

Connected Nations 2021

Scotland report



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Overview

This is Ofcom's annual Connected Nations Scotland report, which measures progress in the availability and capability of broadband and mobile services in Scotland. It also highlights the work we are doing, alongside the UK Government, Scottish Government and communications companies, to improve these services.

Alongside this Scotland report, we publish separate reports on broadband and mobile availability for the [UK as a whole](#) and [each of its nations](#). Our [interactive dashboard](#) allows people to easily access data for different areas of the UK and specific types of services. This data is also available at Scottish local authority, Scottish Parliament and UK Parliament constituency level. We are also releasing the [International Broadband Scorecard 2021](#), which compares the UK's recent position on broadband availability with a number of other European nations.

What we have found:

Fixed broadband

- **Coverage of faster networks is increasing rapidly.** Full-fibre broadband is available to 717,000 (27%) homes in Scotland. This is an increase of 280,000 premises (10 percentage points) since last year and represents the highest year-on-year increase seen on full-fibre coverage so far. Gigabit-capable broadband is available to 1.3 million (51%) homes and we expected this will quickly increase further as Virgin Media O2 has announced it has completed the upgrade of its cable network in Scotland.¹ As well as delivering faster speeds, these services are more reliable than older broadband technologies.
- **Superfast broadband coverage availability remains stable at 94% of homes in Scotland. Over two-thirds of homes that have access to superfast broadband have upgraded to a superfast service.** We estimate that around 68% of Scottish premises that are able to get superfast broadband actually take a superfast or faster service.
- **Consumers in Scotland continue to use more data** over their fixed connections. Average monthly data use has continued to grow, and now stands at **446 GB per connection**.

¹ [Virgin Media O2 connects entire network in Scotland to next-generation gigabit broadband - Virgin Media O2](#)

- **The number of premises in Scotland without access to at least decent broadband² continues to fall.³** Factoring in coverage from both fixed and fixed-wireless networks, we estimate that around 30,000 (1.1%) homes and businesses in Scotland are still without a decent broadband connection. These properties may be eligible to receive one under the broadband Universal Service Obligation (USO).⁴ We also estimate that around 9,500 premises in Scotland cannot access either a decent fixed broadband service or get good 4G coverage indoors. Aside from a handful of exceptions, all these premises are in rural Scotland.

Mobile

- **Mobile Network Operators have continued to deploy 5G networks** across the UK this year, with 8% of the c6,500 sites being in Scotland.
- **4G continues to underpin mobile experience in Scotland, and mobile coverage is generally stable.** 82% of Scotland's landmass has access to good 4G coverage from at least one of the mobile operators (up from 81% in 2020) but only 45% has coverage from all 4 operators (up from 44% in 2020).
- Eighty-two per cent of premises in Scotland should be able to get good indoor 4G coverage from all operators (up from 81% in 2020), with 96% of rural premises able to receive a service from at least one operator. The UK Government's Shared Rural Network programme and the Scottish Government's S4GI programme will extend coverage in the coming years.
- **Networks have continued to perform well** as people, families and businesses have relied on their phone and broadband connections more than ever during further periods of lockdowns due to the Covid-19 pandemic.

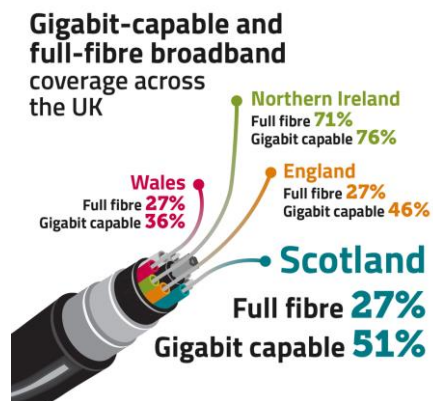
² Premises are considered to have access to a decent fixed connection if the broadband speed is above a download speed of at least 10 Mbit/s and an upload speed of at least 1 Mbit/s and to have access to an indoor 4G mobile service if a connection speed of at least 2 Mbit/s is available.

³ Unless otherwise specified, coverage figures for decent broadband count all premises (residential and commercial). Coverage for all other speed tiers counts residential premises only, unless otherwise specified.

⁴ A customer is eligible for the USO if the costs of providing the connection are below £3,400 or, where the costs are above £3,400, the customer agrees to pay the excess.

Investment in faster, better networks

Full fibre and gigabit-capable broadband coverage is gathering pace



The coverage of faster, more reliable broadband services is improving across Scotland. Gigabit-capable broadband – able to provide speeds of at least 1 Gbit/s – can be delivered over full-fibre networks and the latest versions of hybrid fibre/coaxial cable networks. Gigabit-capable speeds are now available to 1.3 million homes (51%), the second highest of the UK nations.

Around 717,000 (27%) Scottish homes now have access to full fibre connections, a significant improvement of 10 percentage points from last year. Full fibre and gigabit-capable availability is highest in urban areas in Northern Ireland, and lowest in rural areas of Scotland.

5G rollout is expanding

The Mobile Network Operators (“MNOs”) have continued to roll out 5G networks across the UK this year. Many 5G deployments are focused on towns and cities, such as Glasgow, Edinburgh and Stirling, in order to provide enhanced capacity to 3G and 4G services in more populated areas. Around 8% of the c. 6,500 5G deployments across the UK have been in Scotland.

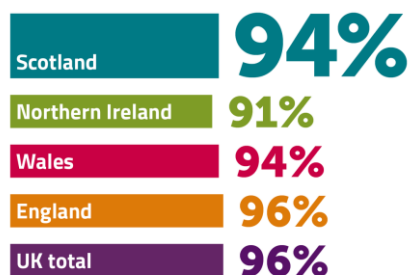
As well as commercial MNO 5G rollout, we are also seeing new initiatives spearheaded by industry and government aimed at providing insights on different use cases. In September 2020, the Scottish Government confirmed additional funding of £4m for the Scotland 5GConnect Initiative, establishing a network of 5G Innovation Hubs across the country. These Hubs will work with key local sectors, communities and businesses to help develop skills needed to use 5G technology as a business enabler. Three hubs are now active virtually, in the Forth Valley, Dundee and Dumfries, and will open physically by the end of 2021.⁵ Other projects, such as the 5G New Thinking project continue to work with rural communities, including the Orkney Islands, to aid local communities and businesses to build and operate their own local mobile and wireless networks.⁶

⁵ <https://scotland5gcentre.org/>

⁶ The 5G New Thinking project is part funded by the Department for Digital, Media, Culture and Sport. <https://www.5gnewthinking.co.uk/>

Good connections are available to most people in Scotland

Superfast broadband
coverage across the UK



Ninety-four per cent of premises in Scotland have access to a superfast broadband connection with speeds of at least 30Mbit/s. A 30 Mbit/s connection is sufficient to stream a 4K/UHD video or download an hour long HD TV episode in under 5 minutes, allowing for several devices to work simultaneously. We also estimate that for those premises that are able to take superfast broadband or a higher speed, around 68% of them do so. This is an increase of 11 percentage points from last year.

Mobile operators provide a high level of 4G coverage outside of premises in Scotland, with coverage from each MNO ranging between 97-99% of premises. Indoor 4G coverage ranges between 90% and 95% of all premises.

How Ofcom is supporting investment in new networks

Our aim is to support investment in gigabit-capable networks. We have put in place a regulatory framework for competition and investment for the five years to March 2026, with the aim of supporting investment in full fibre and other gigabit-capable services. There is continued commercial investment in the rollout of full-fibre networks in Scotland. This year, Openreach announced that they were extending full-fibre coverage to around 400,000 more Scottish homes and businesses⁷, and we are also seeing competitors such as Virgin Media O2 and CityFibre ramp up their investment in Scotland.

We are also supporting the rollout of new wireless services – including 5G – for people and industry to use. This includes making sure a diverse range of companies can access the spectrum they need to develop innovative new services, bringing a better mobile experience to consumers and delivering economic benefits for Scotland and the UK.

As the UK focuses on deploying new networks and moves away from the legacy fixed public switched telephone network (PSTN) and 3G (and eventually 2G) mobile networks, we are working closely with telecoms providers and other stakeholders to ensure a smooth transition and the ongoing support of vital services.

⁷ <https://www.openreach.com/news/160m-boost-for-ultrafast-broadband-in-scotland/>

Working with the UK Government and Scottish Government

Ofcom is working with the UK and Scottish Governments to help improve access to mobile and broadband across the UK. Both Governments are investing public money in networks in areas which are unlikely to be covered commercially. We will work closely with the UK Government as it develops plans to invest in full fibre and gigabit-capable broadband through its Project Gigabit programme. We will also continue to engage with and report on progress made by the Shared Rural Network (SRN) agreement to increase mobile coverage, with our first compliance assessment against initial targets scheduled for 2024.⁸

We also continue to work with the Scottish Government on its digital connectivity ambitions. This includes infrastructure initiatives such as the Reaching 100% (R100) programme, which seeks to deliver superfast speeds at 30 Mbit/s to 100% of premises in Scotland, as well as the Scottish 4G mobile Infill (S4GI) programme which is also supporting increased rural coverage. Many homes and businesses due to receive superfast speeds through the R100 programme will now get even faster gigabit-capable broadband instead.^{9,10}

Some people are still struggling to get connected

A small – but significant – number of Scottish premises still cannot access decent broadband



Around 30,000 (1.1%) premises in Scotland still cannot get at least a decent broadband service from either fixed or fixed wireless networks.¹¹ This compares to 61,000 (0.2%) in England; 17,000 (2.1%) in Northern Ireland, and 15,000 (1%) in Wales.

Some of these premises may be eligible for a service under the universal broadband obligation. Where the costs to provide the connection are below the reasonable cost threshold of £3,400, the customer can be provided a service at standard connection and rental charges with no additional contribution. Where the cost of connection is above the reasonable cost threshold, these premises can still receive a service if the customer pays the additional costs. In November, we changed the rules to clarify that where excess costs are very high, BT should inform customers of the total excess costs of the shared infrastructure and gain agreement to cover these before delivering the

⁸ [Home - Shared Rural Network \(srn.org.uk\)](https://www.srn.org.uk)

⁹ <https://www.gov.scot/news/improving-broadband-access/>

¹⁰ <https://www.gov.uk/government/news/better-broadband-for-500000-rural-homes-in-uk-gigabit-revolution>

¹¹ Premises are considered to have access to decent broadband from either a fixed or fixed wireless network if the broadband speed is above a download speed of at least 10 Mbit/s and an upload speed of at least 1 Mbit/s.

connection.¹² One or more customers in the local area can then cover the total excess costs of the build. Following this change, a number of customers will receive lower quotes in the future, but the cost of connecting some properties – including those in the most remote parts of the UK – will remain very high.

In some cases, rural addresses may be eligible to combine Scottish Government funding of up to £5,000 from the Scottish Broadband Voucher Scheme (SBVS) with funding from the UK Government's Gigabit Broadband Voucher Scheme (GBVS), which provides £1,500 for rural homes and £3,500 for rural businesses to provide a connection.¹³ We will continue to work with the Scottish Government, UK Government and industry to explore technology options and possible ways to fund connections to these homes and businesses so that they do not get left behind.

A small number of premises lack decent fixed broadband and 4G

We estimate that around 9,500 (0.3%) premises in Scotland cannot access either a decent fixed broadband service or get good 4G coverage indoors. Providing connectivity to these premises is a challenge that we will draw to the attention of the UK and Scottish Governments and industry when exploring how to connect the most remote premises across the UK.

Networks security and resilience

The network security incidents reported to Ofcom this year show that the pandemic did not result in a noticeable increase in telecoms outages, despite the increased demand on networks.

However, the lessons learned from the first lockdown about how the latest network technology responded to these unprecedented demand peaks is something we continue to work closely with networks and industry bodies on.

The work we started last year with telecoms providers to better understand the most common causes of major outages has identified several themes, and work to tackle them is ongoing. In the [UK report](#), we highlight how software related failures are reflected in the scale and duration of reported incidents. Ofcom will continue to work with HMG to further improve network and service resilience.

Ofcom has also been working closely with the Department for Digital, Culture, Media and Sport, and the National Cyber Security Centre, in preparation for the Telecommunications (Security) Bill. The Bill has now become an Act, having received Royal Assent on 17 November 2021 and will bring new, strengthened security duties on public telecoms providers. The Act gives Ofcom extended powers and duties to monitor and enforce compliance against the obligations placed on telecoms providers.

¹² <https://www.ofcom.org.uk/news-centre/2021/how-were-changing-the-rules-for-the-broadband-universal-service>

¹³ <https://www.scotlandsuperfast.com/how-can-i-get-it/scottish-broadband-voucher-scheme/>



Fixed broadband and voice

Introduction

The importance of everyone having access to fast and reliable voice and broadband services, wherever they live and work, has continued to grow in 2021. The Covid-19 pandemic has meant that people have continued to rely on these services for work, education, healthcare and entertainment throughout the year.

Broadband connectivity continues to improve across Scotland, as existing networks are being upgraded and new fixed infrastructure is deployed. We support the investment in superfast, gigabit-capable and full-fibre networks, which give people fast, reliable and future-proofed connections.

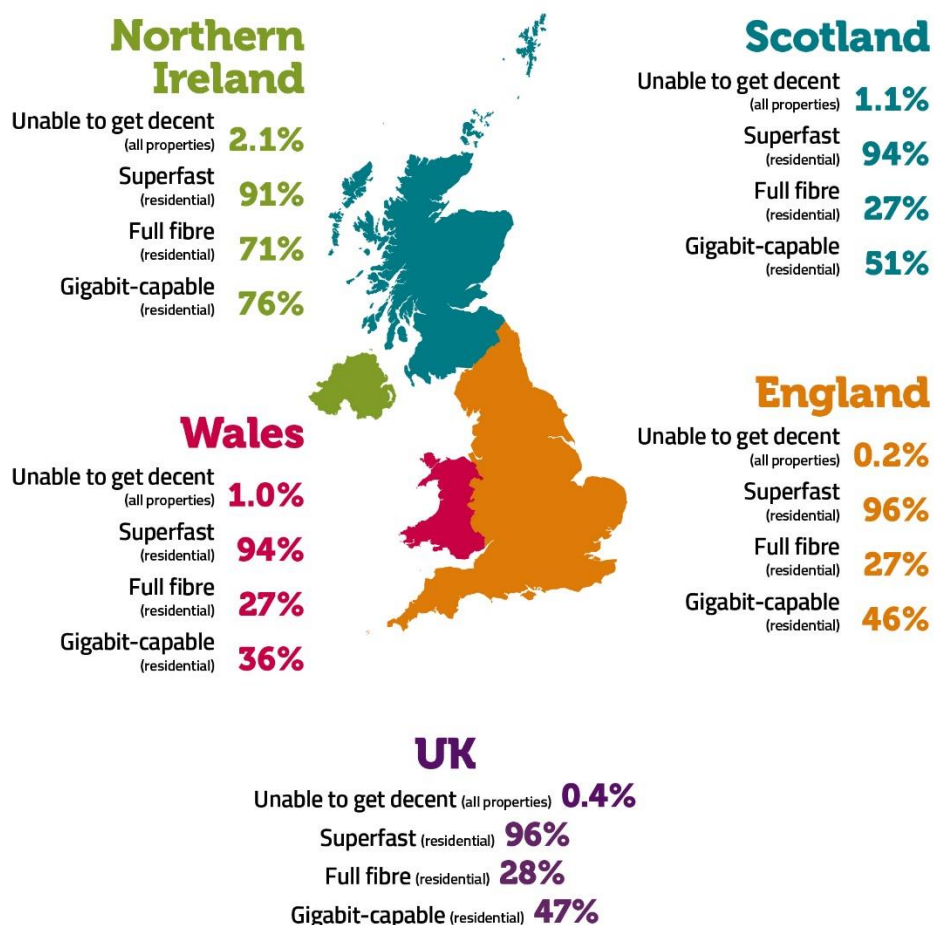
Most homes and businesses in Scotland now benefit from a choice of broadband connections, which deliver superfast or faster speeds. But there are areas in Scotland (and across the UK) where faster services are not yet available. While the number of homes and businesses without access to decent broadband connections continues to fall, we are concerned that some premises in Scotland still do not have access to decent broadband - given the importance of connectivity to participating in an increasingly digital society. However, we note that this number continues to decline year-on-year.

Our reporting on coverage is based on data for September 2021. Figures on data usage are from May 2021. For take-up data we used data provided in both May and September 2021. Throughout this section we generally report data for residential premises unless stated otherwise. However, for reporting of premises not able to get decent broadband which may be eligible for the USO, we report all premises (homes and businesses).

Key highlights:

- **Coverage of faster networks is increasing rapidly.** Gigabit-capable broadband is available to 1.3 million (51%) homes. Full-fibre broadband is available to 717,000 (27%) homes in Scotland. This is an increase of 280,000 premises (10 percentage points) since last year and represents the highest year-on-year increase seen on full-fibre coverage so far. As well as delivering faster speeds, these services are more reliable than older broadband technologies.
- **Superfast broadband coverage is available to 94% of homes in Scotland. Over two-thirds of homes that have access to superfast broadband have upgraded to a superfast service.** We estimate that around 68% of Scottish premises that are able to get superfast broadband actually take a superfast or faster service.
- **Consumers in Scotland continue to use more data** over their fixed connections. Average monthly data use has continued to grow and now stands at **446 GB per connection.**
- **The number of premises in Scotland without access to at least decent broadband continues to fall.** Factoring in coverage from both fixed and fixed-wireless networks, we estimate that around 30,000 (1.1%) premises in Scotland are still without a decent broadband connection and may be eligible to receive one under the broadband Universal Service Obligation (subject to a reasonable cost threshold of £3,400). We also estimate that around 9,500 premises in Scotland cannot access either a decent fixed broadband service or get good 4G coverage indoors. Aside from a handful of exceptions, all these premises are in rural Scotland.

Summary of broadband coverage at a fixed location across the UK and Nations



Availability of fixed broadband services

There has been continued investment in fixed networks in Scotland which has resulted in significant improvements in the availability of superfast, full fibre and gigabit-capable broadband services in recent years. Consequently, the number of premises that do not receive decent broadband has declined.

Fixed broadband is available at a variety of speeds and is delivered over different technologies, including copper (ADSL), fibre to the cabinet (FTTC), hybrid fibre coaxial cable (HFC) and full fibre, or 'fibre to the premises' (FTTP). A detailed explanation of these technologies and speeds can be found in our [Connected Nations UK report](#).

Broadband to fixed locations can also be delivered wirelessly, providing an alternative to fixed network connections. Some premises may be served by a broadband provider over a wireless network (known as fixed wireless access, or FWA), using either a mobile network or a dedicated network. As the capacity in the wireless access network is shared between multiple users, the service needs to be managed appropriately to meet user demand, particularly in areas with capacity

constraints. As Ofcom’s coverage information are based on predictive modelling tools, localised issues may mean that some premises may not be able to receive a service despite being predicted to do so. A detailed explanation of these technologies can be found in [our methodology](#) and in [technical guidance for WISPs](#) on our website.

Full-fibre broadband is now available to 27% (717,000) homes in Scotland with gigabit-capable connections being available at 51% (1.3m) properties

Figure 1: Residential gigabit-capable and full-fibre coverage by UK nation

	Full fibre	Urban	Rural	Gigabit-capable	Urban	Rural
Scotland	27%	30%	17%	51%	58%	18%
Wales	27%	29%	24%	36%	39%	24%
Northern Ireland	71%	85%	36%	76%	92%	36%
England	27%	27%	25%	46%	49%	26%
UK	28%	28%	24%	47%	50%	25%

Source: Ofcom analysis of operator data

Full-fibre (FTTP) and gigabit-capable

Our data shows that 27% (around 717,000) premises in Scotland are now served by a full-fibre connection, a considerable increase of 10 percentage points from last year. This increase is largely due to the continued investment in the rollout of fibre networks in Scotland from providers included last year, such as Openreach, Virgin Media and CityFibre. However, we are now including coverage data from many more, predominantly smaller, fibre network providers. Whilst these providers do not significantly alter the national figures, they are important in providing full-fibre coverage at the local level.

We are reporting on gigabit-capable broadband again in this report. The UK Government has set a target of at least 85% gigabit coverage by 2025, alongside an ambition to get as close to 100% as possible.

When all technologies are combined, our data shows that 51% of homes (around 1.3m) in Scotland now have access to gigabit-capable broadband. This is the second-highest figure of the UK nations and is 4 percentage points higher than the UK total. In addition to full fibre, Virgin Media O2’s upgrade to DOCSIS3.1 is a key driver of this increase. This means that whilst there has been an increase in gigabit-capable coverage in both urban and rural areas, there has been a greater increase in urban areas. As we expect Virgin Media O2 to complete this upgrade by the end of 2021, we would then expect to see further increases being driven by full-fibre deployment with the gap between full-fibre coverage and gigabit-capable coverage reducing in future. On 1 December, Virgin

Media O2 announced that its entire network of 1.2 million premises in Scotland now have access to gigabit broadband speeds.¹⁴

Full fibre can boost business productivity. It enables faster services and better access to cloud-based computing services. Commercial full-fibre coverage continues to be lower than residential coverage and stands at 14%, which is an increase of 6 percentage points from last year. Twenty-eight per cent of commercial premises have access to a gigabit-capable service, but this drops to just 7% for rural businesses.

Figure 2: Commercial gigabit-capable and full-fibre coverage in Scotland by rurality

	Total	Urban	Rural
Gigabit-capable	28%	34%	7%
Full fibre	14%	16%	7%

Source: Ofcom analysis of operator data.

Access to a superfast broadband service continues to increase

Ofcom defines superfast broadband as a service which delivers a minimum download speed of at least 30 Mbit/s.¹⁵ A further 22,000 homes in Scotland now have access to a superfast broadband connection. This equates to 94% of residential premises (around 2.46m). Taking commercial premises into account, superfast broadband is available to 93% of total premises in Scotland. Figure 3 below shows the total percentage of residential premises that have access to superfast broadband.

Figure 3: Residential superfast broadband coverage by UK nation (urban/rural split)

	Superfast	Urban	Rural
Scotland	94%	98%	73%
Wales	94%	98%	80%
Northern Ireland	91%	99%	70%
England	96%	98%	85%
UK	96%	98%	83%

Source: Ofcom analysis of operator data.

There are significant differences in the availability of superfast broadband in urban and rural areas of Scotland, with 98% of residential premises in urban areas having access to superfast broadband compared to 73% in rural areas. This is reflected in the superfast coverage data for local authority areas covering some of the more remote and rural parts of Scotland.

¹⁴ [Virgin Media O2 connects entire network in Scotland to next-generation gigabit broadband - Virgin Media O2](#)

¹⁵ The Scottish Government also defines superfast broadband as speeds of at least 30 Mbit/s.

Figure 4: Residential superfast broadband coverage by selected Scottish local authority area

Scottish Local Authority	% of premises with speeds \geq 30 Mbit/s
Orkney Islands	64%
Shetland Islands	71%
Na H-eileanan Siar	76%
Argyll and Bute	80%
Highland	82%
Aberdeenshire	83%
Moray	85%

Source: Ofcom analysis of operator data.

Superfast coverage in Orkney Islands and Shetland Islands stands at 64% and 71% respectively, while the more densely populated, urban local authority areas such as Dundee (99%), Glasgow City (98%), City of Edinburgh (98%) enjoy more widespread coverage.

However, residential superfast coverage continues to increase at a faster rate than commercial coverage. Around 81% of commercial premises can access superfast compared to 94% of homes in Scotland. This may in part be the result of lower coverage in business/enterprise park areas, which are generally more expensive to connect and have fewer occupants than in residential areas. The divide between urban and rural coverage is even more pronounced for businesses in Scotland, with only 56% of commercial premises in rural areas covered by superfast broadband.

Figure 5: Commercial superfast broadband coverage by rurality

	Total	Urban	Rural
Scotland	81%	89%	56%

Source: Ofcom analysis of operator data.

Some premises still cannot access decent broadband

Taking into account all fixed line connections, 97% of homes and businesses in Scotland have access to at least decent broadband. Around 100,000 do not have access to decent broadband via a fixed connection, the majority of these in rural areas.

Figure 6: Homes and businesses unable to receive decent broadband from a fixed line

	Total	Urban	Rural
Scotland	4% (100,000)	1% (13,000)	17% (87,000)
Wales	4% (55,000)	1% (11,000)	12% (43,000)
Northern Ireland	6% (45,000)	1% (6,000)	17% (39,000)

	Total	Urban	Rural
England	2% (451,000)	1% (217,000)	7% (234,000)
UK	2% (651,000)	1% (248,000)	9% (403,000)

Source: Ofcom analysis of operator data.

Broadband delivered wirelessly to fixed locations can meet the needs of some people, including those in areas without access to decent broadband over wired connections

As discussed above, some premises can access broadband provided over a wireless network, known as Fixed Wireless Access (FWA), using either a mobile network or a dedicated network operated by a Wireless Internet Service Provider (WISP).

Fixed Wireless Access on mobile networks

Of the four MNOs in the UK, only O2 does not currently offer FWA services. Based on the MNOs' claimed coverage, we estimate that 93% premises in Scotland have access to an MNO FWA service.¹⁶ MNOs claim average download speeds up to 100-200Mbit/s on their 5G FWA services. Download speeds on 4G FWA are lower.

These services are provided to an indoor router, although EE offers an external antenna for its FWA services in areas with poor indoor coverage. The end users' experience of the service could be affected by where they place the router, their indoor mobile coverage, the capacity available in the wireless access network and the backhaul network, and the number of users at that location.¹⁷

Fixed Wireless Access from WISPs

This year, we have expanded our collection of WISP data; asking operators to provide an estimate of their coverage based on network capacity constraints, interference and other external factors.¹⁸ Based on these estimates, almost 2% (52,000) homes and businesses in Scotland have coverage from a WISP network. These services are primarily delivered using license exempt spectrum in the 5GHz band.

Fixed Wireless Access delivered by WISPs can be used to provide gigabit speeds using spectrum in higher frequency bands. Some WISPs are beginning to offer these services, but it has not yet been very widely deployed, due to the availability of affordable equipment.

¹⁶ Based on coverage data provided by EE and Three, as Vodafone did not submit data at the level of granularity requested. As coverage forecasts are determined by predictive modelling tools, localised issues may mean that particular premises may not be able to receive a service despite being predicted to do so.

¹⁷ Backhaul here refers to the connection between the cell site and the mobile network core.

¹⁸ Ofcom, [Technical guidance for WISPs](#), September 2020.

Figure 7: Coverage of MNO and WISP FWA networks

	MNO FWA	WISP FWA
Scotland	93%	2%
Wales	91%	31%
Northern Ireland	82%	3%
England	94%	6%
UK	94%	7%

Source: Ofcom analysis of operator data.

Fixed Wireless Access and the impact on the availability of broadband

As shown in our research, both MNOs and WISPs networks can deliver a decent broadband service and can be an alternative network technology for consumers who cannot receive a decent broadband connection from their fixed network.

Based on the coverage estimates provided by FWA providers, we estimate that 70,000 premises in Scotland that do not have access to a decent broadband service from a fixed network could have access via an FWA network. This provides an additional 2.5% of decent broadband service coverage to Scotland. Just under 2,000 premises have access to a decent broadband service from a WISP only network. A further 65,000 premises in Scotland have access to a decent broadband service from an MNO FWA service only. Some premises that can get decent broadband on a WISP network may also be covered by an MNO FWA service. Over the next year, we plan to work with FWA providers to understand how they manage capacity and to continue our work on understanding the performance of these services.

Figure 8: Access to a decent broadband service by technology type

	Has no access to decent broadband from a fixed network	Has access to decent broadband from a FWA network	Remaining premises without access to decent broadband
Scotland	100,000	70,000	30,000
Wales	55,000	40,000	15,000
Northern Ireland	45,000	28,000	17,000
England	451,000	390,000	61,000
UK	651,000	528,000	123,000

Source: Ofcom analysis of operator data.

Our latest estimate is that 30,000 (1.1%) of premises in Scotland still do not have access to a decent broadband service via either a fixed or fixed wireless network. This figure has reduced slightly from our estimate of 34,000 last year. This is due in part to the rollout of more fibre and fixed wireless networks but also because we have gathered data from more operators this year.

The remaining premises may be able to have a new connection built under the broadband Universal Service Obligation (USO).¹⁹

Premises that do not have a decent fixed or a 4G mobile network connection

As with last year, this report continues to examine those premises unable to get a decent fixed or 4G mobile broadband service. Premises are considered to have access to a decent fixed connection if the broadband speed is above a download speed of at least 10 Mbit/s and an upload speed of at least 1 Mbit/s and to have access to an indoor 4G mobile service if a connection speed of at least 2 Mbit/s is available.

We estimate that 94% of premises in Scotland can receive both decent fixed and 4G mobile broadband services, while we estimate that around 9,500 premises in Scotland cannot access either a decent fixed broadband service or get good 4G coverage indoors. Aside from a handful of exceptions, all these premises are in rural Scotland.

The Broadband Universal Service Obligation (USO)

The broadband USO provides everybody with the right to request a broadband connection with the following technical characteristics:

- a download sync speed of at least 10 Mbit/s;
- an upload sync speed of at least 1 Mbit/s;
- a contention ratio of no more than 50:1;
- latency which is capable of allowing the end user to make and receive voice calls effectively; and
- the capability to allow data usage of at least 100GB per month.

Where an affordable service with the above characteristics is not available, or due to be available in twelve months under a publicly funded scheme, the customer is eligible for the USO if the costs of providing the connection are below £3,400 or, where the costs are above £3,400, the customer agrees to pay the excess.²⁹ In calculating whether the costs are below or above £3,400, the eligible Universal Service Provider (USP) must take into account where costs could be shared by several USO eligible premises. BT is the USP for the UK (excluding Hull), and KCOM for the Hull Area. They are required to provide the USO and to report at six monthly intervals on delivery. In November, we changed the rules to clarify that where excess costs are very high, BT should inform customers of the total excess costs of the shared infrastructure and gain agreement to cover these before delivering the connection. One or more customers in the local area can then cover the total excess costs of the build.²⁰ Despite this, the costs could still be significant for many rural premises in Scotland, meaning they are unlikely to benefit from the USO. We will continue to work with industry and the UK and Scottish Governments to look at alternative technology and funding solutions for these hard-to-reach properties.

¹⁹ [The Electronic Communications \(Universal Service\) \(Broadband\) Order 2018](#)

²⁰ <https://www.ofcom.org.uk/news-centre/2021/how-were-changing-the-rules-for-the-broadband-universal-service>

Satellite services may be an option for customers in poorly served areas

Geostationary satellites can also be an alternative to a fixed broadband connection, particularly in the most remote and rural parts of Scotland. Performance can be limited by its high latency and the data caps on usage. As such, we do not consider that geostationary satellites can currently provide a service that meets the broadband USO specification.

We are beginning to see the introduction and deployment of Low Earth Orbit (LEO) satellite constellations that offer residential and business broadband to UK consumers. These services will have lower latency, because the satellites are closer to Earth, so they are more likely to provide better broadband services. Providers such as OneWeb are building a global communications network that will deliver low latency, high-speed connectivity through an LEO satellite constellation, providing Fixed Satellite Services (FSS) to end-users in the UK. BT recently announced a partnership with OneWeb to test and trial LEO satellite constellations within their network, in order to understand how to better meet the communications needs of businesses and consumers.²¹ SpaceX's Starlink service has also been launched and is currently in beta trial. It offers direct to consumer services on a 24/7 basis in most of the UK with future coverage for the whole of the UK planned. Starlink indicates that users can currently expect to see 100 to 200 Mbit/s or greater download speeds and upload speeds of 10 to 20 Mbit/s with latency of 20ms or lower in most locations.

Private and public sector investment play a role in building faster networks

Supporting investment in faster networks across the UK is a key priority for Ofcom. While commercial and public sector investment has delivered at least superfast services to most of the UK, not every part of the UK has the same access to faster speed services. Therefore, we are continuing our work to both improve access to better broadband services in the hardest to reach locations, and support investment in new gigabit-capable networks.

Governments across the UK continue to supplement commercial rollout by investing in faster speeds for the hardest to reach areas. While subsidy schemes designed to bring superfast speeds continue to operate, governments are also considering how public funding can be used to support gigabit-capable connectivity.

The UK Government has committed £5 billion in investment through the Project Gigabit programme, with at least £1.2bn available by 2025, to provide connectivity for the hardest to reach areas. In this year's Budget the Chancellor announced a further £8 million broadband boost for 3,600 rural homes and businesses in Aberdeenshire, Angus, the Highlands Moray and Perth & Kinross.²² These premises were due to get access to superfast broadband through the R100 programme, but due to an agreement between the UK and Scottish governments, these homes and businesses will now get even faster gigabit-capable broadband instead.

Building on the work of the Digital Scotland Superfast Broadband Programme, the Scottish Government has committed to ensuring every home and business in Scotland can access superfast broadband. This commitment will be delivered through the R100 programme via three key strands of activity – the £600 million R100 contracts (North, Central and South), the R100 Scottish

²¹ <https://newsroom.bt.com/bt-secures-industry-first-global-partnership-with-oneweb>

²² <https://www.gov.uk/government/news/better-broadband-for-500000-rural-homes-in-uk-gigabit-revolution>

Broadband Voucher Scheme (R100 SBVS) and ongoing commercial deployment. Recently, the Scottish Government announced an extension of the R100 Interim Voucher Scheme to 31 March 2022. The interim voucher is available to all homes and businesses with speeds less than 30Mbps and where superfast broadband rollout is planned, but unlikely to be delivered until after 31 December 2021.²³

Contracts for R100 in all three lots (North, Central and South) have been signed with BT and will go beyond the original commitment to provide superfast broadband of 30 Mbit/s by providing a significant amount of gigabit-capable and full-fibre connections. Work is now underway in all three lots and the Scottish Government is working with Openreach to identify opportunities to accelerate this where and when possible.

In 2020, the Infrastructure Commission for Scotland also published its Phase 1 and Phase 2 Reports.²⁴ The Commission made twenty-three recommendations, including that the Scottish Government ensure the delivery of a full-fibre network for Scotland by 2027.

Local authorities in Scotland can also play a key role in driving improved digital connectivity. The Scottish Government (in conjunction with COSLA) has set out plans for a refreshed Digital Strategy for Scotland that will build on the work between central and local government during the Covid-19 pandemic. Other organisations, such as the Digital Office for Scottish Local Government, work directly in partnership with local authorities to help drive 'digital transformation.'²⁵ Some local authorities, such as Glasgow City Council, have developed their own digital strategies to help deliver better public services.²⁶

More consumers are upgrading to higher speeds

Having discussed coverage, and the investment in improving the availability of network above, we now report on take-up. The benefits of increased coverage of broadband networks able to support higher speed services cannot be realised if consumers do not take advantage of these services when they are available. So alongside reporting on the extent of coverage of broadband networks we also examine the take-up of services over them.

Overall, we estimate that for those premises that are able to take superfast broadband or a higher speed (94% of all premises in Scotland), around 68% of them do so. This is an increase from around 57% last year. And we estimate that the take up of full-fibre services in Scotland, where they are available, is around 22%. Our reporting of full-fibre take-up may appear lower than expected because, whilst networks are being deployed at pace, take-up is likely to lag coverage.

²³ [Interim voucher scheme extended until March 2022 | Digital Scotland Superfast Broadband](#)

²⁴ <https://infrastructurecommission.scot/>

²⁵ <https://www.digitaloffice.scot/>

²⁶ <https://www.glasgow.gov.uk/councillorsandcommittees/viewSelectedDocument.asp?c=P62AFQDNDX0G2U812U>

Figure 9: Take-up of broadband service by speed (as a percentage of premises where those services are available)

Nation	Superfast and above	Full fibre
Scotland	68%	22%
Wales	66%	24%
Northern Ireland	73%	19%
England	69%	25%
UK	69%	24%

Source: Ofcom analysis of operator data.

Data usage over fixed networks continues to grow

Consumers in Scotland continue to use more data over their fixed connections as more people use broadband for data-heavy activities such as streaming. The average monthly data usage now stands at 446 GB per connection, up from 433 GB last year and 327 GB in 2019.



Mobile

Introduction

Mobile services play an ever-increasing role in people's lives. In this chapter, we report on the availability of mobile coverage, outside and inside premises, across Scotland's landmass and on roads.

We also provide an update on developments in the rollout of 5G over the last year, and for the first time provide a view of how extensively 5G is available in our [Connected Nations UK report](#). The availability and use of 'Internet of Things' devices and services have continued to increase, and we discuss this in more detail in the UK report. In Scotland, the Scottish Government continues promote the use of IoT technologies through a variety of initiatives, including IoT Scotland²⁷ and the Scottish Wide Area Network (SWAN).²⁸

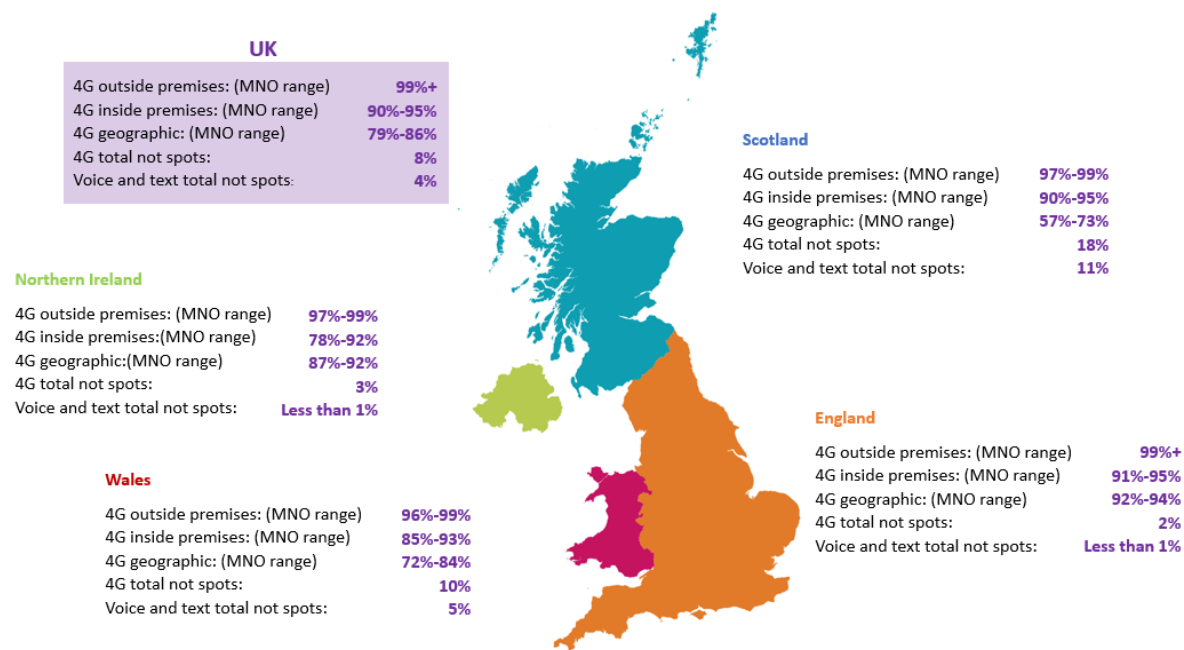
Key highlights:

- **Mobile Network Operators have continued to deploy 5G networks** across the UK this year, with 8% of the c6,500 sites being in Scotland.
- **4G continues to underpin mobile experience in Scotland, and mobile coverage is generally stable.** 82% of Scotland's landmass has access to good 4G coverage from at least one of the mobile operators (up from 81% in 2020) but only 45% has coverage from all 4 operators (up from 44% in 2020).
- Eighty-two per cent of premises in Scotland should be able to get good indoor 4G coverage from all operators (up from 81% in 2020), with 96% of rural premises predicted to receive a service from at least one operator. The UK Government's Shared Rural Network programme and the Scottish Government's S4GI programme will extend coverage in the coming years.

²⁷ <https://www.iot-scotland.net/>

²⁸ <https://www.scottishwan.com/>

Summary of mobile coverage across the UK



5G rollout and adoption is evolving

5G deployment has continued at pace in 2021, and now stands at more than c6,500 5G mobile sites across the UK, up from c3,000 in 2020. 87% of these sites are in England, 8% in Scotland, 3% in Wales and 2% Northern Ireland. Many 5G deployments are focused on towns and cities, such as Glasgow, Edinburgh and Stirling, in order to provide enhanced capacity to 3G and 4G services in more populated areas. We also expect MNOs to leverage other benefits of 5G as they continue to rollout their networks and to provide connectivity solutions for both consumers and businesses. This includes private networks for businesses, which will facilitate greater control and privacy in addition to connectivity, and in some cases broader improved coverage across large business sites where not spots exist.

The Scottish Government has published a national Strategy²⁹ and established the Scotland 5G Centre³⁰ to facilitate investment in, and deployment of, 5G in Scotland. The Scotland 5G Centre is the national hub for 5G, with a key role in delivering the Scottish Government's 5G strategy.

In September 2020, the Scottish Government confirmed additional funding of £4m for the Scotland 5GConnect Initiative, establishing a network of 5G Innovation Hubs across the country. These Hubs will work with SMEs to help develop skills needed to use 5G technology as a business enabler. Three hubs are now active virtually, in the Forth Valley, Dundee and Dumfries, and will open physically by the end of 2021. Other projects, such as the 5G New Thinking project continue to work with rural

²⁹ [5G: strategy for Scotland - gov.scot \(www.gov.scot\)](https://www.gov.scot/Information/Policy/5G/5G_strategy_for_Scotland)

³⁰ [The Scotland 5G Centre is the national hub for 5G](#)

communities, including the Orkney Islands, to aid local communities and businesses to build and operate their own local mobile and wireless networks.³¹

5G rollout is well underway in Scotland. Coverage from any operator is between 35-48% of premises, with this range spanning very high to high confidence levels.³² We are not yet in a position to break down by operator, as we discuss further in the [UK report](#). Take up remains modest, and the majority of consumers continue to rely on 4G, 3G and 2G.

Coverage

Methodology

In this section we continue to report on the availability of voice calls and data services across a range of metrics, as we have done in the past. This year, we are placing a particular focus on the range of 4G coverage available from individual MNOs, as the experience which closely matches that of consumers. We continue to report on other metrics, including where all operators, or any one operator have coverage, both here but also in our [interactive report](#).

The mobile coverage figures provided are based on predictions which the MNOs supply to Ofcom, with Ofcom undertaking regular testing to ensure the predictions provided are suitable for national and regional reporting. We take the accuracy of the data supplied to us seriously and we continue to monitor, through drive testing, the accuracy of all operators' coverage predictions. We note that operators continue to update and improve their prediction models and continue to work with them to ensure appropriate validation is undertaken.³³

Indoor coverage

The coverage people receive indoors will depend on a range of factors including: the thickness of walls, building materials used in construction and where in a building people are using their phone. Due to these factors, in some premises there may be differences between our predicted indoor coverage data and the actual coverage available. Our online coverage checker³⁴ provides additional information on the likelihood of there being indoor coverage in buildings at different locations, which takes into account some of the factors that can affect a mobile signal.

MNOs continue to provide a number of alternative options to improve indoor mobile coverage at locations without reliable coverage. All MNOs in the UK offer Wi-Fi calling services (the ability to make and receive a call over a Wi-Fi network) to consumers (although not all mobile handsets support this feature). We note that the percentage of calls across the UK made using voice over Wi-Fi³⁵ by MNOs has remained relatively stable overall, between 2% and 16% per MNO compared to 2%

³¹ The 5G New Thinking project is part funded by the Department for Digital, Media, Culture and Sport

<https://www.5gnewthinking.co.uk/>

³² This range is based on associating MNO predictions with confidence levels in coverage being delivered at different signal strengths. More detail is provided in the [methodology](#) of the UK report.

³³ In last year's report, we noted that new predictions had been received from O2 and that validation was ongoing. O2 has shared further data with Ofcom over the last year, and is continuing to undertake work in this area.

³⁴ [Mobile and Broadband checker - Ofcom](#)

³⁵ There are two types of Wi-Fi calling solutions: "cellular preferred", where the devices use Wi-Fi calling only if there is poor cellular coverage, and "Wi-Fi preferred" where all the calls are made via Wi-Fi, when Wi-Fi is available. This year, we have seen some of the UK MNOs move or revert to a "Wi-Fi preferred" solution.

and 18% last year. Other examples of available tools include broadband-based calls on services such as Skype/WhatsApp, and femtocells.

In addition, this year Ofcom has decided to expand the range of static indoor mobile repeaters that people can install themselves, without a licence. Such devices can boost the signals between a network operator's base station and a mobile phone, and so improve access to mobile services indoors. The new regulations will now allow 'provider specific' and 'multi-operator' repeaters to boost the signals of more than one MNO at a time, as long as they meet technical requirements.³⁶

4G services (Indoor)

MNOs provide a high level of indoor 4G coverage, with coverage from individual MNOs ranging between 90% and 95% of all premises. As can be seen from figure 10 below, 82% of premises in Scotland can receive 4G coverage indoors from all four operators, broadly in line with a UK average of 81%. However, indoor coverage from all four operators falls to 53% for premises in rural Scotland.

Figure 10: Indoor premise 4G coverage by UK nation (all operators)

Nation	Total
Scotland	82%
Wales	74%
Northern Ireland	66%
England	82%
UK	81%

Source: Ofcom analysis of operator data.

The picture improves if we consider indoor coverage from at least one operator, with around 96% of rural premises in Scotland having the option of taking a 4G service from at least one operator. In urban Scotland, 99%+ of premises can access a 4G service from at least one operator.

Figure 11 and figure 12 below highlights indoor 4G premise coverage by individual operator across urban and rural Scotland. It shows that individual operators 4G coverage inside of urban premises is predicted to range between 94-99%, however this is significantly reduced when we look at 4G coverage inside of rural premises which ranges between 71-82%.

³⁶ https://www.ofcom.org.uk/data/assets/pdf_file/0032/227579/statement-mobile-phone-repeaters.pdf

Figure 11: Indoor premise 4G coverage in urban Scotland (by operator)

Urban	% of premises with indoor 4G coverage (2020)	% of premises with indoor 4G coverage (2021)
EE	96%	97%
O2	98%	98%
Three	93%	94%
Vodafone	99%	99%

Source: Ofcom analysis of operator data.

Figure 12: Indoor premise 4G coverage in rural Scotland (by operator)

Rural	% of premises with indoor 4G coverage (2020)	% of premises with indoor 4G coverage (2021)
EE	78%	81%
O2	82%	82%
Three	70%	71%
Vodafone	81%	82%

Source: Ofcom analysis of operator data.

Voice services (Indoor)

Mobile voice services from all four operators are available to 93% of premises in Scotland. Again, urban areas of Scotland are better served with 98% indoor coverage compared to 73% in rural areas. This is illustrated by the difference in all-operator coverage between North Lanarkshire (99%+) and Orkney Islands (42%). However, almost every premise in Scotland (whether urban or rural) has indoor voice coverage from at least one operator.

Coverage outside premises

4G services (outdoor premise)

People expect good mobile coverage inside and outside their home. Coverage that is only present outside a home does not provide consumers with a comprehensive experience (although other workarounds, such as Wi-Fi calling, can mitigate this impact). Coverage outside premises, however, provides a good indication of the availability in places where people typically live, work and travel.

MNOs provide a high level of 4G coverage outside of premises in Scotland, with coverage from each individual MNO ranging between 97-99% of premises. As can be seen from figure 13 below, 4G outdoor premise coverage from all operators in Scotland stands at 96%, the second highest of the UK nations. This coverage falls to 83% for rural areas of Scotland. This still represents a considerable increase in rural outdoor premise coverage from 70% in January 2018.

Figure 13: Outdoor premise 4G coverage by UK nation (all operators)

Nation	Total
Scotland	96%
Wales	93%
Northern Ireland	94%
England	98%
UK	98%

Source: Ofcom analysis of operator data.

Outdoor premise coverage from at least one operator stands at 99% for rural Scotland. Figure 14 and figure 15 below highlights outdoor premise coverage by individual operator across urban and rural Scotland. It shows that individual operators 4G coverage outside of rural premises ranges between 88-96%, whereas each MNO serves more than 99% of urban premises, these figures have not changed since last year.

Figure 14: Outdoor premise 4G coverage in urban Scotland (by operator)

Urban	% of premises with outdoor 4G coverage
EE	99%+
O2	99%+
Three	99%
Vodafone	99%+

Source: Ofcom analysis of operator data.

Figure 15: Outdoor premise 4G coverage in rural Scotland (by operator)

Rural	% of premises with outdoor 4G coverage
EE	96%
O2	93%
Three	88%
Vodafone	94%

Source: Ofcom analysis of operator data.

Voice services (Outdoor premise)

As with last year, around 98% of premises in Scotland have voice coverage outside from all four operators. This drops to 92% for premises in rural Scotland. Again, almost every premise in Scotland (whether urban or rural) has outdoor voice coverage from at least one operator.

Geographic coverage

4G services (Geographic)

Although we continue to see limited year on year changes in geographic coverage, some incremental improvements by individual operators have taken place. Figures 16 and 17 below highlight the extent of 4G geographic coverage across urban and rural Scotland by individual operator. It shows that individual operator 4G geographic coverage in Scotland ranges between 98-99% in urban Scotland, compared to between 56-73% in rural Scotland.

Figure 16: Geographic 4G coverage in urban Scotland (by operator)

Urban	Geographic 4G coverage across Scotland (2020)	Geographic 4G coverage across Scotland (2021)
EE	99%	99%
O2	98%	98%
Three	98%	98%
Vodafone	99%	99%

Source: Ofcom analysis of operator data.

Figure 17: Geographic 4G coverage in rural Scotland (by operator)

Rural	Geographic 4G coverage across Scotland (2020)	Geographic 4G coverage across Scotland (2021)
EE	70%	73%
O2	62%	62%
Three	56%	56%
Vodafone	65%	65%

Source: Ofcom analysis of operator data.

There are still considerable gaps between the coverage available from at least one operator compared to the coverage from all operators, and partial not spots limit the service people may experience in Scotland. Figure 18 below shows the change in 4G geographic coverage from all operators by UK nation. It highlights an increase of 1 percentage point in coverage across Scotland (up from 44% in 2020).

Figure 18: Change in 4G Geographic coverage from all operators by UK nation

	% of landmass served by all operators (2020)	% of landmass served by all operators (2021)	% change
Scotland	44%	45%	+1%
Wales	60%	61%	+1%
Northern Ireland	79%	79%	-
England	84%	84%	-
UK	69%	69%	-

Source: Ofcom analysis of operator data.

Geographic coverage varies considerably among mobile operators and remains poor in many places. As can be seen from figure 19 below, only 44% of rural Scotland has 4G coverage from all operators.

Figure 19: 4G Geographic coverage from all operators by UK nation and rurality

Nation	Total	Urban	Rural
Scotland	45%	96%	44%

Source: Ofcom analysis of operator data.

4G geographic coverage across Scotland from at least one operator increased by 1 percentage point this year to 82%, up from 81% in 2020. Complete not spots are down 1 percentage point to 18% this year, from 19% last year. There remain significant differences in coverage across the nations of the UK, with Wales (61%), Northern Ireland (79%) and England (84%) having geographic coverage from all four operators.

Whilst the trend for differences in coverage between the nations of the UK is also reflected in the coverage provided by individual MNOs, these overall coverage levels from operators tend to be higher and reflect the actual coverage available to a consumer on a given network in each nation.

Urban areas of Scotland are relatively well served by 4G networks but those in rural areas, particularly in the western Highlands and Islands, continue to experience poor levels of 4G geographic coverage. This compares to 8% of the overall UK geographic area which has no coverage from any operator.

Figure 20: Complete 4G not-spots by UK nation

Nation	% of 4G not-spots
Scotland	18%
Wales	10%
Northern Ireland	3%
England	2%
UK	8%

Source: Ofcom analysis of operator data

It should be noted that some areas in Scotland without coverage are very remote, for example, 20% of Scotland is considered ‘wild’ by Nature Scot.³⁷ This challenging terrain presents challenges for mobile operators who must consider a range of factors when deploying infrastructure, such as proximity to power sources and backhaul or radio links to connect masts to the main network. It can also be difficult to obtain the relevant permissions to access private land and the low population density in rural areas can limit the commercial attractiveness of some of these more remote areas.

Figure 21 below highlights 4G geographic coverage across the UK from at least one operator by rurality.

Figure 21: 4G Geographic coverage from at least one operator by UK nation and rurality

Nation	Total	Urban	Rural
Scotland	82%	99%+	82%
Wales	90%	99%	89%
Northern Ireland	97%	99%	97%
England	98%	99%+	97%
UK	92%	99%+	91%

Source: Ofcom analysis of operator data.

Voice services (Geographic)

Mobile voice services from all four operators are available across 60% of Scotland’s geographic area, up 1 percentage point from last year. The difference between urban coverage (99%) and rural coverage (59%) is striking and consistent with broader trends and gaps in coverage between urban and rural areas. However, 89% of Scotland’s geographic area can get voice coverage from at least one operator, and this equates to 99%+ of urban and 89% of rural Scotland.

³⁷ Scottish Natural Heritage (now NatureScot), [Scottish Natural Heritage’s Advice to Government](#), 16 June 2014.

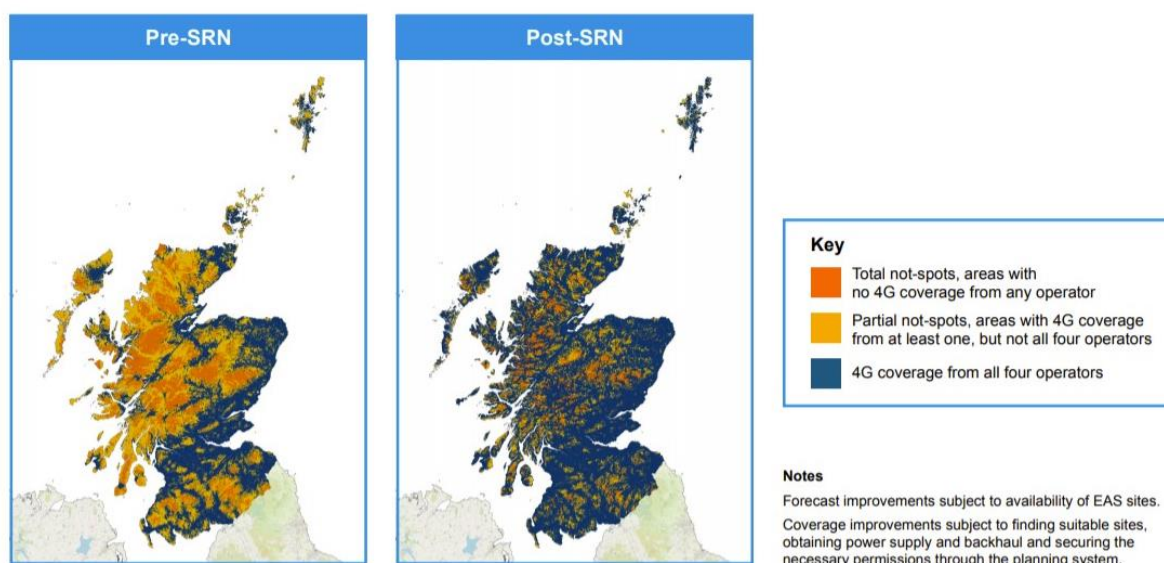
Improving geographic coverage

Both the UK Government and Scottish Government have introduced initiatives which should see significant investment in networks and therefore improved geographic coverage over the coming years.

The Shared Rural Network project was agreed between the UK Government and the UK mobile operators in March 2020, as a key plank in improving UK mobile coverage and to support the Government's ambition of achieving 95% coverage of the UK landmass by 2025. Under the agreement, each MNO is committed to reaching 88% coverage of UK landmass by 30 June 2024, and 90% by 30 June 2026 (subject to certain conditions), with an expectation that this will see the 'at least one operator' footprint (i.e. the area where there is mobile coverage available, but not always from the same MNO) reach 95% of UK landmass by 2025. Ofcom is responsible for assessing operators against these 88% and 90% targets, which have been added to spectrum licenses to make them binding.

Coverage in Scotland is expected rise to 91% from at least one operator and reach 74% from all four operators. The areas in Scotland forecast to benefit from the SRN are illustrated in the figure 22 below.

Figure 22: SRN coverage forecast improvements in Scotland



Source: Department for Digital, Culture, Media and Sport, Shared Rural Network coverage forecast improvements in Scotland.³⁸

This year has seen MNOs begin to make significant progress towards the 88% target, which they are delivering under their own commercial steam. A key objective of the programme announced in March 2020 was a reduction in the number of partial not spots consumers experienced, where service was available from one MNO but not others. Since that time, we have seen a two-percentage

³⁸ <https://srn.org.uk/forecast-coverage-improvements/>

point decline in partial not spot levels, as parts of the UK begin to experience a more comprehensive service.

The Scottish Government is also investing up to £28.75 million to deliver 4G mobile infrastructure to up to 55 mobile ‘not-spots’ through the Scottish 4G Infill programme (S4GI). The first site in the programme – at New Luce in Wigtownshire – went live in February 2020 and is now delivering 4G services. As of the time of writing in November 2021, 22 sites are currently live with a pipeline of sites to be built and activated through to March 2023. Updates – including timescales for 4G service availability – are being published on the Scottish Government’s website.³⁹

Coverage on roads

The road network in Scotland is hugely diverse, spanning the ten-lane M8 in Glasgow city centre to single carriageway sections in the Highlands. Good coverage is important along this road network to assist with vehicle communications, navigation, infotainment and safety aids. This section focuses on coverage along Scotland’s major roads but a detailed breakdown of coverage along A&B roads can be found via our [interactive dashboard](#).

In-vehicle 4G coverage from all operators along major roads in Scotland now stands at 51%. Whilst this represents a small increase of 1 percentage point from last year, coverage has risen from 41% in January 2018. Five per cent of Scotland’s major roads are unable to receive in-vehicle 4G coverage. Figure 23 below highlights the range of in-vehicle 4G coverage along major roads in Scotland, by individual operator.

Figure 23: In-vehicle 4G and voice coverage on major roads in Scotland, by operator

	4G	Voice
EE	81%	84%
O2	79%	92%
Three	66%	82%
Vodafone	80%	91%
All operators	51%	70%
At least one operator	95%	98%

Source: Ofcom analysis of operator data.

There has also been a small increase for in-vehicle voice coverage from all operators on major roads in Scotland, which now stands at 70%. Around 2% of major roads are without voice coverage from any operator.

³⁹ [Scottish 4G infill programme: progress update - gov.scot \(www.gov.scot\)](https://www.gov.scot/resources/documents/2021/11/Scottish_4G_infill_programme_progress_update.pdf)

Mobile network performance and capacity

4G continues to carry most of the data traffic

Mobile data traffic in Scotland continues to grow significantly year-on-year. Our monthly sample indicates data growth increased to c48,000 TB, up from c33,000 TB in 2020. Most of this data is from 4G traffic, which accounts for c44,000 TB of this year's total data traffic in Scotland. The share of data traffic on 3G and 2G continues to fall compared with 4G. Most traffic remains concentrated in urban areas of Scotland, with Glasgow City local authority area generating around 21,000 GB/km sq. of data traffic, compared to just under 39 GB/km sq. in the Highland Council area.