National Audit Office

REPORT

Supporting mobile connectivity

Department for Science, Innovation & Technology

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Supporting mobile connectivity

Department for Science, Innovation & Technology

Report by the Comptroller and Auditor General

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Comptroller and Auditor General
National Audit Office

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Key facts

92.7%

percentage of the UK landmass with 4G coverage as at September 2023, up 1.3 percentage points from 91.4% in 2020, and against a target to achieve 95% 4G coverage by December 2025

£1bn

planned total spending over 20 years to 2039-40 to deliver and maintain 4G coverage through the Shared Rural Network (SRN) programme

2030

date by which the Department for Science, Innovation & Technology (DSIT) wants standalone 5G (5G infrastructure that does not require 4G infrastructure) to be available in all populated areas

Tenfold	increase in consumption of mobile data per person in the UK between 2013 and 2021
£532 million	share of planned £1 billion spending on the SRN programme to be funded by the UK's four mobile network operators
£501 million	share of planned £1 billion spending on the SRN programme to be funded by DSIT
£1,352 million	estimated quantifiable benefits arising from the SRN programme
Around £400 million	DSIT's funding commitment since 2017 to determine uses of 5G technology and support its adoption
Between £41 billion and £159 billion	DSIT's estimate of cumulative productivity benefits between 2021 and 2035 from the widespread adoption of standalone 5G

Summary

1 The government considers that access to good-quality mobile connectivity is key to growing the economy. Good mobile connectivity allows people to access the internet and communicate while on the go and in locations where a wired connection does not exist. It helps to ensure that people across the UK can make choices about where to live and work, and are not left out of future technological revolutions because of poor infrastructure. Between 2013 and 2021, consumption of mobile data per person in the UK increased tenfold. Although the future pace is uncertain, demand is expected to continue to grow as greater use is made of data-intensive services and as new technologies enable new uses.

2 The Department for Science, Innovation & Technology (DSIT) is responsible for government policy on digital connectivity, and Building Digital UK (BDUK), an agency of DSIT, is responsible for delivering infrastructure programmes to improve connectivity.[1] Ofcom, the regulator and competition authority for the UK's communications industries, issues licences to the UK's four mobile network operators (MNOs) to use radio spectrum.

3 While the government considers that a competitive market plays a key role in increasing capacity and meeting future customer needs, it may choose to intervene where there is a weaker commercial case for investment, such as in remote areas. One such example is the Shared Rural Network programme, in which DSIT and BDUK are working with MNOs to deliver reliable 4G coverage to 95% of the UK landmass by December 2025. One element of this programme builds commercial 4G coverage onto the Home Office's Emergency Services Network, which we reported on most recently in 2023.[2] DSIT also funds programmes that aim to create favourable conditions for investment in technologies for the UK's future connectivity needs. It has set out its plans in its 2023 wireless infrastructure strategy.

1 In February 2023 responsibility for digital connectivity moved from the Department for Digital, Culture, Media & Sport to the Department for Science, Innovation & Technology (DSIT). Throughout this report, we refer to the accountable department as DSIT, irrespective of the period under discussion.
2 Comptroller and Auditor General, *Progress with delivering the Emergency Services Network*, Session 2022-23, HC 1170, National Audit Office, March 2023.

4 This report examines whether DSIT is on track to deliver UK-wide reliable mobile connectivity that meets the country's needs now and in the future. Part One of the report sets out the UK mobile landscape. The report then examines whether:

- DSIT and BDUK have set up effective arrangements for delivering UK-wide 4G connectivity through the Shared Rural Network programme (Part Two);
- BDUK is on track to deliver this (Part Three); and
- DSIT is developing a good basis for meeting the UK's future connectivity needs (Part Four).

5 This report does not examine DSIT's progress in delivering gigabit broadband through Project Gigabit, which we reported on in 2020, or the extent to which DSIT's broadband and mobile programmes complement each other.[3] We have considered how DSIT has learned lessons from digital infrastructure projects. The government requires MNOs to remove high-risk vendor infrastructure from their networks.[4] We have considered how DSIT is managing the risk that this requirement affects MNOs' capacity to deliver DSIT's programmes, but we have not examined MNOs' progress in meeting this requirement. The report does not cover broader issues such as: DSIT's role in managing the impact of MNOs switching off their 3G and 2G networks, which the Local Government Association reported on in September 2023;[5] the retirement of analogue telephone landlines by 2025 and their replacement with digital technology using an internet connection;[6] and digital exclusion issues, including affordability, which were examined in a 2023 House of Lords inquiry.[7]

Key findings

Establishing the Shared Rural Network programme

6 **DSIT set a clear objective for increasing mobile coverage.** In 2020, DSIT set out its plans for the Shared Rural Network (SRN) programme, which aims to broaden consumer choice for mobile services in rural areas. Building on a 2017 government manifesto commitment, it set a target for 95% of the UK landmass to have 4G coverage from at least one MNO by December 2025, up from 91.4% in 2020. DSIT aims to cover 280,000 additional premises and 16,000 kilometres of roads through the programme (paragraphs 2.2 and 2.3).

3 Comptroller and Auditor General, *Improving broadband*, Session 2019–2021, HC 863, National Audit Office, October 2020.
4 Secretary of State for Digital, Culture, Media & Sport, *Designated Vendor Direction under section 105Z1 of the Communications Act 2003, given to [a Public Communications Provider], 12 October 2022.*
5 Local Government Association, *2G/3G switch off impact survey,* September 2023.
6 House of Commons Library, *The withdrawal of landlines and switch to digital calls*, research briefing 9471, January 2024.
7 Communications and Digital Committee, *Digital exclusion*, Third Report of Session 2022-23, HL 219, June 2023.

7 DSIT secured a private sector commitment to cover just over half of the planned £1 billion cost of improving mobile coverage in remote areas. MNOs supply mobile infrastructure where profitable, but infrastructure costs and lower population density make some areas less attractive commercially. Under the SRN programme, the UK's four MNOs agreed to improve connectivity in 'partial not spots' (PNS – areas where there is coverage from at least one, but not all four, MNOs) at an estimated cost to the MNOs of £532 million. The government will provide £501 million of funding over 20 years to 2039-40 to reduce 'total not spots' (TNS – areas not covered by any operator) and to develop the 'extended area service' (EAS – building commercial 4G coverage onto the Home Office's Emergency Services Network in remote areas). To help deliver the EAS and TNS elements, DSIT signed a grant agreement with Digital Mobile Spectrum Limited (DMSL), an organisation wholly owned in equal part by all four MNOs. Ofcom licence obligations commit each MNO to increase its 4G coverage to 88% of the UK landmass by June 2024, and to 90% by 2027 (paragraphs 1.11 and 2.4 to 2.6).

8 BDUK has had insufficient information about some elements of the SRN programme but is taking steps to address this. BDUK is responsible for oversight of the programme and requires timely information for effective decision-making and risk management. MNOs run and fund the PNS element of the programme themselves. Although they provide BDUK with updates on progress, they do not routinely provide, for example, data on the level of coverage achieved, or forecasts. To monitor coverage achieved, DSIT has relied on Ofcom data, but this is only retrospective. For projections of future coverage, BDUK started in 2022 to hold more frequent progress reviews with the MNOs on the PNS element of the programme. On the TNS element, BDUK sought in 2023 to improve the financial information it received from DMSL since it considered that the information it had previously agreed to receive contained insufficient detail on which to take financial planning decisions. It aimed to formalise this improvement by January 2024 through an amendment to the grant agreement. It had not been able to confirm to us that it had done so by mid-February, when we finalised this report (paragraphs 2.6 to 2.12).

9 The SRN programme aims to address the digital divide between urban and rural areas but some of the most difficult and expensive infrastructure is in areas with the least clear benefits. The business case identified a range of benefits, such as supporting tourism and business productivity in rural areas. DSIT estimated that the programme would result in quantifiable benefits of £1,352 million. However, the business case included limited evidence of the specific benefits of extending mobile coverage into remote or sparsely populated areas, including locations where building masts may be more difficult or expensive, or where there may be an impact on the environment. A clearer narrative about the outcomes DSIT is aiming for in these locations, who will benefit, and why the investment is needed, would help it communicate its case for investment (paragraph 2.13).

Progress with the Shared Rural Network programme

10 By 2023, the SRN programme had contributed to a 1.3 percentage point increase in coverage. Ofcom reported that, as at September 2023, 92.7% of the UK landmass had 4G coverage from at least one MNO, up from 91.4% in 2020 and against a target of 95% by December 2025. This increase is predominantly due to additional coverage funded by the MNOs, including their delivery of the PNS element of the programme. DSIT was unable to provide details of progress in meeting coverage targets for premises and roads, and is working with Ofcom to develop the necessary data, but it told us that the MNOs are confident that they will achieve these targets (paragraphs 3.2 and 3.7).

11 The programme is behind schedule, partly because preparatory work took longer than expected. In late 2023, three MNOs advised BDUK that they were each likely to miss their Ofcom licence obligation to provide 88% 4G coverage by June 2024 and wanted to discuss an 18-month extension to the PNS element of the programme. The other MNO announced in January 2024 that it had met its obligations ahead of schedule. BDUK and DSIT are assessing the impact of any delays to MNOs meeting their licence obligations on the achievement of the December 2025 95% target. Preparatory work on the government-funded elements of the programme, including agreeing site sharing between the MNOs and the Home Office, finalising mast locations and procuring services, also took longer than expected. As a result, DSIT's funding of expenditure by the MNOs and Home Office on masts in 2022-23 and 2023-24 was almost £62 million (79%) lower than planned. As at January 2024, one EAS mast was operational for commercial 4G coverage, and the Home Office had made nine sites in total available to MNOs, compared to 75 planned by this date. Site acquisition on the TNS element is on track against a timetable agreed in 2023, with the first masts due to become operational in January 2025 (paragraphs 3.8 to 3.14).

12 Local delivery of the programme has proved more difficult than planned timetables allowed for. Based on their previous experience of other digital programmes, DSIT, BDUK, DMSL and the MNOs recognised delivery risks, such as the need to secure agreement from local planning authorities, landowners and communities to the installation of masts, and the remoteness of the sites involved, but these challenges proved more difficult than their planned timetables allowed for. Securing planning permissions has taken longer than expected in some cases because, in part, local authorities have lacked the resources to handle large numbers of applications, and the COVID-19 pandemic hindered processing of applications. In addition, local stakeholders are campaigning against masts in some areas because they are concerned about potential impacts. MNOs, DMSL, BDUK and DSIT are working with stakeholders to attempt to resolve these issues (paragraphs 3.4 to 3.6).

13 The MNOs may no longer be able to deliver the level of coverage required within their current grant funding because costs have risen significantly. Delivery challenges and other cost pressures mean that costs are higher than expected. On the EAS element, estimated costs have increased by around £44 million due to irrecoverable VAT and inflation. BDUK decided not to proceed with 15 EAS sites on the basis of value for money and is keeping other potential sites under review. On the TNS element, in late 2023, DMSL indicated that delivery of the planned number of sites and the 1% increase in coverage required from this element was set to exceed the current level of grant funding, although the number of sites required and their costs were still uncertain. Under the terms of the grant agreement, additional costs are to be borne by the MNOs. However, if costs are excessive, the Ofcom licence agreements with the MNOs allow for relief of their individual obligations to deliver 90% coverage by 2027, putting the achievement of the government's 95% coverage target at risk (paragraphs 3.15 to 3.17).

14 The SRN programme may require upgrades in the future to ensure that it continues to deliver the connectivity that rural areas need. DSIT requires MNOs to meet Ofcom's minimum performance threshold for 4G coverage, with a download speed of 2 Mbps (megabits per second). BDUK expects that this performance will be achieved across the network, with an average speed of around 7 Mbps, although some areas may experience lower speeds than this average. However, Ofcom set this threshold in 2018 and the use of technology has advanced. For example, a download speed of 2 Mbps does not enable uses such as group video calls and quick data downloads. DSIT is also concerned that reported coverage does not always reflect the consumer experience. It has therefore asked Ofcom to keep under review its definition of good 4G coverage and to take steps to improve its coverage reporting. DSIT expects a speed of 2 Mbps to meet current mobile coverage needs but recognises that advances in technology could lead to users requiring higher performance in the future. It is confident that upgrading the network will be technically feasible where doing so represents value for money (paragraphs 3.18 to 3.21).

The government's plans for future mobile connectivity

15 DSIT's 2023 wireless infrastructure strategy for meeting the UK's future connectivity needs has been welcomed by MNOs and other stakeholders. Unlike the SRN programme that directly funds infrastructure to remedy market failure, the strategy sets out DSIT's intention to kick-start investment and innovation as the commercial case for investment in 5G infrastructure is uncertain. Since 2017, it has committed around £400 million to initiatives to determine how 5G can be used and to promote its adoption. These include around £140 million on trials to examine how the UK can take advantage of 5G, and £250 million to encourage diversity in the 5G equipment supply chain. The 2023 strategy provides a further £36 million for UK regions to promote growth through investment in 5G, and up to £100 million for research into more advanced technologies. DSIT has estimated that widespread UK adoption of standalone 5G could deliver cumulative productivity benefits of between £41 billion and £159 billion from 2021 to 2035.[8] MNOs and other stakeholders told us that DSIT's strategy recognises the government's role in reducing barriers to investment, such as through amendments to planning legislation (paragraphs 4.4 to 4.9).

16 DSIT's thinking on how new technology can be used and who needs it must evolve further if it is to meet its future connectivity ambition. DSIT has set a new ambition for standalone 5G in all populated areas by 2030, signalling a move away from 4G in order to enable high specification applications. However, achieving this ambition will require significant investment from MNOs and, although there are potential uses of 5G for businesses and public services, fewer direct benefits are expected for individual consumers. Similarly, it is not yet clear where standalone 5G will be needed or whether government funding will be required to avoid remote areas being left behind. For these reasons, DSIT has not defined 'all populated areas' or the level of performance needed. MNOs told us that, as the wireless infrastructure strategy develops, DSIT will need to clarify what outcomes the government is seeking, what connectivity will be needed to achieve these outcomes, and the role that 5G will play alongside 4G, wired broadband and other technologies. DSIT will be reliant on accompanying action from government departments, Ofcom, local authorities and devolved administrations, which will have their own priorities and resource constraints. DSIT has considerable experience from previous infrastructure programmes, including the SRN, to help it address these issues (paragraphs 4.3 to 4.7, 4.12, 4.19 and 4.20).

8 There are two main types of 5G: non-standalone 5G, which makes use of existing 4G infrastructure, and standalone 5G, which uses 5G infrastructure throughout, and enables substantially higher speeds and the ability to connect thousands of devices in a small area.

Conclusion on value for money

17 Demand for mobile data access is expected to grow as greater use is made of data-intensive services and as new technologies enable new uses. Alongside a similar-sized commitment by the private sector, DSIT and BDUK have committed around £500 million to the SRN programme. However, delays in building new masts mean that it is currently unclear if the programme will meet its target of increasing 4G coverage to 95% of the UK landmass by December 2025, and there are concerns about the programme's affordability. Although BDUK is taking steps to increase the information it receives from MNOs, its information to monitor progress is still insufficient. DSIT has not fully articulated the outcomes it is seeking to achieve from improving connectivity in remote areas, who will benefit, and the quality of connectivity needed. Under the terms of the grant agreement, additional costs are to be borne by the MNOs. However, if costs are excessive, Ofcom licence agreements allow for relief of the MNOs' individual coverage obligations, putting achievement of the government's coverage target at risk. Value for money will be eroded if the programme delivers infrastructure that does not meet UK consumers' growing needs.

18 DSIT has considerable experience of digital infrastructure projects, including the SRN, which it must draw on as it takes forward its future connectivity strategy. It is not yet clear how much investment (in 5G or otherwise) will be made by the private sector, and what support will be needed from the government. As its strategy develops, DSIT will need to resolve what it is aiming to achieve in different parts of the UK and economic sectors, and communicate how connectivity can deliver these outcomes, taking account of changes in user demand and advances in technology over the next decade.

Recommendations

a **DSIT and BDUK should ensure that their arrangements for oversight of MNOs on the SRN programme enable effective decision-making.** BDUK should ensure that it receives timely and detailed financial and performance data across the programme to allow it to monitor progress, have clear sight of reliable forecasts, assess delivery risks, and obtain assurance about the likely outturn costs. DSIT and BDUK should consider whether any further changes to the grant agreement are required to facilitate information sharing, and whether additional financial reviews are needed to understand and verify the reasons for any increases in the cost of the programme.

b **DSIT and BDUK should ensure that there is sufficient focus on delivering the 4G performance that consumers and businesses need.** They should:

- carry out a detailed analysis of the outcomes they are seeking to achieve from improving connectivity in remote areas and who will benefit, and use this analysis to determine the level of service required;
- continue to work with Ofcom to improve processes for measuring coverage to ensure that 4G coverage data reliably reflect user experience, particularly in those remote areas covered by the SRN where Ofcom has carried out limited testing;
- monitor how consumers and businesses are using 4G in SRN areas to ensure that intended benefits are being realised, and use this information to inform plans for supporting future connectivity; and
- assess how any actions they take to address the affordability of the SRN programme affect outcomes for consumers.

c **As it develops the wireless infrastructure strategy, DSIT should:**

- set out target dates for taking key decisions about the outcomes it is seeking, the connectivity that will be needed to realise them, and the input DSIT will need from other government bodies to deliver opportunities to use 5G in key sectors;
- determine the combination of enablers that will be required to deliver this connectivity (for example, 4G, wired connectivity, standalone 5G, other new technologies) and where they will need to be deployed to meet users' needs;
- collect the data needed to assess to what extent the market will meet the UK's future connectivity needs, and the government funding that may be required; and
- learn lessons from its experience on previous digital infrastructure programmes, including the risk that advances in technology coupled with the practical and commercial barriers to deploying infrastructure in remote areas could perpetuate the rural urban divide.