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Rural mobile coverage in the UK: Not-spots and partial not-spots



Summary

- 1 Mobile networks in the UK
- 2 How does mobile coverage vary across different parts of the UK?
- 3 UK Government targets and progress
- 4 Shared Rural Network (SRN)
- 5 Previous measures to improve rural mobile coverage
- 6 Glossary

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Summary

Mobile services are now at the heart of how most people stay in touch and go online. [Ofcom reported](#) in 2020 that mobile phone take-up is close to universal, with 98% of homes having them. Mobile data consumption continues to increase year-on-year. Average monthly data use was 27% higher in 2020 compared to 2019.

This briefing paper looks at mobile coverage in the UK with a focus on rural 4G mobile coverage (not-spots and partial not-spots). It covers Government commitments on mobile coverage and the main measures aimed at improving rural mobile coverage.

What is UK mobile coverage like today?

Ofcom records areas with mobile coverage indoors and outdoors at specific premises, over geographical areas and on major roads.

According to [Ofcom's Connected Nations 2021 report](#), 81% of premises had 4G data coverage and 93% of premises had indoor voice call coverage from all four mobile operators (EE, Three, O2 and Vodafone) in September 2021.

92% of the UK landmass had 4G coverage from at least one operator. 4% of the UK landmass had no good mobile signal at all.

Coverage varies in different parts of the country, with urban areas having better coverage than rural areas. Countries and regions with high proportions of rural areas, such as Scotland, Wales and the North East, have the lowest 4G landmass coverage.

There have been limited improvements in geographic mobile coverage over the past three years, with 4G landmass coverage plateauing at 91% in 2019. This is expected to improve to 95% by 2025 due to the Shared Rural Network agreement (explained below).

Mobile coverage at local areas can be explored at [Ofcom's mobile coverage checker](#).

How are UK mobile networks built?

The roll-out of mobile services and infrastructure in the UK is led by private Mobile Network Operators (MNOs). There are four MNOs that own and operate UK mobile networks:

- EE (owned by BT),
- O2 (now a joint venture with Virgin Media),
- Three (Hutchinson 3G) and
- Vodafone.

The MNOs take commercial decisions about where to build masts and deliver services. Detailed roll-out and infrastructure plans are not publicly available.

Our briefing, [Building broadband and mobile infrastructure](#) provides information on the permissions needed to build mobile masts, such as planning rules and land access rights.

Government targets on mobile coverage

The [Levelling-Up White Paper](#) included two targets for mobile coverage by 2030:

- that 4G mobile coverage is available nationwide, and
- that the majority of the population has access to a 5G signal.

Nationwide 4G coverage means that 95% of the UK landmass should receive signal from at least one mobile operator.

The 2030 timeframe aligns with the Government's other levelling up missions. However, the Government says it aims to reach the mobile coverage targets earlier. For 4G, the Government aims for 95% coverage by 2025 as part of the [Shared Rural Network](#) (SRN) agreement.

On 5G, the Government aims for the majority of population to be reached by 2027. The Government said the 5G target will be reconsidered as part of its forthcoming Wireless Infrastructure Strategy.

Shared rural network

The [Shared Rural Network](#) (SRN) is an agreement between the UK Government and mobile industry announced in March 2020 to improve rural mobile coverage by 2025.

Under the deal, mobile industry operators will invest around £500 million to fill ‘partial not-spots’ (spots with coverage from at least one but not all mobile operators). The mobile operators have committed to legally binding coverage obligations to support this commitment.

The Government will invest up to £500 million on new masts in ‘total not-spots’ (areas with no coverage from any operator). This part of the SRN will also include masts built as part of the Home Office’s new [Emergency Services Network](#), which is also forecast to improve rural mobile coverage.

Together these commitments are expected to bring 4G coverage to 95% of the UK landmass by 2025.

There’s a [dedicated website for the SRN](#) that provides FAQs, coverage forecasts and updates.

Other measures to improve rural mobile coverage

The Government is also bringing forward policy reforms to make it easier for the mobile industry to build new infrastructure. These include:

- [reforms to planning rules](#) to allow for taller and wider masts and
- [reforms to the Electronic Communications Code](#), which governs the rights of telecoms companies to access land (through wayleaves and leases).

These reforms aim to help address rural mobile coverage and the roll-out of new 5G technology by making it easier to build and upgrade mobile masts. Our briefing, [Building broadband and mobile infrastructure](#) covers these proposed reforms.

Rural mobile coverage will also likely benefit from the release of [new radio wave spectrum](#) by Ofcom in 2021. The 700 MHz spectrum band was auctioned in March 2021. Its relatively low frequency makes it well-suited for providing coverage to rural areas.

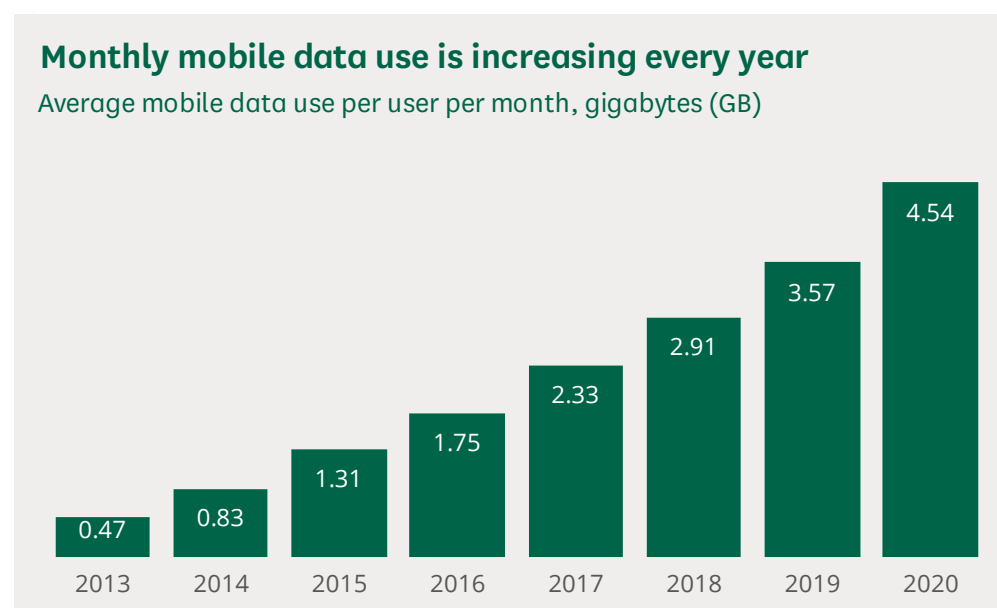
The Scottish Government has a programme for funding new mobile masts in Scotland, called the [Scottish 4G Infill programme](#). The £25 million programme will see around 47 new masts built in remote parts of Scotland.

1 Mobile networks in the UK

The coronavirus pandemic has highlighted the importance of digital connectivity to enable people to stay in touch and access essential services. Mobile services are now at the heart of how most people stay in touch and go online.

The [National Infrastructure Commission](#) stated in 2016 that mobile connectivity had become a “necessity”.¹ In 2020, Ofcom reported that mobile phone take-up is [close to universal](#) in the UK, with 98% of homes having them.²

Mobile data consumption also continues to increase year-on-year, highlighting the importance and demand for mobile services. According to Ofcom, average mobile data consumption in the UK was 4.5 gigabytes (GB) per month in 2020, up 27% on 2019.³



Source: Ofcom, [Communications Market Report 2021](#)

This briefing paper looks at mobile network coverage in the UK with a focus on rural 4G mobile coverage (not-spots and partial not-spots). It covers Government commitments on mobile coverage and the main measures aimed at improving rural mobile coverage.

¹ National Infrastructure Commission, [Connected Future](#), 14 December 2016, page 2.

² Ofcom, [Communications Market Report 2020](#), 30 September 2020.

³ Ofcom, , [Communications Market Report 2021](#)

More information about the roll-out of 5G and associated policy challenges can be found in our [briefing on 5G](#) (last updated September 2019).

1.1 How are mobile networks in the UK built?

The roll-out of mobile services in the UK is led by private Mobile Network Operators (MNOs).

There are four Mobile Network Operators (MNOs) that own and operate UK mobile networks:

- EE (owned by BT),
- O2 (now a joint venture with Virgin Media),
- Three (Hutchinson 3G) and
- Vodafone.

There are also several Virtual Mobile Network Operators (VMNOs), such as TalkTalk, GiffGaff, Plusnet and others. VMNOs do not have their own network infrastructure but have commercial agreements to use the network of one of the MNOs.

Ofcom reported that network providers invested £1.8 billion in UK mobile network infrastructure in 2020, a £400 million (25%) real-term increase compared to 2019.⁴ Most of this investment (£330 million) went to deploying new 5G networks. A further £600 million was invested in infrastructure that is used to provide both fixed-broadband and mobile telecoms services.⁵

1.2 Where are mobile masts located?

Private network operators decide when and where to build infrastructure and provide coverage based on commercial considerations. Detailed network plans showing where masts are located are not usually publicly available.

Mobile infrastructure is largely managed by two network sharing companies, which are each a joint venture between two MNOs: one between Vodafone and O2 and the other between EE and Three.⁶

⁴ Ofcom, [Connected Nations 2021](#), 16 December 2021, Main report, page 46.

⁵ Ofcom, [Connected Nations 2021](#), 16 December 2021, Main report, page 46.

⁶ [Cornerstone Telecommunications Infrastructure Limited](#) (CTIL) is a joint venture between Telefonica (O2) and Vodafone. [Mobile Broadband Network Limited](#) (MBNL) is a joint venture between Three and EE (BT). Each MNO uses different frequency spectrum to deliver services, but the masts and physical infrastructure are shared between those two joint ventures.

Our briefing, [Building broadband and mobile infrastructure](#) explains the rules and permissions required to build mobile networks, such as planning rules and land access rights (the Electronic Communications Code). These rules apply to 3G, 4G and 5G mobile networks as well as broadband infrastructure.

2

How does mobile coverage vary across different parts of the UK?

1 Not-spots and partial not-spots

There are two issues with mobile coverage in the UK:

- **'not-spots'**: areas where there is currently no mobile coverage available; and
- **'partial not-spots'**: areas which have coverage from at least one but not all four mobile network operators. This means that customers in these areas have limited choice about their mobile services provider.

Ofcom defines good mobile coverage to be a service where:

- nearly all 90-second telephone calls complete without interruption; and
- nearly all 4G connections will deliver a connection speed of at least 2 megabits per second (Mbps).⁷

Ofcom records a number of measures of mobile coverage: the percentage of premises with good coverage (indoors and outdoors), the proportion of geographical area with good coverage, and the proportion of major road length that has good coverage.

Mobile coverage maps with local detail can be explored at [Ofcom's mobile coverage postcode checker](#).

81% of UK premises have indoor 4G coverage from all operators.

According to [Ofcom's Connected Nations 2021 report](#), **81% of premises have indoor 4G coverage from all four operators and 93% of premises have indoor voice call coverage from all four operators.** However, this varies in different parts of the country. The tables and maps below illustrate this using Ofcom's data.

4G coverage for premises is highest in Scotland, while voice call coverage for premises is highest in England. Both are lowest in Northern Ireland. Coverage of major roads is highest in England and lowest in Scotland.

⁷ Ofcom, [Connected Nations 2018](#), December 2018, Main report page 22

4G mobile coverage coverage by UK nation, 2021

Location	Coverage from...	England	Scotland	Wales	Northern Ireland	UK
Premises indoors	At least one operator	99.4%	99.3%	98.3%	97.9%	99.3%
	All operators	81.9%	82.5%	74.2%	65.8%	81.2%
Geographical area	At least one operator	97.6%	82.3%	89.8%	97.3%	91.9%
	All operators	84.5%	45.5%	60.5%	80.0%	69.6%
A & B roads	At least one operator	97.7%	92.7%	90.4%	93.3%	95.7%
	All operators	66.1%	46.6%	49.3%	47.7%	59.3%
Motorways & A roads	At least one operator	99.1%	95.5%	95.0%	97.6%	98.0%
	All operators	72.4%	51.8%	56.7%	58.5%	66.3%

4G mobile coverage in UK nations

Coverage from all operators, 2021

Nation	Premises indoors	Geographical area
England	82%	85%
Scotland	82%	45%
Wales	74%	61%
Northern Ireland	66%	80%
UK	81%	70%

Source: Ofcom, [Connected Nations 2021](#)**2 Improving mobile coverage indoors**

Mobile coverage indoors can be affected by the building structure, such as the thickness of the walls and building materials.

Where people experience poor indoor coverage there are some technical solutions that may help. These include WiFi calling (that enables phone calls to be made from inside using broadband networks) and indoor mobile repeaters that amplify outdoor mobile signal indoors.⁸ More information is provided on Ofcom's webpage: [Improving your indoor coverage](#).

⁸ Indoor repeaters are different from indoor boosters (which use a broadband signal to provide a mobile signal indoors). Ofcom relaxed its rules on repeaters in 2021 so more types are now allowed (Ofcom, [Statement: Mobile phone repeaters](#), 4 November 2021, accessed 25 February 2021).

2.1

Coverage by nation and region

The table below shows coverage estimates for English regions and devolved nations. London has the highest 4G and voice call coverage, but it is worth noting that London is the only region without any significant rural area. Geographical 4G coverage reflects the proportion of rural areas in each nation and region (see section 2.2 below).

4G premises coverage and voice calls premises coverage are both lowest in Northern Ireland. In England, premises coverage is lowest in the East. Voice calls coverage on A&B roads is highest in London and lowest in Scotland.

Mobile coverage: English regions and UK nations, 2021

Nation or region	4G data (premises)		4G data (geographical)		Voice calls (premises)	
	At least one operator	All operators	At least one operator	All operators	At least one operator	All operators
East Midlands	99.4%	79.6%	99.5%	92.4%	99.9%	92.9%
East of England	99.2%	74.7%	99.96%	92.0%	99.9%	90.5%
London	99.99%	95.8%	99.99%	98.8%	99.9999%	99.5%
North East	99.7%	84.7%	91.4%	71.4%	99.9%	94.9%
North West	99.7%	82.1%	94.3%	77.6%	99.9%	95.6%
Northern Ireland	97.9%	65.8%	97.3%	80.0%	99.2%	82.0%
Scotland	99.3%	82.5%	82.3%	45.2%	99.7%	93.2%
South East	99.5%	80.1%	99.5%	88.2%	99.9%	93.4%
South West	98.4%	75.5%	97.7%	79.2%	99.5%	90.2%
Wales	98.3%	74.2%	89.8%	60.5%	99.2%	90.4%
West Midlands	99.4%	80.9%	98.8%	84.8%	99.9%	94.2%
Yorkshire & Humber	99.6%	81.5%	95.1%	83.0%	99.9%	93.9%
UK	99.3%	81.2%	91.9%	69.9%	99.8%	93.5%

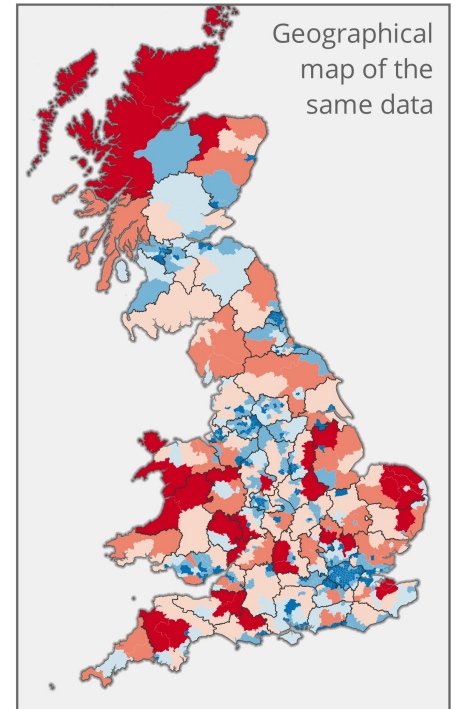
The map overleaf shows the percentage of premises with 4G coverage from all operators. This is presented as a population-scaled cartogram where constituencies are adjusted in size in relation to their populations. This helps to give a clearer view of the proportion of people experiencing good or bad coverage in different areas. You can view a high resolution version of this map [here](#).

4G premises coverage, 2021

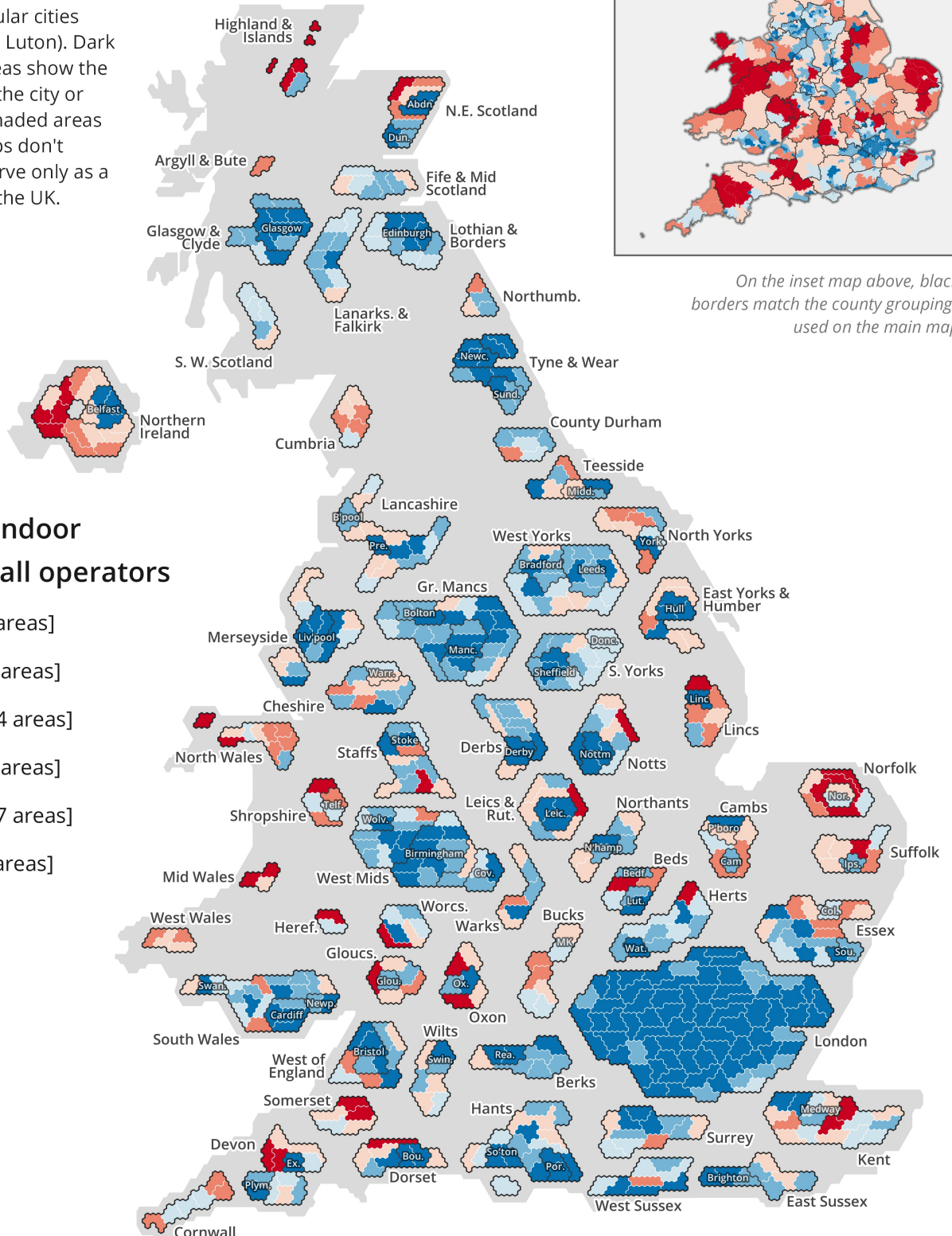
How to read this population-based map

On this map, areas are approximately **scaled in size according to their populations**. Areas are grouped by ceremonial counties, conurbations, and other recognisable sub-national areas. These groups include unitary authorities (e.g. Nottingham UA in the Notts group) and don't all reflect current local gov structures.

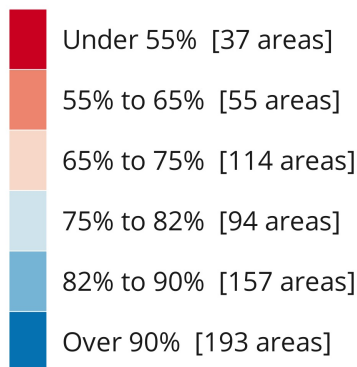
White lines between hexagons represent local authority boundaries. Extra labels are provided for large towns & cities to help you locate particular cities and towns (e.g. 'Lut.' = Luton). Dark lines around these areas show the constituencies within the city or town. The light grey shaded areas between county groups don't represent data and serve only as a background shape of the UK.



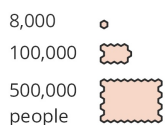
On the inset map above, black borders match the county groupings used on the main map



Premises with indoor coverage from all operators



Map scale (approx)



2.2

Coverage in urban and rural areas

The table below shows estimates for indoor premises coverage in rural and urban areas in the UK, based on constituency data & classifications. Note that Scotland and Northern Ireland have different rural/urban classifications from England and Wales, which is why the categories differ here.

Looking at the most rural constituencies – 61.8% of premises in England had indoor 4G coverage from all operators, compared with 54.2% in Wales, 54.1% in Scotland, and 49.2% in Northern Ireland.. Voice call coverage from all operators in the most rural constituencies ranges from 65.8% in Northern Ireland to 81.9% in England.

Mobile coverage by rural-urban classification, 2021

Calculated based on aggregating constituency data from Ofcom Connected Nations 2021

Nation & urban-rural constituency classification	4G data (indoors)		Voice calls (indoors)	
	No operators	All operators	No operators	All operators
England	0.6%	81.9%	0.1%	94.1%
Mainly rural	2.4%	61.8%	0.6%	81.9%
Largely rural	1.3%	68.8%	0.3%	87.8%
Urban with significant rural	0.7%	76.2%	0.2%	91.4%
Urban cities and towns	0.1%	85.9%	0.0%	96.7%
Urban conurbations	0.0%	90.7%	0.0%	98.5%
Scotland	0.7%	82.5%	0.3%	93.2%
Rural	4.2%	54.1%	1.8%	74.6%
Mixed Urban & Rural	1.2%	74.6%	0.5%	87.5%
Urban	0.2%	87.9%	0.1%	96.9%
Wales	1.7%	74.2%	0.8%	90.4%
Mainly rural	6.0%	54.2%	3.4%	76.7%
Largely rural	4.1%	66.0%	2.1%	84.2%
Urban with significant rural	1.5%	68.2%	0.6%	87.8%
Urban cities and towns	0.2%	84.1%	0.0%	96.5%
Northern Ireland	2.1%	65.8%	0.8%	82.0%
Rural	5.8%	49.2%	2.7%	65.8%
Mixed Urban & Rural	1.7%	61.8%	0.2%	81.3%
Urban	0.2%	77.5%	0.0%	91.4%

Source: Ofcom, [Connected Nations 2021](#)

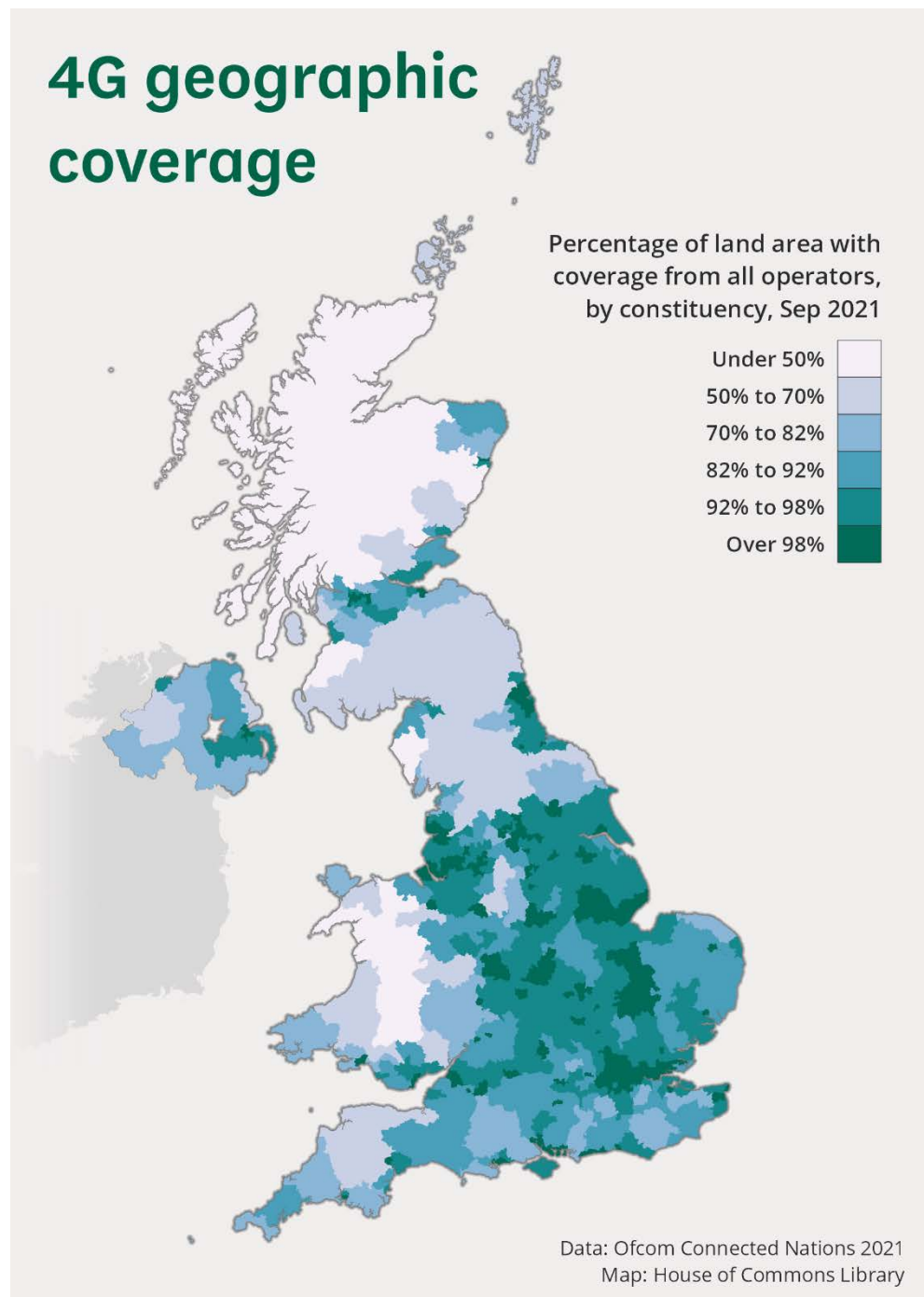
2.3

Geographic landmass coverage

Individual mobile networks cover 79-86% of the UK landmass with 4G.

8% of the UK landmass was a total 4G not-spot meaning it had no coverage from any mobile network. 4% of the UK landmass has no mobile signal for voice calls.

The map below shows the percentage of land area with coverage from all four operators, broken down by parliamentary constituency.



2.4

Changes over time

At a national level, mobile coverage has changed relatively little over the last three years:

- 4G premises coverage from all operators (indoors) was 77% in September 2018 and 81% in September 2021.
- 4G geographic coverage from all operators was 66% in September 2018 and 69% in September 2021.
- 4G coverage from all operators on A and B roads was 55% in September 2018 and 59% in September 2021.
- Voice premises coverage from all operators (indoors) was 92% in September 2018 and 94% in September 2021.
- Voice geographic coverage from all operators was 78% in September 2018 and 80% in September 2021.
- Voice coverage from all operators on A and B roads was 75% in September 2018 and 77% in September 2021.

Improvements in rural areas have been at a similar small scale over this time period:

- 4G premises coverage from all operators (indoors) was 41% in September 2018 and 47% in September 2021.
- 4G geographic coverage from all operators was 62% in September 2018 and 66% in September 2021.
- 4G coverage from all operators on A and B roads was 45% in September 2018 and 49% in September 2021.
- Voice premises coverage from all operators (indoors) was 66% in September 2018 and 70% in September 2021.
- Voice geographic coverage from all operators was 75% in September 2018 and 78% in September 2021.
- Voice coverage from all operators on A and B roads was 67% in September 2018 and 69% in September 2021.

2.5

5G coverage

Mobile network operators began rolling out 5G in 2019. In the first instance, 5G is being rolled out as an upgrade on top of existing 4G infrastructure.

Ofcom's 2021 Connected Nations report estimated 5G was available outside "in the vicinity of 42-57% of UK premises" from at least one mobile operator.⁹

⁹ Ofcom, [Connected Nations 2021](#), 16 December 2021, Main report, pages 33-34.

5G represented 3% of mobile data traffic 2021 and around 10% of mobile handsets were 5G enabled.¹⁰

Most 5G sites are in busy urban areas and are providing additional capacity to existing mobile services. Ofcom says that 5G roll-out is now being extended to busy suburban areas and transport corridors.¹¹

5G coverage at specific areas can be checked on the websites of each of the mobile network operators: [EE](#), [O2](#), [Vodafone](#), [Three](#).

¹⁰ Ofcom, [Connected Nations 2021](#), 16 December 2021, Main report, page 33.

¹¹ Ofcom, [Connected Nations 2021](#), 16 December 2021, Main report, page 34.

3 UK Government targets and progress

3.1 UK Government targets on mobile coverage

92% of the UK landmass had 4G coverage from at least one mobile operator in September 2021.

5G was available nearby around 50% of UK premises.¹²

The Levelling-Up White Paper included two targets for mobile coverage by 2030, as part of the fourth levelling up ‘mission’ on digital connectivity:

- that 4G mobile coverage will be available nationwide and
- a majority of the population will have access to a 5G signal.¹³

Nationwide coverage for 4G means that 95% of the UK landmass should receive signal from at least one mobile operator.¹⁴ As of September 2021, landmass coverage was at 92%.

The 2030 timeframe aligns with the Government’s other levelling up missions including for gigabit broadband coverage.¹⁵ However, in response to Parliamentary questions following the White Paper, the Government explained it aimed to reach the coverage thresholds earlier for mobile coverage.¹⁶

For 4G, the Government aims for 95% coverage by 2025 as part of the [Shared Rural Network](#) (SRN) agreement announced in March 2020 (see section 3 below).¹⁷

On 5G the Government aims for the majority of population to receive a 5G signal by 2027.¹⁸ The 2027 target was set in 2018.¹⁹ The Levelling Up White Paper said that the Government will be reviewing the 5G target as part of its Wireless Infrastructure Strategy due to be published in 2022, “to ensure it accurately reflects the needs of consumers, businesses and the public sector over the next decade”.²⁰ 5G was available nearby around 50% of UK premises in 2021 according to Ofcom.²¹

¹² Ofcom, [Connected Nations 2021](#), 16 December 2021, main report.

¹³ DLUHC, [Levelling Up the United Kingdom](#), 2 February 2022, Table 2.1 page 120.

¹⁴ DLUHC, [Levelling Up the United Kingdom](#), 2 February 2022, Technical annex footnote 93.

¹⁵ See the Library briefing, [Gigabit broadband in the UK: Government policy and targets](#).

¹⁶ [PQ 116941, 7 February 2022](#) [Broadband].

¹⁷ DCMS, [Shared Rural Network](#), 9 March 2020 and [Shared Rural Network website](#) (srn.org.uk).

¹⁸ [PQ 116941, 7 February 2022](#) [Broadband]. This target was first contained in the [2017 Conservative and Unionist Party election manifesto](#) and the 2018 [Future Telecoms Infrastructure Review](#)

¹⁹ DCMS, [Future Telecoms Infrastructure Review](#), 23 July 2018.

²⁰ DLUHC, [Levelling Up the United Kingdom](#), 2 February 2022, Technical annex footnote 94 and 100.

²¹ As of September 2021. Ofcom, [Connected Nations 2021](#), 16 December 2021, main report.

3.2

Progress on improving coverage: commentary

At a national level, rural mobile coverage has changed relatively little over the last three years, particularly with respect to total not-spots.²²

Ofcom reported that 4G coverage began to plateau from 2019 when around 91% of the UK landmass had coverage from at least one operator, leaving 9% of the landmass as a total not-spot.²³ In 2020, only small increases in individual operator coverage were observed with no substantial changes overall.²⁴

In 2021, Ofcom reported that there had been some “incremental improvement” as the Shared Rural Network began to see delivery (see Section 4.4 below).²⁵ As of September 2021:

- 92% of the UK landmass had coverage from at least one operator, leaving 8% as complete not-spot.
- 23% of the country had partial coverage from some but not all mobile operators, compared to 25% in 2019.
- 69% of the country had full coverage from all operators, compared to 66% in 2019.

Section 2.4 provides more statistics on changes over time with respect to coverage from all operators.

The House of Commons Environment Food and Rural Affairs (Efra) Committee in 2019 concluded that rural communities had been waiting too long for mobile coverage to improve:

Rural communities have been told for too long to just wait and see with the unfulfilled promise that mobile coverage will be improved. On the eve of the roll out of 5G, rural communities will only feel more marginalised if they continue to be denied access to 4G, or even 3G. With many now regarding mobile data as an essential service, the Government and Ofcom has to be ambitious in setting coverage targets and obligations.²⁶

The National Infrastructure Commission (NIC), the Government’s independent advisory body on infrastructure, has been critical of the progress of UK mobile coverage since 2016, particularly regarding coverage on roads and rail networks.²⁷ In its 2020 report, [Connected Future: Getting back on track](#), the Commission said that while mobile coverage on roads had improved,

²² See Section 1.3 of this briefing above.

²³ Ofcom, [Connected Nations 2020](#), 17 December 2020, Main report page 41.

²⁴ Ofcom, [Connected Nations 2020](#), 17 December 2020, Main report page 41.

²⁵ Ofcom, [Connected Nations 2021](#), 16 December 2021, Main report

²⁶ Efra Committee, [An update on rural connectivity](#), HC 2223 2017-19, 18 September 2019, para 83.

²⁷ NIC, [Connected Future](#), 14 December 2016; NIC, [National Infrastructure Assessment](#), 10 July 2018; NIC, [Annual Monitoring Report 2019](#), February 2019.

progress on improving rail connectivity had been limited and that work appeared to have stalled.²⁸ The Commission said that there was “no overarching plan” to progress rail connectivity.²⁹ The Commission made recommendations to Government on improving rail coverage, including the need for clear leadership.³⁰ Ofcom’s Connected Nations 2021 report noted that several arrangements between mobile operators and rail networks had been announced in 2021 that “reflect continuing efforts to address the challenge of delivering a service onboard trains across private and public sector players”.³¹

Government strategies on mobile coverage

The Government’s previous strategies on mobile coverage included responses to the NIC’s recommendations. These strategies included the 2017 and 2019 5G Strategies, and the Future Telecoms Infrastructure Review in 2018.³²

The Government’s current Strategy for mobile connectivity is contained in the National Infrastructure Strategy (November 2020) and the Levelling Up White Paper (February 2022).³³ The Government says it will publish a new Wireless Infrastructure Strategy in 2022 regarding its approach to 5G and future wireless networks over the next decade.³⁴

3.3

Measures to improve rural mobile coverage

Policy tools used to improve rural mobile coverage include providing funding support to build new masts, coverage obligations for mobile operators, releasing new spectrum for mobile services and policy reforms intended to make building masts easier (such as planning and land access rights reforms).

UK Government

A key UK Government initiative towards improving rural mobile coverage is the [Shared Rural Network](#) (SRN), announced in March 2020 (see Section 3). The SRN is an agreement between the mobile industry and the Government expected to bring 4G coverage to 95% of the UK landmass by 2025.

²⁸ NIC, [Connected Future: Getting back on track](#), February 2020, Page 3.

²⁹ NIC, [Connected Future: Getting back on track](#), February 2020, page 11

³⁰ NIC, [Connected Future: Getting back on track](#), February 2020.

³¹ Ofcom, [Connected Nations 2021](#), 16 December 2021, Main report page 44-45.

³² DCMS, [Next Generation Mobile Technologies: A 5G Strategy for the UK](#), 8 March 2017; and DCMS, [Next Generation Mobile Technologies: An Update to the 5G Strategy for the UK](#), 19 December 2017; DMCS, [Future Telecoms Infrastructure Review](#), 23 July 2018.

³³ HM Treasury, [National Infrastructure Strategy](#), November 2020; DLUHC, [Levelling up the United Kingdom](#), 2 February 2022.

³⁴ DCMS, [Wireless Infrastructure Strategy: Call for evidence](#), 17 November 2021, accessed 25 February 2022.

Rural mobile coverage will also improve as result of the Home Office's new [Emergency Services Network](#) which will see new masts built in very remote areas (see Box 4 page 27 of this briefing).

In addition, the Government is also making policy reforms to make it easier for the mobile industry to build new infrastructure. These include [reforms to planning rules](#) to allow for taller masts and [reforms to the Electronic Communications Code](#) (which governs the rights of telecoms companies to access land).³⁵ Our briefing, [Building broadband and mobile infrastructure](#) provides information and commentary on these reforms.

Rural mobile coverage will also likely benefit from the release of [new radio wave spectrum](#) by Ofcom in 2021. The 700 MHz spectrum band was auctioned in March 2021; its relatively low frequency makes it well-suited for providing coverage to rural areas. Section 4.1 of this briefing covers the 700 MHz spectrum along with other previous measures aimed at improving mobile coverage that ran until 2016/2017.

Scotland and Wales: Mobile Action Plans

The UK Government has primary responsibility for mobile policy and coverage targets because telecommunications is a reserved power. However, the delivery of mobile infrastructure projects often overlaps with devolved powers such as planning.

The Scottish and Welsh Government have both produced Mobile Action Plans (in 2016 and 2017, respectively). These plans set out how each Government will use devolved policy levers to contribute to improving mobile coverage.³⁶

For example, both plans include proposals such as: reviewing planning regimes, improving access to public sector assets to install electronic communications infrastructure, considering business rates relief for mobile masts, support for building masts (called infill) and encouraging “innovative solutions” and new technology to improve coverage.

The Scottish Government's Mobile Action Plan included funding for a programme to build new masts: the Scottish 4G Infill Programme (see Box 3 overleaf).

³⁵ DCMS, DLUHC, [New laws to end mobile coverage 'no bar blues'](#), 7 March 2021; [Product Security and Telecommunications Infrastructure Bill](#), Bill 289 2021-22 (Parliamentary Bill page).

³⁶ Scottish Government, [Mobile connectivity: action plan](#), 12 June 2016; Welsh Government, [Mobile Action Plan](#), 3 October 2017,

3 Scottish Government 4G Infill Programme

The Scottish Government's 2016 Mobile Action Plan included an ambition to work with industry to develop an infill programme to build masts in areas that are not commercially viable.

The Scottish Government has provided £25 million funding for what is now called the Scottish 4G Infill Programme (S4GI).³⁷ The S4GI programme is part-funded by the European Regional Development Fund (ERDF) to support activity in the Highlands and Islands.³⁸

A [progress update](#) was published in November 2021, including a map of programme sites.³⁹ It reported that 24 sites had gone live, 18 more were in the building stage and 5 were in the pre-build stage, totalling 47 new mast sites.

³⁷ Scottish Government, [Improving mobile coverage](#), 12 March 2018

³⁸ Scottish Government, [Scottish 4G infill programme: progress update](#), 22 November 2021.

³⁹ Scottish Government, [Scottish 4G infill programme: progress update](#), 22 November 2021.

4 Shared Rural Network (SRN)

4.1 What is the Shared Rural Network?

The [Shared Rural Network](#) (SRN) is an agreement between the UK Government and the mobile industry, announced in March 2020.⁴⁰ Under the deal by 2025:

- UK mobile operators (EE, O2, Three and Vodafone) will invest £532 million in a network of new and existing phone masts which they would all share. This would address partial not-spots (areas with coverage from some but not all operators). The operators have committed to legally binding contracts regarding coverage (see below).
- The Government has committed to fund up to £500 million to eliminate total not-spots (areas with no coverage). This investment will create new masts and infrastructure in areas that are not commercially viable for operators.

In general, rural stakeholders welcomed the SRN announcement, having campaigned for further action on rural mobile coverage for some time. However, they called for the programme to be delivered without delay and for mobile operators to be closely held to their commitments.⁴¹

4.2 What coverage will the SRN deliver?

The SRN is expected to bring 4G coverage to 95% of UK landmass by 2025.⁴²

To reach this coverage, the mobile operators have committed to the following [coverage obligations](#) that are legally enforceable by Ofcom:

- Each reach 88 per cent coverage of the UK by 2024;
- Each reach 90 per cent coverage of the UK by 2026;

⁴⁰ DCMS, [Shared Rural Network](#), 9 March 2020; DCMS, [Shared Rural Network \(SRN\) - transparency commitment publication](#), 11 March 2021.

⁴¹ CLA, [UK's £1 billion shared rural network to go ahead](#), 9 March 2020; Countryside Alliance, [Countryside Alliance welcome £1bn deal to end poor rural mobile coverage](#), 9 March 2020; Farmers' Weekly, [Farm groups welcome £1bn rural mobile coverage deal](#), 17 March 2020; CLA, [Are we getting closer to better mobile phone coverage?](#) (accessed 6 July 2020); Local Government Association, [LGA response to shared rural network announcement](#), 9 March 2020

⁴² DCMS, [Shared Rural Network](#), 9 March 2020.

- Each reach nation-specific coverage targets in England, Northern Ireland, Scotland, and Wales by 2026;
- Collectively provide additional coverage to 280,000 premises and 16,000km of roads by 2026.⁴³

The coverage obligations are legally enforceable because the operators agreed to the conditions of their licences to use relevant radio spectrum be modified to include these commitments.⁴⁴

Digital Mobile Spectrum Limited (DMSL), is a joint venture of all four mobile operators, set up to manage and run the commercial part of the SRN programme.

4.3 When and where are masts being built?

There is a [dedicated SRN website](#) set up to provide information, FAQs and progress updates on the SRN.⁴⁵

It includes [forecasts](#) of where mobile coverage is likely to improve due to the SRN at a regional level.⁴⁶

For each nation overall the following coverage improvements are expected.

Coverage forecasts for the Shared Rural Network 4G coverage pre and post-SRN (forecast)				
	All operators		At least one operator	
	pre-SRN	Post-SRN forecast	Pre-SRN	Post-SRN forecast
UK-wide	69%	84%	91%	95%
England	84%	90%	97%	98%
Scotland	44%	74%	81%	91%
Wales	60%	80%	90%	95%
Northern Ireland	79%	85%	97%	98%

Notes: Rounded to nearest %. Pre-SRN figures taken from Ofcom’s Connected Nations Report published 12 May 2021 showing coverage data as of January 2021.

Source: Shared Rural Network website, [Forecast coverage improvements](#), accessed 14 February 2022.

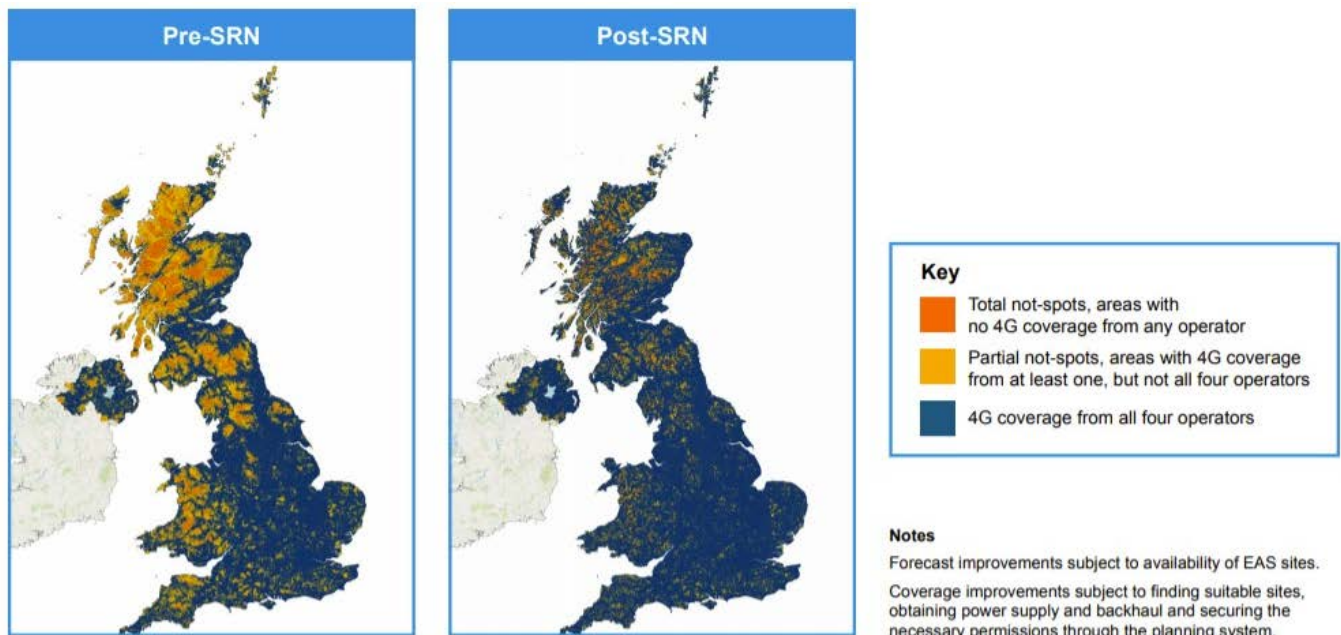
⁴³ DCMS, [Shared Rural Network](#), 9 March 2020.

⁴⁴ The mobile operators have agreed to their 900 MHz and/or 1800 MHz licences being varied to give effect to coverage commitments. Ofcom, [Mobile coverage obligations](#), 27 July 2021, accessed 14 February 2021.

⁴⁵ Website: <https://srn.org.uk/>

⁴⁶ SRN, [Forecast coverage improvements](#), accessed 14 February 2022

The maps below show forecast geographic coverage after the SRN completion, compared to coverage before the SRN programme began (2020). Coverage maps for each nation are available on the SRN website: [England](#), [Northern Ireland](#), [Scotland](#) and [Wales](#).



Notes: Pre SRN figures are for 2020.

Source: Shared Rural Network, [Forecast Coverage Improvements by Region](#), accessed 6 April 2022.

4.4 Progress on the SRN

Ofcom reported that coverage had increased in each of the UK nations in 2021, with mobile operators installing 46 new sites towards their Shared Rural Network commitments.⁴⁷ This includes 24 sites in England, 17 in Scotland and 5 sites in Wales. These sites were built from private investment. Ofcom said these sites contributed to “incremental progress” in improving coverage (see section 3.2 above).⁴⁸

Ofcom described the public-funded portion of the SRN as at an early stage. A [public procurement](#) process is underway for the publicly funded parts of the SRN. Work on these projects is expected to start on 2022.⁴⁹

Some parts of the SRN include masts built as part of the Emergency Services Network (see Box 4 below).

⁴⁷ Ofcom, [Connected Nations 2021](#), 16 December 2021, Main report, page 42

⁴⁸ See section 3.2 above for further discussion. Ofcom, [Connected Nations 2021](#), 16 December 2021, Main report, page 2.

⁴⁹ Shared Rural Network Website: [Procurement](#) and [FAQs](#).

4 Emergency Services Network (ESN)

What is the ESN?

The [Emergency Services Network](#) (ESN) is a new communications network for the emergency services in Great Britain (police, fire, ambulance and other public safety users).⁵⁰ The ESN will use 4G infrastructure to replace the old digital radio Airwave system that is coming to the end of its lifetime. The ESN project is led by the Home Office.⁵¹

The programme began in 2015 and was originally due to complete by 2019. Following significant delays, it's now expected to complete in 2026.⁵² The whole-life cost of the ESN has increased from £9.5 billion (the 2015-2017 forecast) to £11.2 billion in 2021.⁵³ The [National Audit Office](#) and [Public Accounts Committee](#) have reported on the programme delays; their reports provide more information about the ESN programme and timetable.⁵⁴

The ESN and rural mobile coverage

The ESN will include coverage 12 miles out to sea, in the air (to 10,000 feet) and on the London Underground.⁵⁵ The ESN mainland coverage is divided into two areas: the primary coverage area and the Extended Area Service (EAS).⁵⁶

Mobile operator EE is responsible for funding and building masts in the primary area. The Government is funding and delivering coverage for the EAS, which includes the most rural and remote locations in the country.⁵⁷ The ESN is expected to improve rural mobile coverage because 292 new or refurbished masts built as part of the Extended Area Service will form part of the Shared Rural Network and be available for mobile operators to offer services from where possible.⁵⁸

⁵⁰ Home Office, [Emergency Services Network: overview](#), 18 February 2021, accessed 25 February 2022.

⁵¹ Home Office, [Emergency Services Network: overview](#), 18 February 2021, accessed 25 February 2022.

⁵² Public Accounts Committee, Oral evidence: Home Office recall/Windrush compensation scheme, [HC 174, 7 June 2021](#).

⁵³ [Home Office Government Major Projects Portfolio data, 2021](#), March 2021, published July 2021, accessed 14 February 2022. The ESN is jointly funded by the Home Office, Department of Health & Social Care, the Scottish and Welsh Governments, and by the emergency services that will ultimately use it: NAO, [Progress delivering the Emergency Services Network](#), 10 May 2019, para 2.

⁵⁴ See: National Audit Office, [Progress delivering the Emergency Services Network](#), 10 May 2019; Public Accounts Committee, [Emergency Services Network: further progress review](#), 10 July 2019. The Government responded to the PAC's report in October 2019: [Treasury Minutes CP 176](#). The PAC took evidence from the Home Office again in [September 2020](#) and [June 2021](#).

⁵⁵ Home Office, [Emergency Services Network](#), 18 February 2021, accessed 14 February 2022.

⁵⁶ Home Office, [Emergency Services Network](#), 18 February 2021, accessed 14 February 2022.

⁵⁷ NAO, [Progress delivering the Emergency Services Network](#), 10 May 2019; [PQ 178675, 15 April 2021](#).

⁵⁸ [PQ 185966, 28 April 2021](#); [PQ 114901, 7 February 2022](#).

5 Previous measures to improve rural mobile coverage

5.1 Mobile spectrum: 700 MHz band auction

The 700 MHz band is a portion of the radio frequency spectrum that has been previously used for Digital TV and other services. Ofcom decided to make the 700 MHz band available for mobile data in November 2014.⁵⁹ The release of the 700 MHz spectrum for mobile is part of Ofcom and the Government's proposals to improve rural mobile coverage generally and to meet projected increases in demand for mobile data.⁶⁰

The technical characteristics of the spectrum band make it suitable for delivering rural and indoor mobile coverage. It is low frequency spectrum which means it is suitable for travelling long distances and penetrating physical objects. The 700 MHz band is also expected to be used to support wide coverage of future 5G applications. The Library briefing paper on [5G](#) has more information about mobile spectrum and spectrum auctions.

The 700 MHz band was auctioned to mobile network operators in March-April 2021.⁶¹

Ofcom had originally proposed that it would attach coverage obligations to licences for the 700 MHz band as part of the auction process.⁶² These proposals were dropped following the SRN agreement in which operators agreed voluntarily to different coverage obligations.⁶³

5.2 Previous coverage obligations (2013–2017)

Coverage obligations are legal requirements on mobile operators to provide a minimum level of mobile coverage across a geographic area or certain number of premises.

⁵⁹ Ofcom, [Decision to make the 700 MHz band available for mobile data – statement](#), 19 November 2014 [accessed 12 February 2019].

⁶⁰ Ofcom, [Enabling 5G in the UK](#), 9 March 2018; DCMS, [Statement of Strategic Priorities for telecommunications, the management of radio spectrum and postal services](#), 15 February 2019, para 30.

⁶¹ Ofcom, [Award of 700 MHz and 3.6-3.8 GHz spectrum by auction](#), 5 May 2021.

⁶² Ofcom, [Consultation: Award of the 700 MHz and 3.6-3.8 GHz spectrum bands](#), 18 December 2018.

⁶³ Ofcom, [Consultation: Award of the 700 MHz and 3.6-3.8 GHz spectrum bands](#), 18 December 2018.

In 2014, the four UK MNOs signed a [voluntary agreement with the Government](#) to deliver mobile voice services to 90% of the UK landmass by the end of 2017.⁶⁴ Operators' licence conditions were amended such that the agreement could be enforced by Ofcom.⁶⁵

Additionally, the operator O2 was under an additional legal obligation, as a condition of its licence for the 800 MHz band awarded in the 2013 spectrum auction.⁶⁶ That obligation required O2 to provide a minimum level of indoor data coverage to 98% premises (with a minimum of 95% in each nation) by the end of 2017.

These obligations allowed operators to choose which specific areas they would provide coverage to in order to meet the obligation.

[Ofcom confirmed](#) in March 2018 that all operators had complied with the coverage obligations in the time required.⁶⁷

5.3 Mobile infrastructure project (concluded 2016)

The Government's [Mobile Infrastructure Project \(MIP\)](#) was announced in 2011 with the aim to extend mobile phone coverage to 'mobile not-spots' – areas where there was no coverage available from any Mobile Network Operator.

The Government provided capital funding to Arqiva – a communications infrastructure company – to build new mast infrastructure from which the mobile network operators (EE, O2, Three and Vodafone) provided coverage and funded the operating costs for the 20-year life of the project.⁶⁸

The Government intended to invest up to £150 million and provide 575 new masts. However, the project faced challenges, delivering 75 masts by the time the project closed in March 2016, at a cost to the Government of £36 million (as of July 2017).⁶⁹ The House of Commons DCMS Committee, in its 2016 report on [Establishing world-class connectivity throughout the UK inquiry](#), described the challenges faced by the project as follows:

The reasons cited include a long delay in getting State Aid clearance, planning problems, lack of access to power and backhaul connections in rural areas, difficulties in locating suitable sites, and probably most of all the fact that the State Aid rules had stipulated that all four MNOs had to be connected to all MIP masts. In addition, network operators are left in a position of having to cover all the higher ongoing operating costs associated with running and

⁶⁴ DCMS, [Government secures landmark deal for UK mobile phone users, 18 December 2014](#).

⁶⁵ The obligation applied to licences of the 900MHz and 1800MHz spectrum bands. Ofcom, [Voice Coverage Obligation Notice of Compliance Methodology](#), 30 January 2015.

⁶⁶ For background information, see the Library briefing paper [The UK 4G spectrum auction and mobile coverage](#), June 2015.

⁶⁷ Ofcom, [Consultation: Award of the 700 MHz and 3.6-3.8 GHz spectrum bands](#), 18 December 2018.

⁶⁸ DCMS, [Mobile reception around UK to get massive boost](#), 30 July 2013 [accessed 27 December 2018].

⁶⁹ DCMS, [Mobile Infrastructure Impact and Benefits Report](#), July 2017.

maintaining remote masts where they might never see a return on their investment.⁷⁰

⁷⁰ DCMS, [Establishing world-class connectivity throughout the UK](#), 2nd report of session, HC147, 19 July 2018, para 50.

6

Glossary

2G, 3G, 4G and 5G refer to generations of mobile wireless communications standards.

2G was the second generation of mobile phone technology and the first digital mobile technology. It is suitable for making calls, sending text messages and supports very-low speed data connections.

3G made it possible to access the internet more effectively through a mobile phone (called mobile broadband), supporting voice, text and data services. 3G provides typical download speeds of over 5 Mbps (in 2014, the UK average was 6 Mbps).

4G, launched in 2012, made it much quicker to surf the web on mobile phones, tablets and laptops, supporting faster upload and download speeds and faster response times. 4G supports download speeds over 10 Mbps (in 2014, the UK average was 15 Mbps).

5G: 5G is the next generation of wireless networks. 5G is expected to support fast download speeds and near instant response times, with the capacity to support many devices operating at the same time. 5G is expected to offer advantages beyond mobile broadband, supporting a wide array of internet connected devices and services, for example, from healthcare to manufacturing. For more information, see the Library briefing paper on [5G](#) (CBP7883).

Backhaul: the link that connects a mobile base station to the core internet and phone network. Backhaul is usually provided by full-fibre broadband cables or fixed-radio links.

Base stations: mobile base stations contain radio communications equipment that sends and receives mobile voice/data signals over an area surrounding the station and connects them to a mobile operator's network. Mobile masts, macro cells and small cells are all types of base stations. Mobile base stations require access to power and a backhaul connection.

Fibre optic cable: Fibre optic cables are made of glass or plastic. They transmit data using light. Fibre optic cables can transmit more data with faster speeds and significantly less signal loss with distance compared to copper wires.

Full-fibre (Fibre to the Premises/Home, FTTP/FTTH): In a full-fibre connection, a fibre optic cable runs from the exchange directly to the premises or home. Full-fibre connections can provide download and upload speeds in excess of 1

Gbps (1000 Mbps). Full-fibre is also called Fibre-to-the-Premises (FTTP) or Fibre-to-the-Home (FTTH).

Mobile Network Operator (MNO): a provider of mobile wireless communications services that owns or controls all the elements necessary to sell and deliver services to an end user, including spectrum allocation, infrastructure, and customer services. There are four MNOs in the UK: EE (owned by BT), Vodafone, O2 (now a joint venture with Virgin Media) and Three (owned by Hutchinson 3G). Contact details and spectrum allocations for each of the MNOs are provided on Ofcom's webpage: [Mobile and Wireless Broadband below 5 GHz](#).

Mobile Virtual Network Operator (MVNO): a mobile service provider that does not own the infrastructure which it uses to deliver services. MVNOs have agreements with the MNOs to deliver services using the MNOs infrastructure. There are many MVNOs in the UK.

Macro cell: a mobile base station that provides wide-area coverage for a mobile network. The antennas for macro cells can be mounted on ground-based masts, rooftops or other existing structures.

Small cell: a low-powered base station that provides coverage over a smaller area than macro cells. Small cells are used to boost mobile network capacity and coverage in localised areas e.g. dense urban areas where there are large numbers of users. They are smaller and lighter than macro cells so can be mounted in more places.⁷¹ Small cells are already used for 4G networks in some busy areas and will be important for future 5G networks.

⁷¹ GMSA, [Improving wireless connectivity through small cell deployment](#) (pdf) December 2016.

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