 2: Coverage of 2G and 3G networks across the UK

	Premises where outdoor 2G (voice) coverage is available from all operators, %		Premises where outdoor 3G (voice and data) coverage is available from all operators, %	
	2015	2014	2015	2014
UK	97%	97%	88%	84%
England	98%	98%	91%	87%
Northern Ireland	92%	91%	73%	63%
Scotland	95%	95%	79%	75%
Wales	90%	90%	67%	65%

Source: Ofcom analysis of operator data

1.10   Coverage of data services have increased modestly in Wales but basic voice service coverage remains unchanged

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[1] Broadband Delivery UK administers a number of programmes on behalf of the UK government intended to increase the coverage of fixed and mobile broadband.

Fixed broadband in Wales

Scorecard for 2015

Fixed broadband networks	Wales	UK
Coverage of broadband faster than • **2 Mbit/s (% of premises)** • **5 Mbit/s (% of premises)** • **10 Mbit/s (% of premises)**	98.2% 95.4% 88.9%	98.2% 96.2% 91.6%
Coverage of NGA (Next Generation Access) (% of premises)	87%	90%
Superfast broadband coverage (% of premises)	79%	83%
Superfast broadband coverage in rural areas (% of premises)	50%	37%
Fixed broadband take-up (% of residential premises)	77%	78%
Broadband take-up (fixed and mobile)	78%	80%
Superfast broadband take-up (% of premises)	24%	33%
Average broadband speed (download)	23 Mbit/s	29.0 (23.4) Mbit/s
Average broadband speed (upload)	3.1 Mbit/s	3.5 Mbit/s
Average broadband download speeds by settlement type	**Urban:** 25.7 Mbit/s **Rural:** 9.5Mbit/s	**Urban:** 31.3(28) Mbit/s **Rural:** 11.6 (10) Mbit/s
Premises that could receive less than 2Mbit/s	1.8%	1.8%
Data use (Average monthly)	77.7GB	82.3GB

Key points

2.1   Superfast broadband is available to more consumers than ever before, with both industry and Government investments driving improvements in coverage. However, almost 5 million (or 17% of) consumer households and small and medium-sized enterprises (SMEs) in the UK remain unable to take advantage of these services. While that number is likely to reduce over the coming few years, a significant proportion of homes and businesses are still unlikely to be unable to receive superfast broadband without further action.

2.2   The most important points for fixed broadband in Wales are:

- **Coverage of NGA has risen 19 percentage points from 58% to 87%.** NGA is being delivered predominantly by FTTC solutions both commercially and through the intervention programmes. There is an important difference between access to an NGA network or cabinet and availability of superfast speeds as some FTTC lines may be unable to support superfast speeds;

- **Superfast broadband coverage in rural areas has risen from 17% in 2014 to 50% of premises.** This increase is more than double the overall UK increase of 15%. Increased take-up of superfast services in Wales has also been strong over the last year increasing from 13% in 2014 to 24% in 2015.

- **Wales has seen a substantial year-on-year percentage increase in average download speeds. Speeds increased by 5 Mbit/s to an average headline speeds of 23 Mbit/s.** This represents a 28% increase. Ofcom has also reported on upload speeds this year and in Wales average upload speeds are 3.1 Mbit/s compared to a UK average of 3.5 Mbit/s.

- **The average amount of data used each month in Wales is 77.7GB.** This is short of the UK average 82.3GB per month and earlier Ofcom analysis suggests that lower speeds can impact on how people use networks. On average, Wales has more connections less than or equal to the key 10Mbps download speed threshold than the UK as a whole.

- **Take-up of superfast services is around a third of availability.** 24% of premises in areas where superfast services are available (79%) have taken up the service.

Coverage and speed of superfast broadband services continue to increase

2.3   Superfast broadband is now available to 83% of UK premises, up from 75% in 2014.

2.4   Coverage and speed of superfast broadband in the constituent nations of the UK have also seen similar improvement, as shown on page 2. Coverage has improved most in Scotland and Wales, as a result of investment in new and upgraded networks by industry and governments. However, coverage in Northern Ireland has remained unchanged over the past year; we would expect coverage to increase again in coming years as a result of further Government investment, intended to improve services for consumers living in rural areas.

How is superfast broadband delivered to homes and small businesses?

Broadband that supports download speeds of 30Mbit/s or more is known as superfast broadband. In order to deliver these speeds, service providers need to install fibre optic cabling, which supports higher speeds than the copper cables used in traditional networks.

The current generation of superfast broadband is typically delivered by replacing the copper cable between the local exchange and the street cabinet with a fibre optic cable. The cable between the street cabinet and the consumer's home or business is still made of copper. The replacement of copper with fibre in the connection enables higher speeds for the consumer. It is also possible to use fibre optic from the exchange all the way to the consumer's premises. This offers speeds that are even higher than superfast: ultrafast broadband.

Some common terms used to describe broadband services include:

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, as described above. 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 can deliver superfast or ultrafast speeds and is offered to different extents by BT as part of the Welsh Government's Superfast Cymru initiative on the Llŷn Peninsular, Spectrum Internet in Shirenewtown Primary School, Monmouthshire trialling microtrenching, KCOM in and around Kingston-Upon-Hull, and several smaller providers such as B4RN in rural Lancashire, and Gigaclear.

Government targets and interventions

2.5   The primary vehicle for public intervention in Wales is the Superfast Cymru programme funded by the Welsh Government, the UK Government through its BDUK initiative and the European Union.

	Target
Superfast Cymru **Passing a total of 772,000 homes**	Minimum of 90% of premises able to access speeds at or above 30 Mbit/s Minimum of 95% of premises able to access speeds at or above 24 Mbit/s Minimum of 40% of premises able to access speeds at or above 100 Mbit/s

2.6   To date the project has provided superfast broadband to 521,000 premises across Wales, has taken on 123 apprentices, created 254 jobs, provided 992 hours of work experience for pupils and students and delivered sixty ten week adult placements.

2.7   Combining the Superfast Cymru roll-out with the commercial roll-outs of BT, Virgin Media and others, around 79% of homes and businesses in Wales now have access to broadband connections in excess of 24 Mbps. This puts Wales ahead of Scotland and Northern Ireland as well as the EU average and countries like France and Italy.

2.8   Since the Superfast Cymru project began the number or premises that need to be enabled has increased. This is either because they are new premises or where premises due for roll-out under telecommunications' companies own plans have subsequently been deemed to be economically unviable. Following an Open Market Review, the Welsh Government has identified an additional 45,000 premises in this way.

2.9   In July 2015, the Welsh Government announced an extension to the Superfast Cymru contract with BT to cover over 42,000 of these premises. Accordingly the date for completion of the build phase of the overall contract has been extended to June 2017. BT is still expected to achieve the original contract target of 655,000 premises by summer 2016. The maximum grant payable under the project will increase by around £19 million. BT will also invest significant extra funding.

2.10   In addition, at the end of June, the Welsh Government awarded a contract to Airband, specialists in high speed wireless broadband, to provide connectivity to almost 2,000 of the 45,000 additional premises in business parks and industrial estates across Wales. This project is due to be completed by summer 2016.

2.11   The Welsh Government's contract with BT in Wales stipulates that Fibre-on-Demand, a business-focused Ultrafast broadband technology, will also be made available by the end of summer 2015 to the majority of premises in Wales. Coupled with the Welsh Government's Ultrafast Connectivity Voucher, businesses in Wales have a range of options to allow them to connect more effectively to their customers and suppliers.

2.12   As the deployment extends to more and more homes and businesses, the Welsh Government has said that it needs to focus on ensuring that businesses and homes take-up superfast broadband so that it can make the best use of the technology for the benefit of the economy and society generally.

2.13   Today 24% of premises which have access to the service have taken up the service. Take up in Wales is important because the Superfast Cymru contract includes a clawback mechanism where Welsh Government receives a refund from BT if the customer base grows as a result of the programme. The Welsh Government has set itself the target of fifty per cent take-up to be achieved by the end of the operational phase of the contract in 2024.

2.14   At the National Assembly for Wales at the end of September, the Deputy Minister for Skills and Technology, Julie James AM, announced the Superfast Broadband Business Exploitation programme. The £12.5 million five-year Wales-wide business exploitation programme is funded by the Welsh Government, local authorities, the ERDF (£7 million) as well as academic and private sources. The programme aims to support predominantly SMEs to understand the superfast infrastructure and to take advantage of the latest technology. The programme has delivery plans across Wales and businesses will be provided with targeted information, telemarketing engagement, online tools as well as access to workshops and one-to-one support.

2.15   For some time, alongside commercial investment and publicly-funded programmes to roll-out superfast broadband, Ofcom has advocated the introduction of a universal

service obligation (USO) for broadband. In November 2015 the UK Government announced that work was commencing to introduce a USO of 10Mbit/s with a consultation planned for early 2016. This will give consumers and businesses – including those in rural areas – the right to request a connection to broadband with speeds of 10Mbit/s by the end of this Parliament. This is the speed Ofcom research suggests is sufficient to meet the needs of a typical household. Details of Ofcom's work in this area are available in the main Connected Nations Report.

2.16   Swansea is being used as a test bed for BT ultrafast technology, called G.fast, which can provide speeds of up to 500Mbps, which is based on the superfast technology being deployed across Wales. Wales is also benefiting from the Broadband Delivery UK £10m innovation fund to explore ways to take superfast broadband to the most difficult to reach places in the UK. A trial of a hybrid fixed line and fixed wireless superfast rural broadband network is being used to connect around 1600 premises in Monmouthshire.

2.17   Work is ongoing, supported by the UK and national Governments, to extend high quality broadband access to as many consumers as possible.

Fixed networks in urban and rural areas

## Figure 3: Download, upload and data usage in urban and rural areas of Wales

	Average download sync speeds (Mbit/s)	Average monthly data usage (GB)	Average upload speeds (Mbit/s)	Average data use during peak time (GB)
Wales	23	78	3	23
Wales Urban	26	83	3	24
Wales Rural	10	50	2	9

Source: Ofcom analysis of operator data

Data usage declines with sync speeds

2.18   In line with overall trends and previous Ofcom research, premises in rural Wales which have lower speeds available to them tend to also use less data over the course of a month.

Figure 4: Download speeds and data use in urban and rural areas
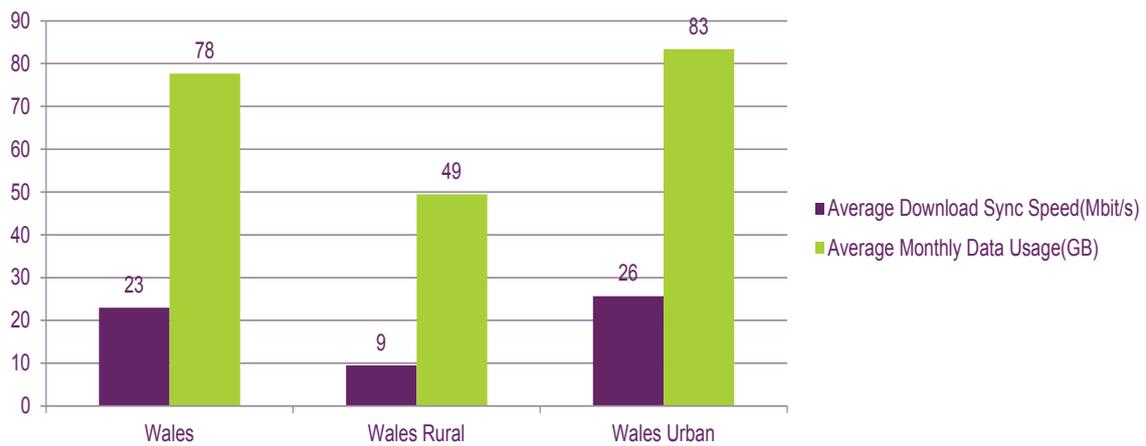
Source: Ofcom analysis of operator data

2.19   The chart below shows areas where both SFBB and non-SFBB speeds are available. In areas where SFBB services are available, the usage differential is less marked as shown in Figure 5.

Figure 5: Download speeds and data use in urban and rural areas with superfast availability

Source: Ofcom analysis of operator data

2.20   People in rural areas see a greater deterioration in speeds due to longer line lengths, Figure 6 also shows that rural consumers are served mainly by BT. There are some smaller operators who offer services in rural areas but they would not be of a scale that would see Ofcom routinely collect data from them.

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.

However, some consumers who live too far from the cabinet to receive superfast broadband may still benefit from the upgrade at the cabinet, as the reduction in the length of the copper access line will improve their broadband speeds.
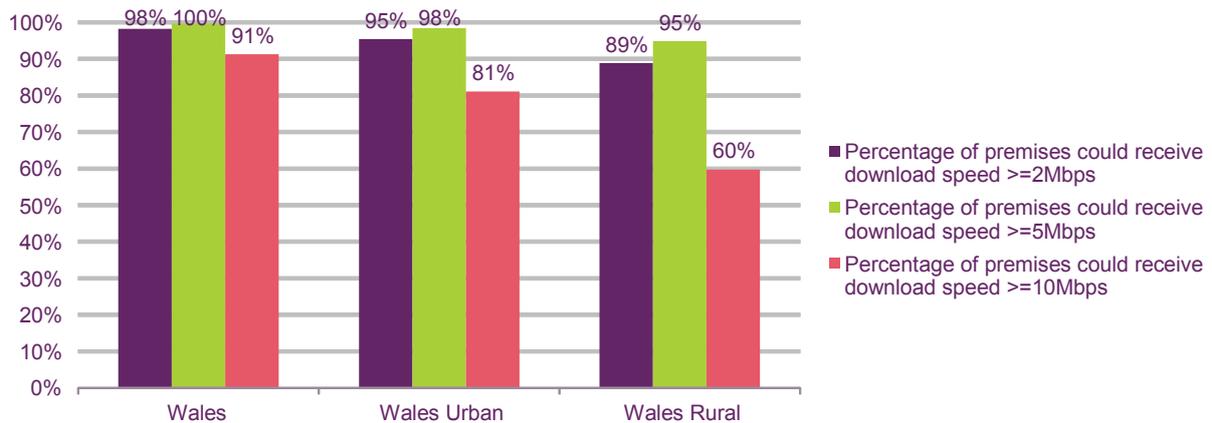
Figure 6: NGA and superfast availability in urban and rural areas by operator

	Virgin Media NGA availability	Virgin Media SFBB availability	BT NGA availability	BT SFBB availability
Wales	21%	21%	83%	75%
Wales Urban	25%	25%	86%	80%
Wales Rural	0%	0%	69%	50%

Source: Ofcom analysis of operator data

2.21   In rural areas of Wales some households use wireless or satellite broadband services which can offer rural and remote households better services than they could achieve through fixed line options. The Welsh Government offer subsidies through their Access Broadband Cymru programme (ABC) which supports households or businesses receiving less than 2 Mbit/s to secure a wireless or satellite connection with a grant of up to £900 towards the cost. As the USO at 10 Mbit/s has become a reality in policy terms and as the superfast rollout programmes move forward, the UK and devolved governments are considering how to tackle the issues faced by households in the more remote and rural areas of the UK with plans specifically directed at the 'last 5%'. The Welsh Government is in the process of developing a new scheme to replace the existing ABC scheme which will consider a mix of technologies including satellite, wireless and 4G services.

2.22   Unsurprisingly, rural areas have the greater number of lines currently incapable of supporting speeds of above 10 Mbit/s, but the SFBB rollout programmes are causing this picture to change rapidly. In Wales, 19% of premises in urban areas and 40% of premises in rural areas cannot currently achieve speeds greater than or equal to 10Mbit/s. The number of premises that cannot get 10 Mbit/s in rural areas is more than double that of urban areas.

Figure 7: Percentage of premises that can receive 2, 5 and 10Mbit/s in urban and rural areas
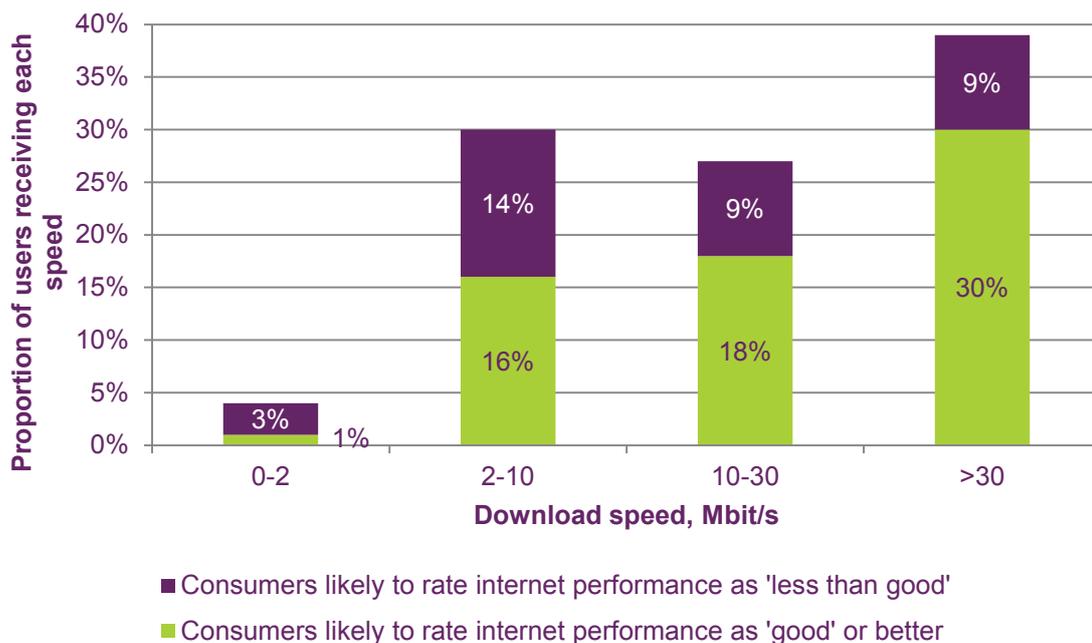

Legend:
- Percentage of premises could receive download speed >=2Mbps
- Percentage of premises could receive download speed >=5Mbps
- Percentage of premises could receive download speed >=10Mbps

Wales: 98%, 100%, 91%
Wales Urban: 95%, 98%, 81%
Wales Rural: 89%, 95%, 60%

Source: Ofcom analysis of operator data

Better broadband matters to consumers

2.23   Evidence suggests that those consumers with faster connections are more likely to rate their broadband experience as good. As shown in Figure 8, only 52% of consumers with a download speed of between 2 and 10Mbit/s rate their broadband experience as 'good'. However, this rises to over three-quarters of consumers with superfast speeds above 30Mbit/s.

2.24   In general, 10Mbit/s appears to be the tipping point beyond which most consumers rate their broadband experience as 'good'. This continues to support our view that a minimum of 10Mbit/s is required by the typical household.

Figure 8: Consumers with faster broadband speeds are more likely to rate their internet experience as 'good' or better

Proportion of users receiving each speed (y-axis) vs Download speed, Mbit/s (x-axis)

0-2: 3% (less than good), 1% (good or better)
2-10: 14% (less than good), 16% (good or better)
10-30: 9% (less than good), 18% (good or better)
>30: 9% (less than good), 30% (good or better)

Legend:
- Consumers likely to rate internet performance as 'less than good'
- Consumers likely to rate internet performance as 'good' or better

Source: Actual Experience for Ofcom

2.25   Faster broadband also means that consumers can connect more devices to the internet at the same time. Wi-Fi is helping increasing numbers of consumers share their broadband connection throughout their homes. As a result, Wi-Fi has become vital to the broadband experience.

2.26   A new, innovative measurement approach[2] commissioned by Ofcom has found that Wi-Fi performance and congestion, occurring outside the ISP network in the wider internet, can combine to affect the broadband experience of consumers with both low speed and superfast connections.

2.27   In particular, we have found that the performance of in-home Wi-Fi networks plays a significant role in approximately 25% of households in the UK that experience problems with their broadband. In Wales, we estimate that 275,755 homes and office could improve their wireless connection. We have launched an app for smartphones and tablets that tests Wi-Fi networks for performance issues. It will help consumers identify if their broadband is not performing as it should, and suggest simple troubleshooting steps to improve performance.

Access to broadband for small businesses in Wales

2.28   Businesses are increasingly reliant on communication services to sell goods and services, connect to customers, deal with suppliers and manage their workforce. Beyond this, many digital businesses rely on broadband services for the actual delivery of their products and services. Reliable and high quality broadband and mobile connections are becoming ever more important to commerce and to the wider economy.

2.29   Good connectivity is important for businesses of all sizes. In broad terms, larger enterprises are able to afford dedicated fibre based services to meet their needs so here we focus on provision for businesses with 249 or fewer employees – referred to as Small and Medium Enterprises (SMEs).

2.30   Figure 9 shows that availability of superfast broadband to SMEs in Wales has increased significantly in the past year, from 55% of SMEs in 2014 to 79% this year.

Figure 9: Analysis of superfast broadband coverage for SMEs in Wales

	2014	2015
Total superfast coverage, premises	55%	79%
Superfast coverage for SMEs with 1 or more employees, premises	37%	66%

Source: Ofcom analysis of operator data

2.31   As expected, connectivity has increased for businesses when measured by size as well, with a slightly lower uplift for medium sized business which may reflect the areas that they need to locate.

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[2] http://stakeholders.ofcom.org.uk/binaries/research/infrastructure/2015/downloads/qoe-analysis.pdf
http://stakeholders.ofcom.org.uk/binaries/research/infrastructure/2015/downloads/qoe_uk-analysis.pdf

Figure 10: Analysis of superfast coverage for SMEs in Wales by business size

|	2014	2015
Superfast coverage for SMEs with 1 or more employees, premises	37%	66%
Micro (excluding sole traders)	37%	66%
Small	38%	66%
Medium	35%	62%

Source: Ofcom analysis of operator data

Data at Local Authority Level in Wales

2.32   This section provides an overview of some of the data available at local authority level in Wales. Maps which cover more data at a local authority level are here http://maps.ofcom.org.uk/ .

2.33   We focus in this section on fixed networks as local authorities across the UK have been instrumental in assisting with the rollout of joint UK and devolved government programmes and many have also contributed financially. One of the measures considered to be of critical interest to local authorities is how far each area could be from reaching the 10Mbit/s universal service obligation recently confirmed by UK Government.

Figure 11: The percentage of premises unable to get 2, 5 and 10 Mbit/s by local authority area
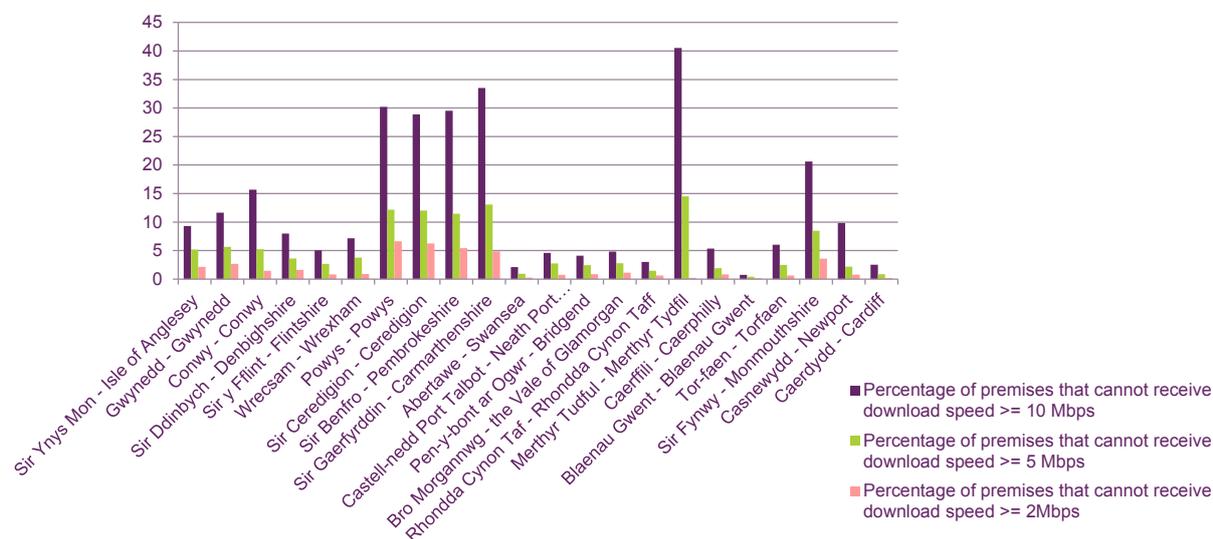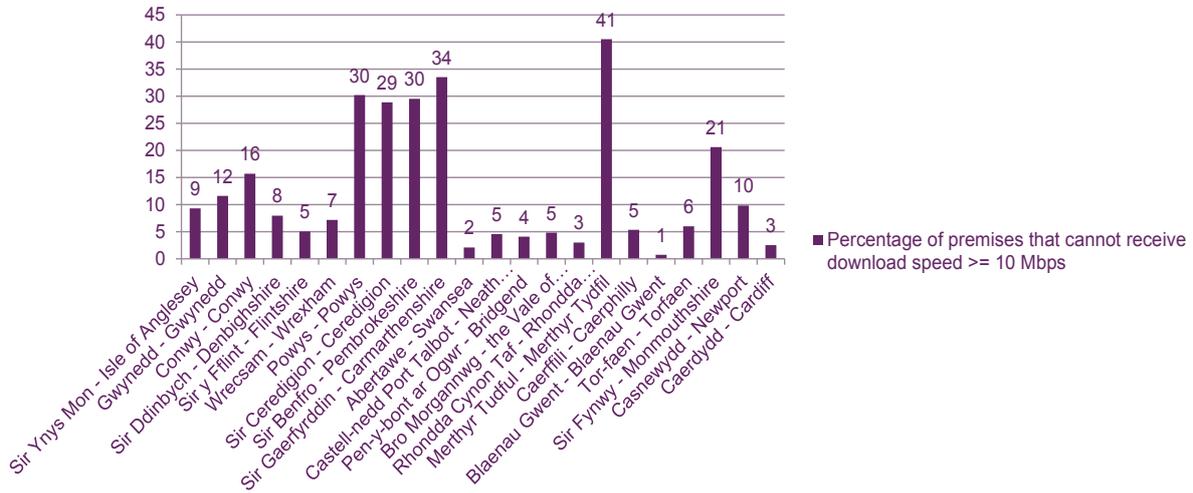

Source: Ofcom analysis of operator data

2.34   Looking in more detail at those locations which would need service enhancements to reach the proposed USO level of 10Mbit/s, it should be noted that the superfast broadband rollout programme is at a midpoint and some of the premises included in these figures will see improvements as the phased rollouts continue.

2.35 Merthyr Tydfil, Carmarthenshire, Powys and Pembrokeshire see the greatest deficits in coverage at speeds that would fulfil the USO. In these areas around a third or more of premises would need to see speed enhancements to reach the proposed USO level. The costs associated with this will vary depending on topography, available backhaul and other essential connection needs.

Figure 12: The percentage of premises that cannot receive a download speed greater than 10Mbit/s

Source: Ofcom analysis of operator data

2.36 Ofcom, operators and governments have been aware of and reporting on the differential between speeds in urban and rural areas for some time. Even where superfast speeds are available in rural areas they are slower than in urban areas due to the dispersion of premises and the distance of premises from cabinets with a Fibre to the Cabinet (FTTC) solution. The graph below outlines this speed differential for both SFBB and non-SFBB connections, and for urban and rural areas. We can see greater variance in superfast speeds between some urban and rural areas than with non-superfast services which will in part reflect the premises dispersal or network configuration in these areas of Wales.

Figure 13: Superfast speeds and non-superfast speeds by urban and rural settlement types
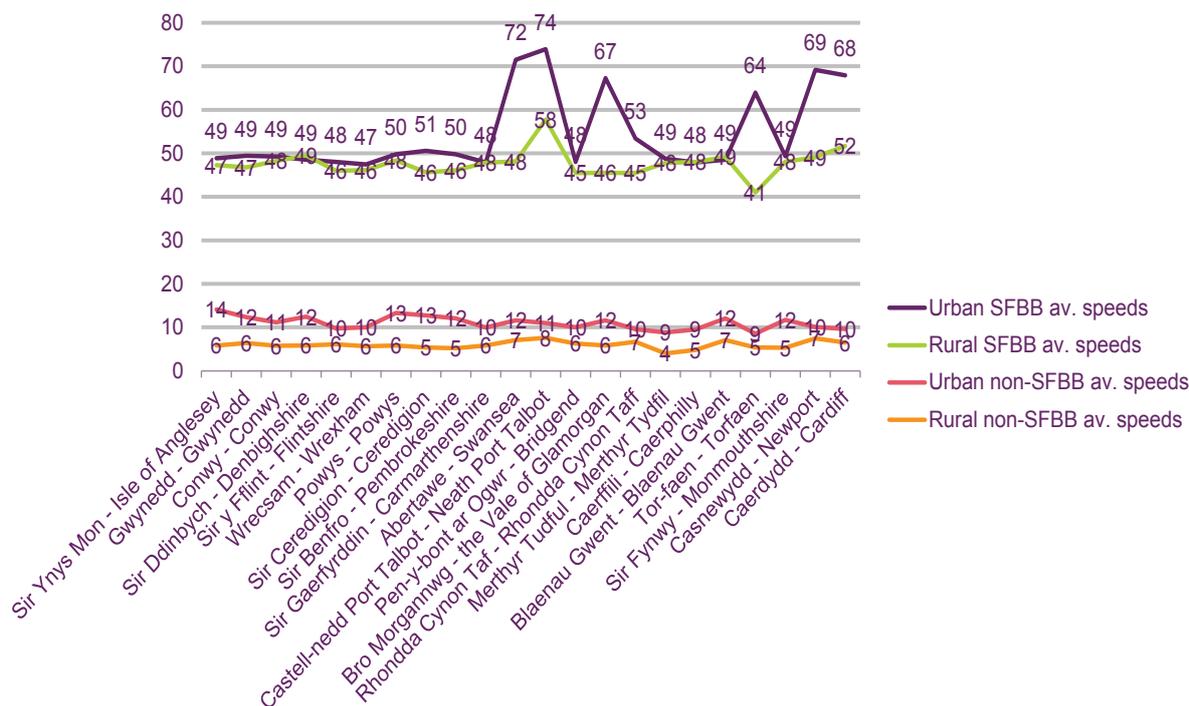
Source: Ofcom analysis of operator data

Fixed Broadband

2.37   Due to the nature of the Digital Subscriber Line (DSL) technologies commonly used to support broadband services the distance between the consumer's premises and exchange or street cabinet will affect the speeds that the connection can support; longer lines cannot support speeds as high as shorter lines.

2.38   Given the geography and population densities of different areas of the UK it is clear that there will be locations where the length of the line to a premise will mean that delivery of even 10Mbit/s[3] becomes very difficult, if not impossible at an affordable cost. Alternative technologies such as satellite and wireless deployments that are already widely deployed in Wales could ultimately form part of the solution to connect these premises.

2.39   The actual number of premises that may benefit from the USO is yet to be determined. As rollouts progress and technology develops, more is being learned about the possibilities of extending the reach of services in a sustainable and cost-effective way.

Superfast Broadband

2.40   Each of the devolved governments in the nations has added funds to the UK Government BDUK programme to support additional rollout of superfast broadband

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[3] As detailed in the main report, we consider 10 Mbps the effective threshold for what constitutes an acceptable level of broadband service to meet current consumer expectations and use.

beyond commercial deployments. Ofcom fulfils an advisory role to governments on these projects, providing information and data on current service availability and the structure of the relevant markets.

2.41   The funding for all of these projects has come from a variety of sources but is largely based on contributions from the devolved governments, the UK Government, and BT. Some projects, like the Superfast Cymru project in Wales also utilise European Union funding. In total, across the UK over £1.7 billion has been invested to support and extend coverage of superfast broadband.[4]

2.42   A major challenge to the roll out of superfast services is the longer line lengths in the access network across the UK. The distances between exchanges and premises reflect the lower population densities and disparate nature of dwellings in the nations and rural areas of England such as Northumberland, Cumbria, Devon and Cornwall compared to the UK average. 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.

2.43   As projects have rolled out the geographic and topographic challenges of the different areas of the UK have become evident. On top of the issues already understood with reaching universal availability across the UK, the population spread and density as well as geographic features have presented additional factors to overcome in order to roll out as high a quality of service possible to as many premises as possible at a reasonable cost per premise.

2.44   The map in Figure 14 was used in the Ofcom publication, "The availability of communications services in the UK", published in 2013. It is reproduced again here as it offers a useful insight into why availability and rollout is not uniform across the UK.

Figure 14: Light pollution in the UK
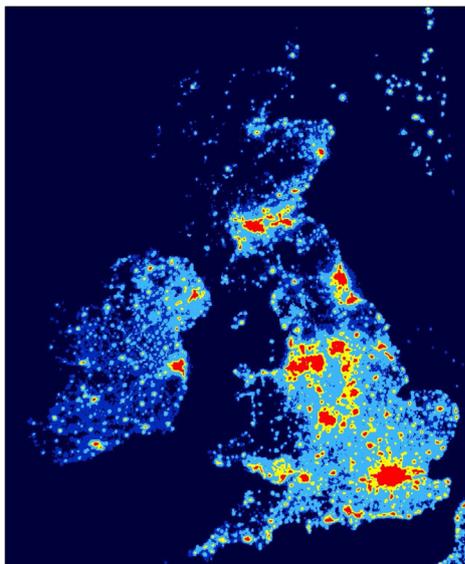
Source: Campaign to Protect Rural England

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[4] PQ220396 [on broadband], 12 January 2015

2.45   The map shows light pollution in the UK which offers an insight into where premises are located. It shows that in each of the component nations the spread of premises can be different which affects how communications services are rolled out and the costs associated with doing this.

Mobile services in Wales

Scorecard for 2015

2015	Wales	UK
Indoor voice premises (coverage by all 4 operators)	65%	85%
Outdoor voice premises (coverage by all 4 operators)	88%	96%
Indoor data premises (coverage by all 4 operators)	47%	77%
Outdoor data premises (coverage by all 4 operators)	67%	88%
Indoor voice premises (complete not-spots)	4%	2%
Outdoor voice premises (complete not-spots)	1%	<1%
Indoor data (complete not-spots)	6%	3%
Outdoor data (complete not-spots)	2%	<1%%
Geographic voice (coverage by all 4 operators)	46%	58%
Geographic data (coverage by all 4 operators)	17%	38%
Geographic voice (Complete not-spots)	15%	13%
Geographic data (Complete not-spots)	21%	21%

3.1   Mobile services are playing an increasingly important role in our daily lives. This has created a growing expectation that mobile devices will work reliably wherever we are, whether at home, at work, in a car or out walking in the countryside. In this section we provide an update on the levels of mobile voice and data coverage being achieved in Wales.

3.2   The key highlights are:

    3.2.1   4G roll-out: There has been good roll-out of new, higher-speed 4G networks in the most densely populated towns and cities.

    3.2.2   Rural coverage continues to lag behind urban coverage: Levels of mobile coverage in rural areas continue to be lower than in urban areas. A new study has shown that this reflects the higher costs-per-user of providing coverage in less densely populated areas.

    3.2.3   Developments helping to improve mobile coverage: There have been three main developments over the past year which are helping to improve mobile coverage:

- *a new coverage commitment:* Mobile operators have agreed with the Government to achieve 90% geographic outdoor voice call coverage by the end of 2017;

- *interactive coverage maps:* We have launched interactive mobile coverage maps, enabling consumers and businesses to compare the coverage provided by different mobile operators in the locations that are most important to them. In addition to allowing consumers to make more informed choices of mobile operator, we anticipate that these maps will encourage mobile operators to further compete in providing better coverage;

- *voice over Wi-Fi:* All the mobile network operators now offer voice over Wi-Fi services. These new services are helping to improve coverage in buildings that have poor mobile coverage but good indoor Wi-Fi connectivity.

3.3   It is recognised that mobile coverage varies across the UK and is generally worse in rural than in urban areas. The decision to offer mobile coverage in a particular area is essentially a commercial judgement by the mobile network operators. Profitability will depend on the likely demand for mobile services as well as the costs of providing these services. The main drivers of local availability are likely to be differences in the density and composition of the local population and the topography of the local area.

3.4   Earlier in 2015, Ofcom created and published a set of interactive maps which provide searchable data of 2G, 3G and 4G mobile coverage at postcode level across the UK. We have raised the thresholds at which we assess mobile coverage and have further developed the metric which illustrates what type of service will be available to consumers in their area of interest.

3.5   The data presented here offers a snapshot at the national level in Wales but more granular analyses are available using the online mapping tool which is available on the Ofcom website at http://maps.ofcom.org.uk/ .The site allows consumers to provide feedback in order to make improvements to the maps so that they reflect consumers' experience across the UK as accurately as possible.

Mobile delivery technologies

There are currently three generations of technology used to deliver mobile services to consumers in the UK.

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. 2G services are delivered by O2, Vodafone and EE. There has been no material change in coverage provided by 2G networks over the past year.

3G is a later generation of digital mobile technology, launched in 2003, and can provide download speeds[5] of over 5Mbit/s. 3G supports voice, text and data services, and services are operated by O2, Vodafone, EE and Three. Outdoor 3G coverage from all operators has increased over the past year by 5%.

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 has also recently upgraded its 4G network to support voice services. It is likely that other operators will introduce similar services over the coming months.

Mobile coverage (premises) in Wales 2014-2015 by operator

3.6   There are some variations between the coverage provided by the individual operators, and consumers can seek to assess their own usage patterns and compare this with Ofcom or operator assessments of coverage.

3.7   This year we have presented the data on coverage in a way that is intended to reflect what people actually want to use their mobile services for; so rather than reporting on 2G, 3G and 4G services separately the measures of these services are provided in an integrated way, as they are on the devices which are used to access them. Devices enable use of either voice services (to make calls and send texts), or data services (which would enable internet use or web applications). In reporting on voice services we have looked more closely at the real signal strength required to offer an adequate consumer experience. This gives a more tangible measure of customers' experience but limits the comparability of data between 2014 and 2015 on voice coverage. The 2014 figures in the table below have been re-analysed to reflect our new 'experience-led' measurement, so will not match coverage data in previous Ofcom reports.

3.8   Overall, EE provides the most comprehensive voice and data coverage in Wales. However, as is the case with all operators, much of the variation in mobile coverage between different parts of Wales can be explained by differences in the likely demand for, and cost of providing mobile services. The rural and sensitive landscape in Wales with its mountains and valleys poses a particular technical challenge for the provision of mobile signals.

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[5] Based on research into 3G and 4G mobile broadband speeds, November 2014, http://stakeholders.ofcom.org.uk/market-data-research/other/telecoms-research/broadband-speeds/mobile-bb-nov14

Figure 15: Premises coverage of voice and data networks in Wales by operator

	EE		H3		O2		Vodafone	
	2015	2014	2015	2014	2015	2014	2015	2014
Indoor Voice (2G/3G)	89%	89%	82%	83%	82%	83%	82%	80%
Outdoor Voice (2G/3G)	97%	97%	95%	95%	93%	94%	94%	93%
Indoor Data (3G/4G)	89%	88%	83%	83%	62%	62%	62%	58%
Outdoor Data (3G/4G)	96%	96%	95%	95%	73%	73%	79%	75%

Source: Ofcom analysis of operator data

Mobile coverage (geographic) in Wales 2015 by operator

3.9   The coverage data allows us to make an assessment of which operator has the most geographically widespread network in Wales with the same constraints on interpretation as before over handset performance and the issues presented by some geographic features such as valleys and dense forestation.

3.10   The data suggests that EE currently has the widest geographic coverage in Wales with some operators below this level. It should be noted that the UK Government's geographic coverage target of 90% applies across the UK and is not a Wales-specific target, and that while O2 hold the coverage obligation for data on the 4G network to cover 95% of each of the nations by the end of 2017, this obligation applies only to premises coverage rather than geographic coverage.

Figure 16: Geographic coverage of voice and data networks in Wales by operator

Geographic coverage	EE	H3	O2	Vodafone
Voice (2G+3G)	77.2%	66.3%	59.1%	66.4%
Data (3G+4G)	73.5%	66.4%	24.8%	32.5%

Source: Ofcom analysis of operator data

Mobile Not-Spots in Wales

3.11   There remain areas in Wales with no mobile coverage from all four of the network operators as well as complete not-spots where there is no coverage at all. The network sharing agreements between the operators (EE/ Three and O2/ Vodafone) have created difficulties for consumers in certain parts of Wales, where consumers have experienced a temporary loss of service as a result of the consolidation

programme, which, in the long term will improve coverage across Wales. Similar difficulties have also arisen as a result of the roll out of 4G mobile broadband technology which whilst creating overall improvements, has seen pockets of fluctuation in coverage.

3.12   In geographic terms Wales has more voice not spots than the UK (13%). A similar pattern is seen with data coverage. Wales has about the same level of data not-spots as the UK overall at 21% of the landmass not covered by a data service from any operator.

Figure 17: Partial and complete not-spots, coverage by all operators

	2015					
	Indoor Voice (premises)	Outdoor Voice (premises)	Indoor Data (premises)	Outdoor Data (premises)	Voice (geog.)	Data (geog.)
Partial Not-Spots	31%	11%	47%	31%	39%	62%
Complete Not-Spots	4%	1%	6%	2%	15%	21%
Premises covered by all operators	65%	88%	47%	67%	46%	17%

Source: Ofcom analysis of operator data

3.13   In response to not having any fixed or mobile services, the citizens of one village in mid Wales have taken matters into their own hands and built their own mast. Based in Pontrhydfendigaid, Ger-y-Gors Projects Ltd is a not-for-profit community based business that provides wireless broadband to the village and surrounding area. Initial connection speeds were in the 5 to 8Mbps range, but that has now been increased to 20-40Mbps. The 25 metre mast was constructed to full mobile operator specifications and will soon also be providing mobile telephony to what until now has been a complete not spot.

3.14   The Rural Open Sure Signal programme is a national initiative by Vodafone UK to provide high quality 3G voice services to up to 100 rural communities in mobile not-spot locations. Launched in July 2014, Pendine in South West Wales was one of the original twelve locations involved in trialling the Sure Signal technology, which has now been deployed in Loggerheads Country Park in Denbighshire and Bryneglwys. A fourth location at Moylegrove is currently in the installation phase.

Mobile networks in urban and rural areas

3.15   Complete and partial not spots are more prevalent in rural areas. This reflects the relative population densities in these areas.

Figure 18: Urban and rural premises voice coverage

		Indoor Voice (2G + 3G)	Outdoor Voice (2G + 3G)
Partial Not-Spots	Urban	25%	5%
	Rural	62%	41%
Complete Not-Spots	Urban	Less than 1%	Less than 1%
	Rural	19%	6%
Premises covered by all operators	Urban	75%	95%
	Rural	19%	54%

Source: Ofcom analysis of operator data

Mobile networks on roads in Wales

3.16   Coverage on the M4 motorway in Wales is good. This is the only motorway in Wales. Voice and data coverage from EE and Three is moderately good whilst voice coverage from both O2 and Vodafone slightly lower at 50% and 59%. Data coverage from O2 and Vodafone trails behind at 23% and 28%.

Figure 19: Road coverage across all operators

	EE		H3		O2		Vodafone	
	Voice (2G+3G)	Data (3G+4G)	Voice (2G+3G)	Data (3G+4G)	Voice (2G+3G)	Data (3G+4G)	Voice (2G+3G)	Data (3G+4G)
Motorways	100%	100%	98%	99%	95%	82%	96%	81%
A&B Roads	76%	72%	65%	65%	50%	23%	59%	28%

Source: Ofcom analysis of operator data

3.17   As discussed within the main Connected Nations Report there are a number of elements that can impact consumers' experience of mobile telecoms including geography, whether they are situated indoors or outdoors, signal strength and the reception performance of the individual handset.

Basic voice and text services - 2G

3.18   2G services have seen slow incremental growth reflecting their maturity in the market. However, we expect the UK Government's agreement with the MNOs announced in December 2014 to secure investment to take geographic coverage to 90% of the UK landmass which will lead to further availability of voice and text services in the nations of the UK.

3.19   The agreement does not specify individual targets. Across the UK a relatively low number of premises - 4% remain unable to access voice services from any operator.

Voice, text and data services - 3G

3.20   3G services offering access to data have lower premises and geographic coverage across all areas of the UK. Mobile network operators offering 3G services have coverage obligations built into their licences to cover 90% of premises in the UK. This figure was increased in 2013 from 80% in exchange for changes to duration of licences.

3.21   The popularity of smartphones has increased during the past few years. Consumers' expectation of their mobile device is also greater – consumers expect to be able to use their mobile phones to access information and data wherever they are, at home and on the move. Not being able to do so cause anger and frustration.

High speed data services - 4G

3.22   In 2013, Ofcom conducted the first auction of its kind – the auction of spectrum to support high speed 4G mobile broadband services. 4G licences in the UK are subject to the highest coverage obligation ever placed upon a mobile operator in this country requiring operators to reach:

- 98% indoor coverage across the UK by the end of 2017, and;

- 95% indoor coverage in each of the nations of the UK by the end of 2017.

3.23   Roll out of high-speed 4G technology has been good in highly populated areas over the past year and 77% of premises across the UK can access high-speed mobile data services vis either the 3G or 4G network. Operators are now beginning to upgrade their 4G networks to support voice calling, as well as high speed data services. A summary of the level of 4G coverage in the UK is provided by different operators is shown in Figure 19.

Figure 19: Increase in 4G coverage: 2014-2015
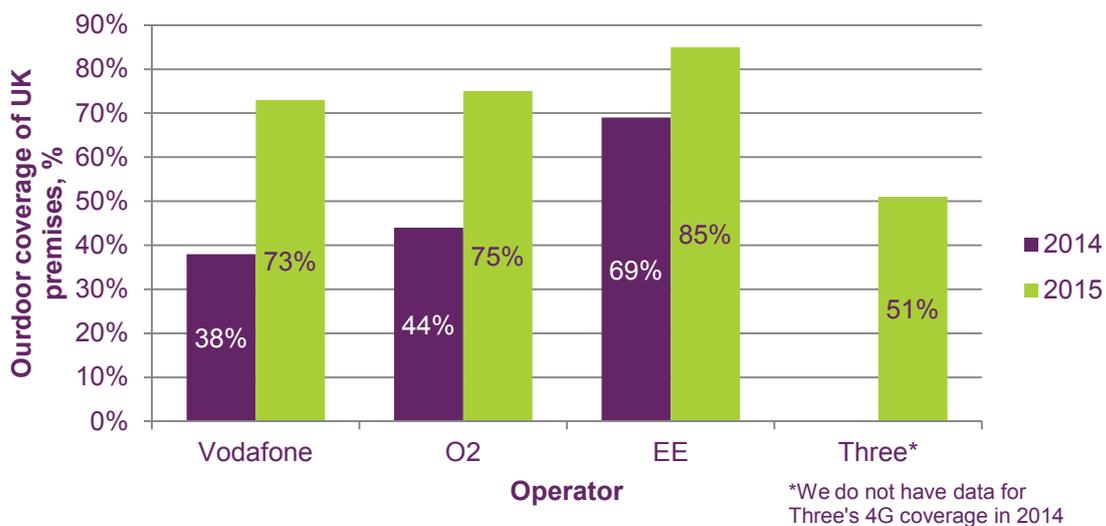
Source: Ofcom analysis of operator data

Developments that are helping to improve mobile coverage

3.24   There have been three significant developments over the past year, which are helping to improve mobile coverage:

  3.24.1 **A new voice coverage commitment:** In December 2014, the UK Government signed a binding agreement6 with the four network operators to improve mobile coverage. This was aimed, in particular, at reducing 'partial not spots', where coverage is provided by some but not all mobile operators. This agreement guarantees a £5bn investment from the MNOs to improve the mobile infrastructure, and to provide mobile voice and text service coverage from each operator to 90% of the UK's land mass by 2017. This agreement was reached based on a definition of coverage for 2G networks which is different to that used in this report. It likely that mobile operators will also use 3G and 4G networks to help meet this coverage obligation.

  3.24.2 **Providing better information to consumers:** In August 2014, Ofcom launched interactive online mobile coverage maps7. These enabled consumers and businesses to compare the voice and data coverage provided by different mobile operators in the locations that are most important to them. In addition to allowing consumers to make a more informed choice of mobile operator, we anticipate that these maps will further encourage mobile operators to compete on providing better coverage.

  3.24.3 **Voice over WiFi:** All mobile operators have launched voice over WiFi services, which are helping improving coverage in buildings that have poor mobile signal coverage but good indoor WiFi network coverage. EE's and Vodafone's services are integrated into the smartphone operating system and do not require the user to use a standalone app.

3.25   Coverage of both fixed and mobile networks is very dynamic as government intervention programmes and consolidation within the mobile market presents new opportunities to enhance coverage. This report forms part of an update to the UK Government on the state of infrastructure across the UK. Ofcom provides data on coverage, take-up and use through a number of research and analysis publications throughout the year which can be found on the Ofcom website.

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[6] https://www.gov.uk/government/news/government-secures-landmark-deal-for-uk-mobile-phone-users
[7] http://www.ofcom.org.uk/mobile-coverage