

The role of councils in tackling digital exclusion

A report to the Local Government Association

January 2023



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Director

Executive Summary

Recognising that digital exclusion remains an important issue for many local communities and in the delivery of council services, the Local Government Association (LGA) commissioned DMS Research & Consulting to explore the links between various types of disadvantage and the availability and usage of digital infrastructure, and to consider the role of councils in tackling digital exclusion.

Analysis of the link between digital infrastructure and disadvantage

In this study we have systematically explored the correlations between thousands of pairs of connectivity and socio-economic variables and how connectivity has changed over time – for example by rural urban classification and in terms of the distribution across output areas and/or council areas. Our key findings¹ include the following:

- There has been **important progress in closing the digital divide in the coverage of superfast** and ‘decent’ fixed broadband. But a **new digital divide has emerged in gigabit and full fibre** coverage². The top 10% of district/unitary local authority areas enjoy full fibre coverage of over 60%, while the bottom 10% have less than 10% of premises able to access these services.
- Overall, **rural areas have done relatively well in getting full fibre coverage so far, but lag in terms of gigabit coverage**. While the predominantly rural local authority areas now lag predominantly urban areas by about 3 percentage points in full fibre coverage (38% versus 41%), this gap is relatively modest. However, a substantial gap remains between rural and urban areas in terms of gigabit coverage, given the lower Virgin Media presence in rural local authority areas. At September 2022, **gigabit coverage was 47% in predominantly rural areas, versus 79% in predominantly urban areas**.
- There are widening disparities in the actual speeds of users’ fixed broadband lines: **average download speeds are now over 172 Mbps for the top 10% of output areas, but below 50 Mbps for the bottom 10%**. The spread of average data usage is also widening.

¹ Note that all analyses are for England only, and exclude data from Scotland, Wales and Northern Ireland. Latest coverage data is as of September 2022; latest performance data (speeds, usage and fixed broadband penetration) is as of May 2022.

² Full fibre is the ‘gold standard’ for broadband, as this provides the option of taking optical fibre into the customer’s own premises. Gigabit services (with download speeds of 1 gigabit per second or more) may be delivered over full fibre, or over other technologies such as Virgin Media’s cable network.

- A disparity is increasingly apparent in the actual upload speeds of users' fixed broadband lines. **The highest average upload speeds are mostly in rural areas served by symmetric full fibre networks from B4RN and Gigaclear.**
- There remains a **persistent disadvantage for many areas in the mobile coverage from multiple operators**. While the top 10% of district/unitary local authorities have more than 98% indoor 4G coverage of premises from all four operators, the bottom 10% have less than 62% such coverage. Furthermore, the areas with the best fixed broadband coverage tend also to have the best mobile coverage.
- Recent growth in total fixed broadband lines has been slower in areas with the best mobile coverage – suggesting that the improved speeds and data allowances available from mobile services (4G and 5G) have prompted some households to forego fixed broadband lines, and to rely on their mobile contracts for internet connectivity provided there is a reliable mobile signal. **Prior to the pandemic, mobile substitution for fixed broadband was particularly marked in areas with poorer living environments.**
- Average data **usage over fixed broadband lines is strongly influenced by demographics**: higher in areas with a large proportion of children in the population, and lower in areas where there are more people aged 65+.
- The more deprived areas tend to have the lowest penetration of fixed broadband. **Fixed broadband penetration is 15 percentage points lower in the most deprived areas** than in the least deprived.
- But the more deprived areas of England tend to use their broadband lines more heavily. Average monthly data **usage is 46% higher in the most deprived areas** than in the least deprived areas.
- Fixed broadband penetration is positively correlated with economic activity and educational attainment. Each 10 percentage point increase in fixed broadband penetration is associated with a **4 percentage point increase in the economic activity rate** and about **3 points in the average Attainment 8 score** at Key Stage 4.

Overall these quantitative findings confirm the importance of ensuring that subsidised infrastructure initiatives – primarily Project Gigabit and the Shared Rural Network – succeed in **rapidly 'levelling the playing field'** in the availability of high quality fixed and mobile coverage. They also highlight how **rural areas can be at the forefront** of the shift to higher speeds: with high take-up of symmetric full fibre services in the rural areas served by B4RN and Gigaclear, for example.

Consultation findings on the role for councils

Key messages from our stakeholder consultations on the role for councils in tackling digital exclusion are as follows:

- Digital exclusion is **an issue of concern** to councils.
- Councils have responsibilities, relationships and assets which **position them to play a key role** in tackling digital exclusion.
- But they are not necessarily **organised** to tackle digital exclusion in a **joined-up way**.
- In a complex digital exclusion landscape, there is **little strategic guidance** to councils from central government.
- A **more joined-up approach** across central government departments could help.
- Although demographics vary across councils, they all face **similar fundamental barriers** to digital inclusion.
- Digital inclusion efforts need to be **embedded into core services** for them to be sustainable.
- **Key ingredients for success** are leadership, having a strategy, budget and staff, and partnership.
- And **sharing lessons** learned across councils is also valuable.

Recommendations

Drawing our study's findings from the quantitative analysis of the links between digital infrastructure and disadvantage and the qualitative findings from consultations, we offer the following recommendations for the UK Government, for the LGA and for councils.

For the **UK Government**:

- **Clarify ministerial and executive leadership** on digital inclusion, bearing in mind the cross-cutting nature of this issue.
- Create and maintain a **new framework** with national-level guidance, resources and tools that support local digital inclusion initiatives, replacing the Digital Inclusion Strategy of 2014.
- Develop mechanisms for **more effective cross-department coordination** in tackling digital exclusion.

For the **LGA**:

- Continue to facilitate the **sharing of good practice** and lessons learned between councils, and seek to ensure that these are widely disseminated beyond the attendees of specific events.
- Consider making an online **digital inclusion dashboard tool** available to councils, such that they can benchmark their areas' position relative to their peers by various relevant metrics.

For **councils**:

- Clarify the **cabinet and senior executive leadership** on digital inclusion, and ensure that the respective leadership roles of county and district councils are clear in two-tier areas.
- County/unitary councils or combined authorities should **lead development of a local digital inclusion strategy** (in collaboration, as appropriate, with district councils and Integrated Care Partnerships) where there is not already one in place.
- Embed digital inclusion **throughout the council's other strategies**, as a means of helping to deliver their intended outcomes.
- **Build capacity** in the council's frontline staff and in partner VCS organisations for recognising where digital exclusion is a problem and in helping service users improve their digital inclusion where appropriate.
- Establish mechanisms for **cross-directorate information sharing** and coordination in digital inclusion initiatives.
- Ensure that **national-level resources** are effectively leveraged for local benefit.

1. Introduction and methodology

The importance of being able to access and confidently use online tools and resources came into stark focus during the COVID-19 lockdowns. As businesses, voluntary and community sector (VCS) and public sector organisations rapidly accelerated digitalisation of their services, it quickly became apparent that people experiencing some form of ‘digital exclusion’ were facing important disadvantages. Perhaps the most obvious of these was that school children without appropriate devices and/or connectivity could not access online learning resources at home (leading to the Department for Education’s Get Help With Technology programme which had distributed about 2 million laptops and tablets by March 2022).

Recognising that digital exclusion remains an important issue for many local communities and in the delivery of council services, the Local Government Association (LGA) commissioned DMS Research & Consulting to explore the links between various types of disadvantage and the availability and usage of digital infrastructure, and to consider the role of councils in tackling digital exclusion.

Research³ suggests that there are four key barriers to digital inclusion:

- access: the ability to connect to the internet and go online
- skills: the ability to use the internet and online services
- confidence: a fear of crime, lack of trust or not knowing where to start online
- motivation: understanding why using the internet is relevant and helpful.

By ‘digital exclusion’ we’re referring to situations in which people are at a material disadvantage through some lack of access to digital technologies, whether that’s down to a lack of motivation, awareness of the benefits, skills, trust or confidence, an inability to afford devices or services, or the quality of the available connectivity.

Research methods

There have been two main parts to our research:

- data analysis
- stakeholder consultations.

³ Source: [UK Digital Strategy 2017](#)

Data analysis

We have pulled together Ofcom Connected Nations datasets for coverage (fixed broadband and mobile) and for performance (fixed broadband) at output area (OA) and district/unitary local authority levels from January 2018 to the most recent period reported (May 2022 for performance data and September 2022 for coverage data). From this data we have calculated key coverage and performance metrics at other geographies: lower layer super output area (LSOA), middle layer super output area (MSOA), county/unitary local authority, and international territorial level 3 (ITL3) levels⁴.

We then combined this connectivity data with several socio-economic datasets at the smallest geographic levels for which they are available in the public domain. These include, for example, household composition (available at OA level), the Index of Multiple Deprivation (IMD, at LSOA level), business counts (at MSOA level), educational attainment at Key Stage 4 (at district/unitary local authority level), road traffic (at county/unitary local authority level) and internet usage by adults (at ITL3 level). See Annex A for the full list of variables in the combined dataset, and the sources.

Using a bespoke Python script we have systematically explored the correlations between thousands of pairs of connectivity and socio-economic variables and how connectivity has changed over time – for example by rural urban classification and in terms of the distribution across output areas and/or council areas.

Stakeholder consultations

Having agreed a topic guide with the LGA, we undertook consultations with a selection of informed stakeholders, including six councils, the Department for Digital, Culture, Media and Sport (DCMS), Building Digital UK (BDUK), the Digital Connectivity Forum and the Good Things Foundation (see Annex B for a list of consultees). These discussions explored the role that councils can play in tackling digital exclusion and how central government could better support and leverage councils in this.

Report structure

The remainder of our report is structured as follows:

- section 2 summaries our analyses of the links between digital infrastructure and disadvantage
- section 3 presents a summary of findings from our consultations

⁴ In England there are over 170,000 OAs, c. 33,000 LSOAs, c. 7,000 MSOAs, 309 district/unitary local authorities, 152 county/unitary local authorities and 133 ITL3 regions.

- section 4 puts forward a set of recommendations for councils, for the LGA and for central government, in the light of our research.

There are two annexes:

- annex A sets out the connectivity and socio-economic variables included in the data analysis
- annex B lists our consultees.

2. Analysis of the link between digital infrastructure and disadvantage

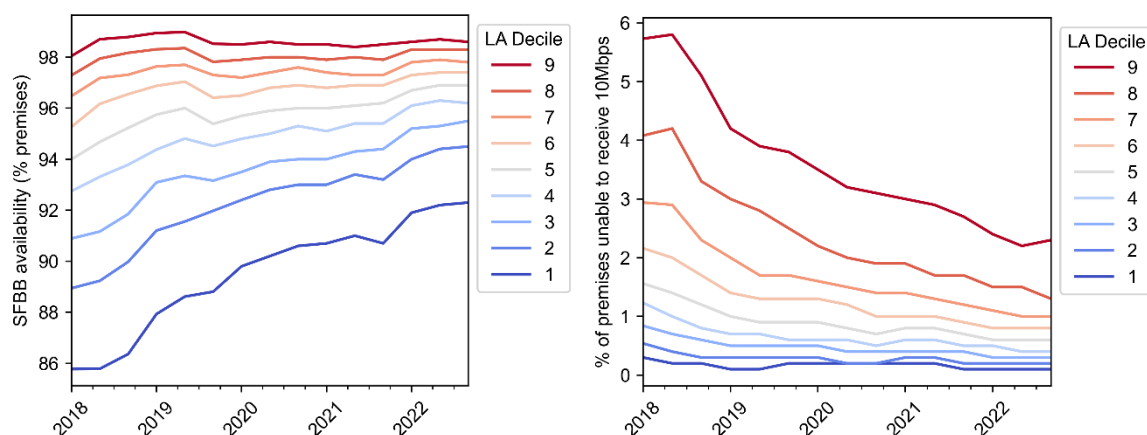
This section presents the main findings from our analyses of the connectivity and socio-economic datasets⁵. Note that all analyses are for England only, and exclude data from Scotland, Wales and Northern Ireland.

There has been important progress in closing the digital divide in the coverage of superfast and 'decent' fixed broadband

An important aspect of a community's digital inclusion is the quality of fixed broadband available to it. As illustrated in Figure 2-1, there has continued to be good progress since 2018 in narrowing the disparities between council areas in the coverage of superfast broadband (30 Mbps+ download speeds) and 'decent' broadband (10 Mbps+ download speeds).

For superfast coverage, the gap between the 1st and 9th deciles of district/unitary local authority areas reduced from of about 12 percentage points (pp) in January 2018 to 6pp in September 2022. For the proportion of premises unable to receive a 10 Mbps service, the equivalent gap has narrowed from 5.4pp to 2.2pp over the same period. Efforts to improve the situation further include the UK Government's recently announced trial in remote locations of Low Earth Orbit satellite broadband services.

Figure 2-1: Superfast coverage and % premises unable to receive 10 megabits per second (Mbps), by decile of district/unitary local authorities (10% of local authorities are below the decile 1 level, 90% are below the decile 9 level)



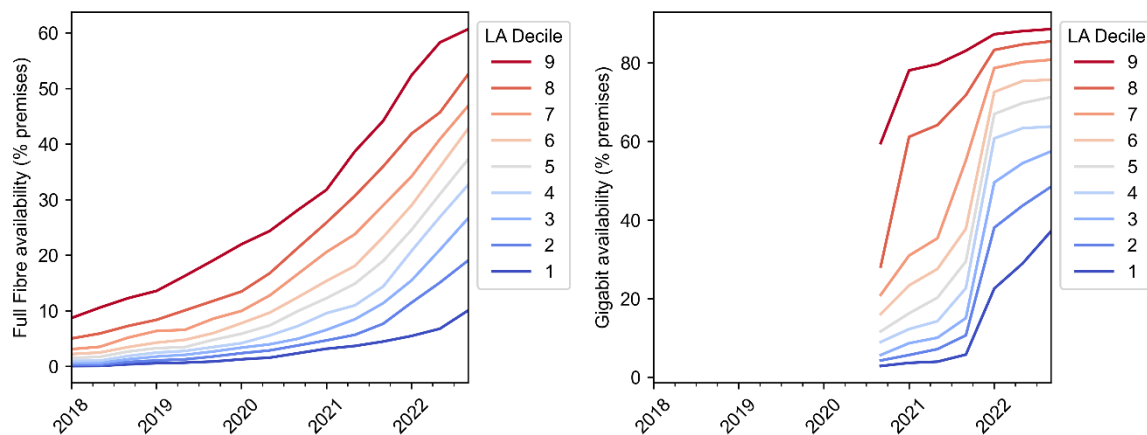
Source: DMS analysis of Ofcom Connected Nations datasets

⁵ In reading this section it is important to remember that highlighting correlations between certain variables (for example between broadband penetration and educational attainment) is not necessarily saying that the connectivity metric leads to the socio-economic metric (or vice versa). Too many other factors will be at play which may affect both the connectivity and the socio-economic variables, and it was beyond the scope of this study to undertake detailed econometric analysis on the direction of causality. However, we consider that the relationships highlighted here provide useful food for thought, and throw light on the links between various types of disadvantage and the availability and usage of digital infrastructure.

But a new digital divide has emerged in gigabit and full fibre coverage

Advances in technology bring new challenges, as new broadband infrastructure can take several years to be fully rolled-out, and this inevitably means that some places take longer than others to be upgraded. Full fibre is the ‘gold standard’ for broadband, as this provides the option of taking optical fibre into the customer’s own premises, establishing a future-proof foundation for further improvements in broadband quality. However, rolling out full fibre infrastructure is an expensive process, typically requiring extensive civil engineering work. As the UK is still in the relatively early stages of full fibre roll-outs we are currently seeing large geographic variations in coverage: as illustrated in Figure 2-2, the top 10% of district/unitary local authority areas enjoyed full fibre coverage of over 60% in September 2022, while the bottom 10% had less than 10% of premises able to access these services.

Figure 2-2: Full fibre coverage and gigabit coverage⁶, by decile of district/unitary local authorities (10% of local authorities are below the decile 1 level, 90% are below the decile 9 level)



Source: DMS analysis of Ofcom Connected Nations datasets

Gigabit-capable broadband can be provided over Virgin Media’s cable network as well as over full fibre infrastructure. Upgrades to DOCSIS 3.1 technology in 2020 and 2021 enabled gigabit capabilities across Virgin Media’s existing network – resulting in the rapid step-change increases in gigabit coverage seen in Figure 2-2. At September 2022, the top 10% of England’s district/unitary local authority areas had gigabit coverage of over 88%, while the bottom 10% had coverage of less than 38%.

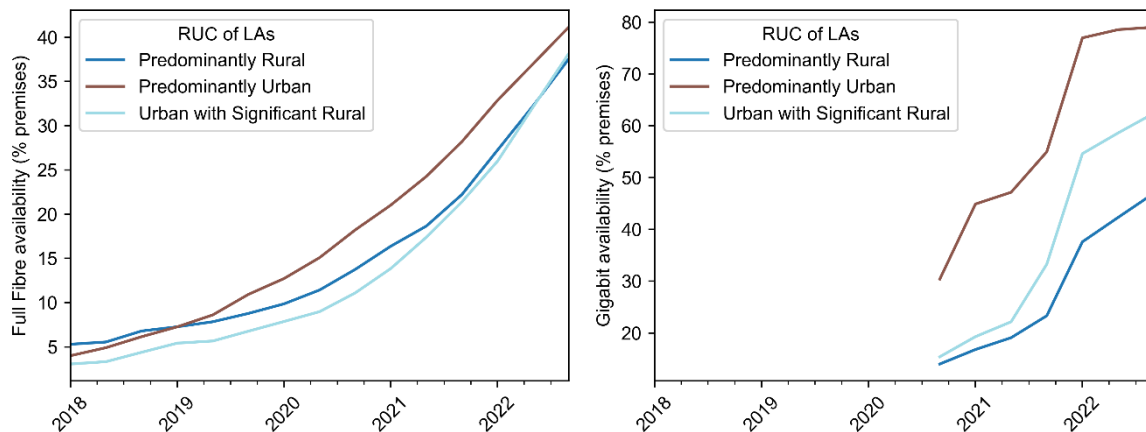
Recognising that some parts of the UK will not be commercially viable for operators to provide gigabit services, the UK Government is providing gap funding: with £5 billion committed to Project Gigabit, which aims to ensure that 85% of UK premises can obtain gigabit broadband by 2025, and 99% by 2030. Subsidised coverage will mainly be delivered through a series of procurements, but the Government is also offering vouchers for rural premises which may not otherwise be covered by gigabit connectivity (the voucher value is now up to £4,500 per home/business).

⁶ Gigabit coverage has only been included in the Ofcom Connected Nations datasets since September 2020

Overall, rural areas have done relatively well in getting full fibre coverage so far, but lag in terms of gigabit coverage

Historically, rural areas have typically been the last places to benefit from investment in new telecoms infrastructure, due to their lower densities of demand. However, we have seen a rather different pattern with full fibre. As illustrated in Figure 2-3 full fibre coverage across the district/unitary local authority areas classified as ‘predominantly rural’ was actually higher than that in ‘predominantly urban’ areas in 2018.

Figure 2-3: Average full fibre availability and average gigabit availability, by 3-fold rural urban classification (RUC) of district/unitary local authority



Source: DMS analysis of Ofcom Connected Nations datasets, and Defra 2011 Rural Urban Classification lookup tables

Although the predominantly rural areas now lag predominantly urban areas by about 3pp in full fibre coverage (38% versus 41% at September 2022), this gap is relatively modest. Remembering that these figures are for periods in advance of the bulk of Project Gigabit effects being felt, there appear to be three key factors behind this:

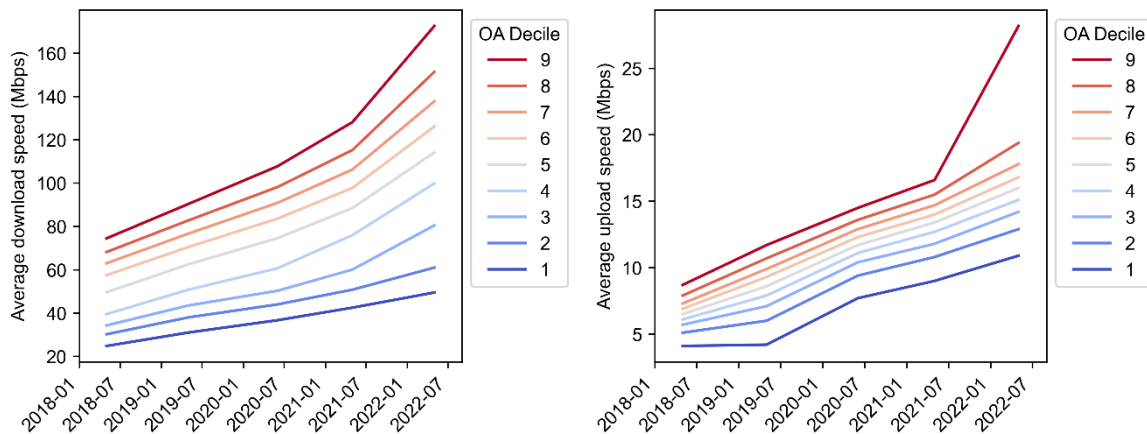
- In many rural local authority areas the latter stages of the subsidised Superfast Broadband programme focused on getting full fibre out to as many areas as possible that still lacked superfast broadband.
- The last few years have seen the emergence of numerous alternative network operators ('altnets') offering full fibre services. Some of these have chosen to target locations such as smaller towns or rural areas, where there is high demand for better broadband but less competition (for example, outside Virgin Media's – predominantly urban – coverage area).
- Alongside the altnets, BT's full fibre roll-out now extends well beyond the major conurbations.

Note, however, that a significant gap remains between rural and urban areas in terms of gigabit coverage, given the lower Virgin Media presence in rural local authority areas. At September 2022, gigabit coverage was 47% in predominantly rural areas, versus 79% in predominantly urban areas.

There are widening disparities in the actual speeds of users' fixed broadband lines

Looking at the speeds of the broadband lines actually used by consumers (as opposed to the speeds available to them) we see that there are widening disparities between those areas with the highest speeds and those with the slowest (Figure 2-4).

Figure 2-4: Average (mean) download speed by decile of output areas; and average upload speed by decile of output areas (10% of output areas are below the decile 1 level, 90% are below the decile 9 level)



Source: DMS analysis of Ofcom Connected Nations datasets

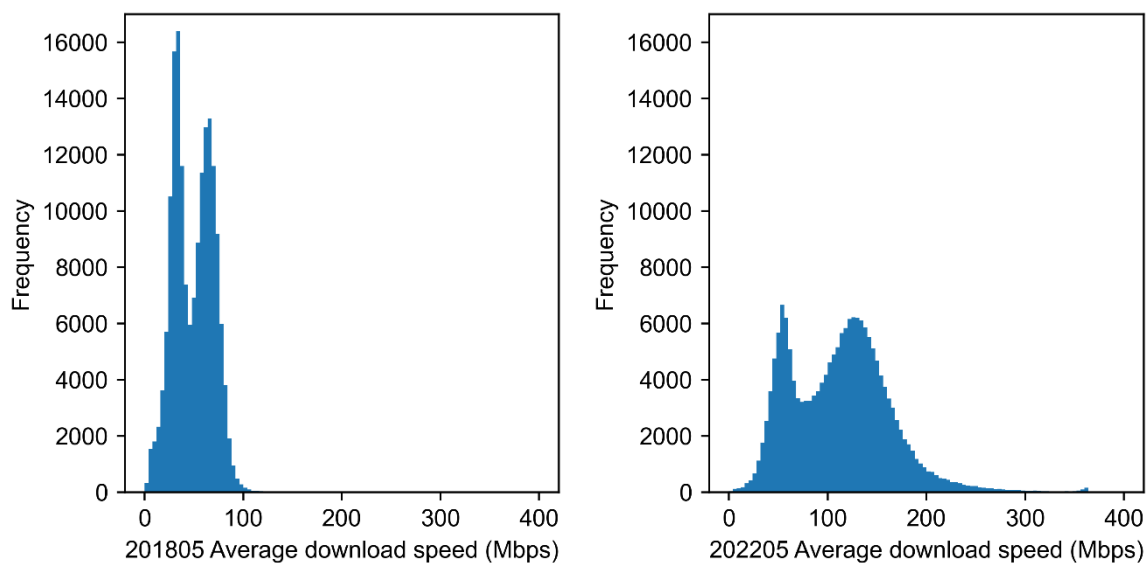
At May 2022 the top 10% of output areas had average download speeds of over 172 Mbps, while the bottom 10% had average download speeds below 50 Mbps. Hence there was a gap between the 1st and 9th deciles of about 122 Mbps in May 2022 – up from a gap of 50 Mbps in May 2018.

The divergence in average upload speeds has become particularly marked over the last year, with the increased uptake of full fibre services: by May 2022, the top 10% of output areas had average upload speeds of over 28 Mbps, while the bottom 10% had average upload speeds below 11 Mbps.

The distribution of average download speeds reveals the continuing distinction between those areas with cable/full fibre and those without

Plotting histograms of the average download speed by output area reveals two clear frequency peaks (Figure 2-5). The left-hand peak is for those areas which only have access to Fibre to the Cabinet (FTTC) services, while the right-hand peak reflects those output areas which also have access to Virgin Media's cable network and/or full fibre services.

Figure 2-5: Histograms⁷ of average download speeds on fixed broadband lines per output area, as at May 2018 and May 2022



Source: DMS analysis of Ofcom Connected Nations datasets

Both peaks have shifted to the right over time (towards higher speeds), and the broadening of the speed distribution over time reflects the trends previously discussed in Figure 2-4.

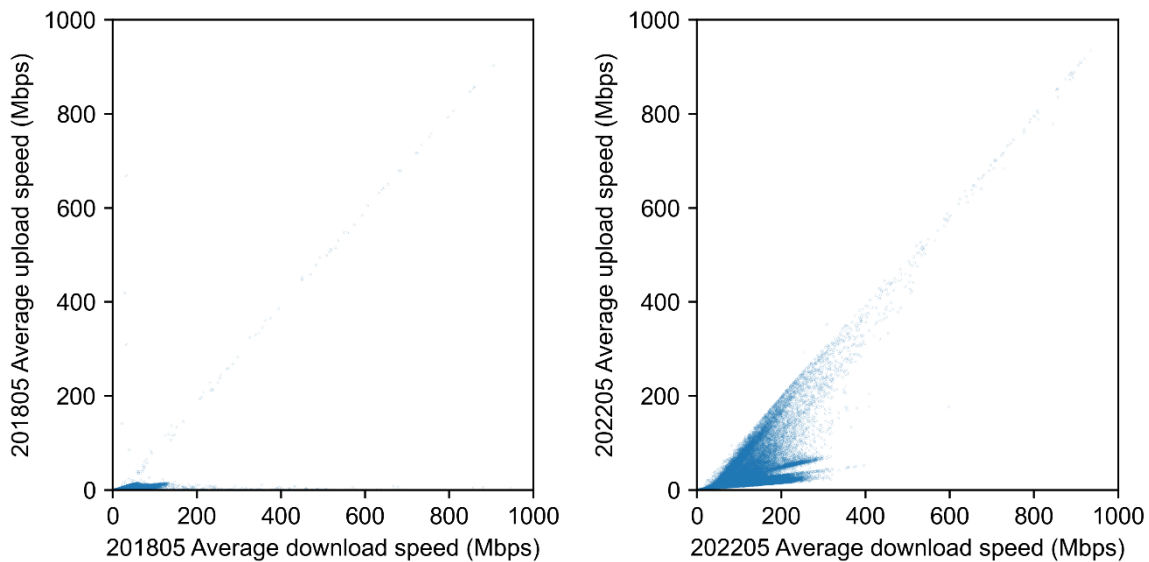
⁷ In these and some other charts in the report, metrics are prefixed with the relevant date in the format 'yyymm'. For example '201805' refers to May 2018, and '202205' refers to May 2022.

A disparity is increasingly apparent in the actual upload speeds

While download speeds tend to be the most frequently cited proxy for broadband quality, upload speeds also matter, and are increasingly important for video-conferencing and other interactive applications.

Plotting average download speed versus average upload speed for England's output areas (Figure 2-6) we can clearly see the emergence of a 'diagonal' of output areas where there is substantial use of symmetric services (where the upload speed matches the download speed). Barely visible in the May 2018 chart, this is much more prominent in the May 2022 data – reflecting the increased availability and take-up of full fibre services in the intervening four years.

Figure 2-6: Average download speed vs average upload speed on fixed broadband lines per output area, for May 2018 and May 2022

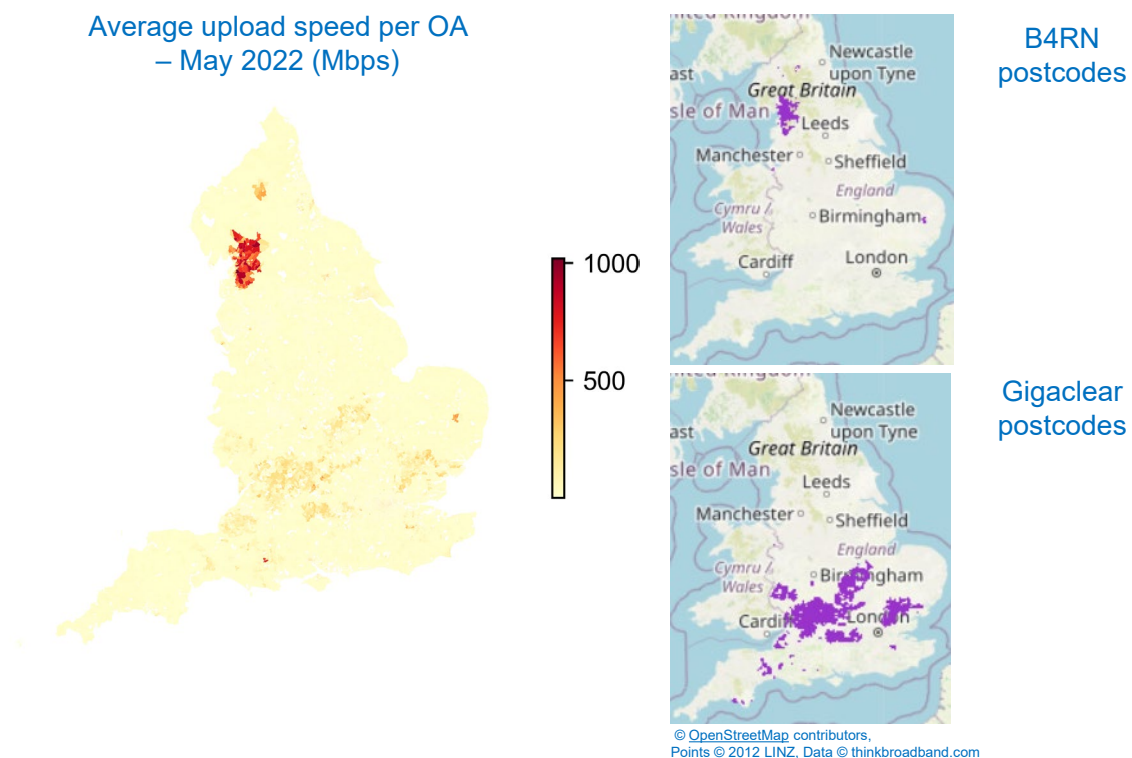


Source: DMS analysis of Ofcom Connected Nations datasets

The highest average upload speeds are mostly in rural areas served by symmetric full fibre networks from B4RN and Gigaclear

A striking picture is revealed when the average upload speeds per output area are mapped (Figure 2-7). A region spanning parts of rural Lancashire and south Cumbria stands out as having particularly high average upload speeds, while parts of rural central England stretching from Devon to Essex also show relatively high average upload speeds.

Figure 2-7: Average upload speed per output area at May 2022; and postcodes served by B4RN and Gigaclear



Source: DMS analysis of Ofcom Connected Nations datasets; and thinkbroadband.com, December 2022

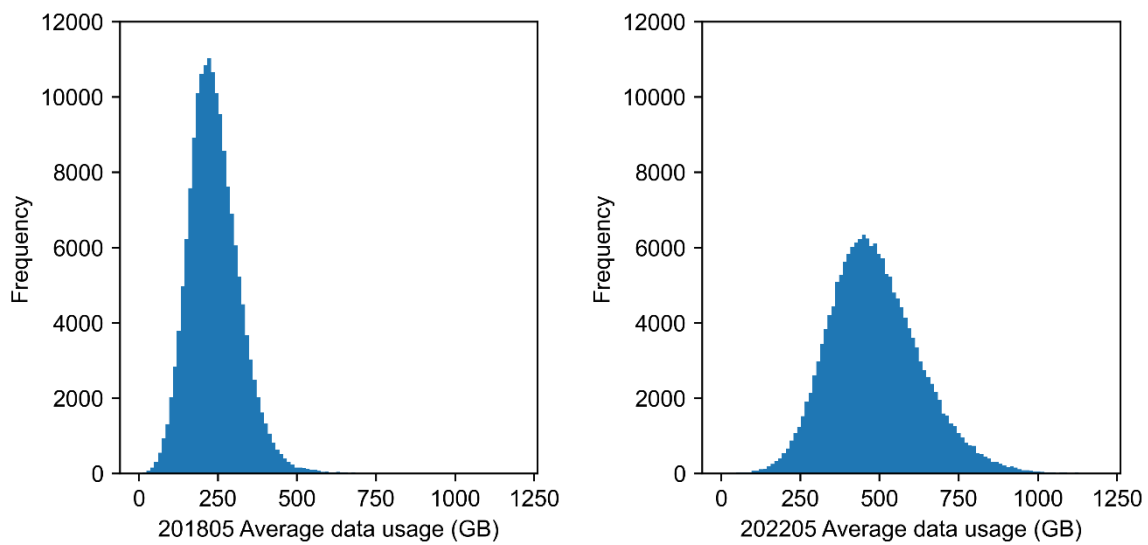
Drawing on operator coverage data from thinkbroadband.com we see that there is a close match between the areas with high average upload speeds and the postcodes covered by B4RN (predominantly in Lancashire and south Cumbria) and Gigaclear. Both of these operators offer symmetric full fibre services in rural communities. The particularly high average upload speeds in the B4RN areas suggest that this operator has been especially successful in securing a very high take-up for its services.

The spread of average data usage is widening

As we are observing a divergence in the broadband speeds used, so we are seeing widening disparities in the average data transferred each month over fixed broadband lines (Figure 2-8).

In May 2022 the top 10% of output areas for usage were consuming more than 677 gigabytes (GB) per month on average, while the bottom 10% were using less than 314 GB: a difference of 363 GB (compared with the equivalent difference of 200 GB in May 2018).

Figure 2-8: Histograms of average monthly data usage on fixed broadband lines per output area, as at May 2018 and May 2022

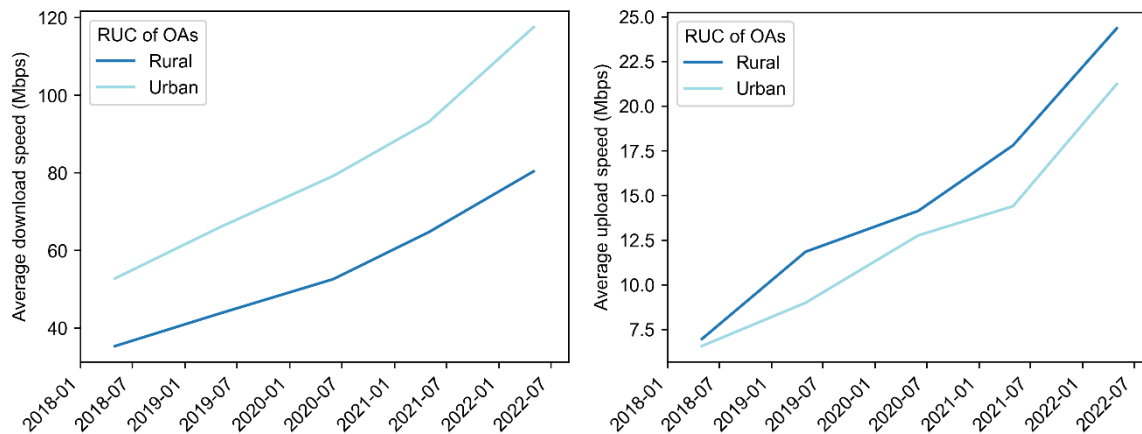


Source: DMS analysis of Ofcom Connected Nations datasets

On average, rural areas have much slower fixed broadband download speeds but similar average upload speeds to urban areas

Overall, England's output areas classified as 'rural' had an average download speed of 80 Mbps in May 2022, compared with 118 Mbps for 'urban' output areas (Figure 2-9). The gap between urban and rural average download speeds increased from 17 Mbps in May 2018 to 38 Mbps in May 2022.

Figure 2-9: Average (mean) download speeds and upload speeds, by 2-fold rural urban classification of output areas



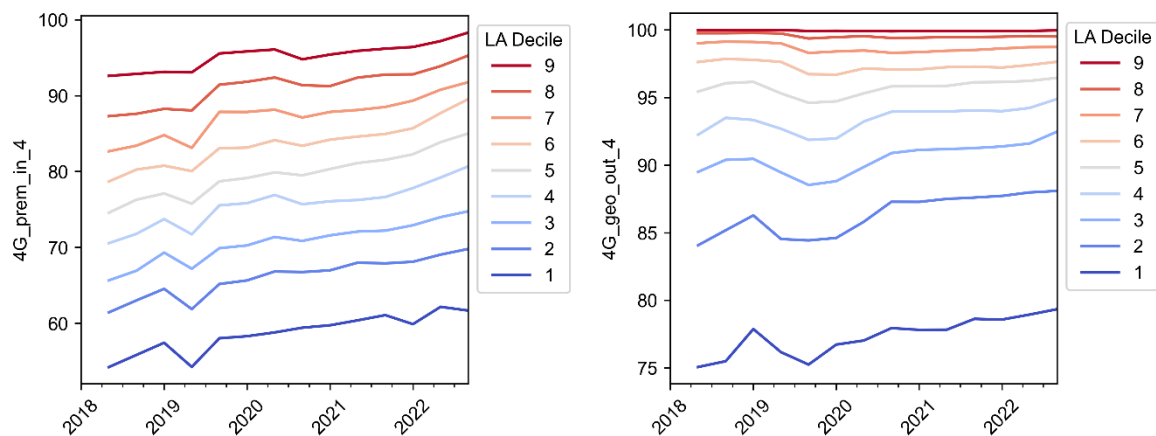
Source: DMS analysis of Ofcom Connected Nations datasets, and Defra 2011 Rural Urban Classification lookup tables

Interestingly, the picture for uploads speeds is different: rural output areas had an average upload speed of 24 Mbps in May 2022, versus 21 Mbps for urban output areas. Note, however, that this difference is small, and is skewed somewhat by a relatively small number of rural output areas with high take-up of full fibre offering particularly high upload speeds (e.g. in the B4RN and Gigaclear coverage areas, as previously discussed). The median value (across output areas) for the median upload speed per output area was higher in urban areas (15 Mbps) than in rural areas (10 Mbps) in May 2022.

There also remains a persistent disadvantage for many areas in the mobile coverage from multiple operators

In terms of mobile coverage, a key consideration is the extent to which an area is covered by all four mobile operators with 4G (Ofcom data is not yet available for 5G). By this metric there appears to be a rather persistent digital divide across England (Figure 2-10).

Figure 2-10: 4G indoor coverage of premises (%) from all four mobile operators, and 4G outdoor geographic coverage (%) from all four mobile operators, by decile of district/unitary local authority area (10% of local authority areas are below the decile 1 level, 90% are below the decile 9 level)



Source: DMS analysis of Ofcom Connected Nations datasets

While the top 10% of district/unitary local authorities had more than 98% indoor 4G coverage of premises from all four operators, the bottom 10% had less than 62% such coverage in September 2022.

Outdoor geographic coverage is somewhat higher, but there remain substantial gaps in coverage for many councils: the top 10% of district/unitary local authority areas had more than 99.9% outdoor geographic coverage from all four operators, while the bottom 10% had less than 79% such coverage in September 2022.

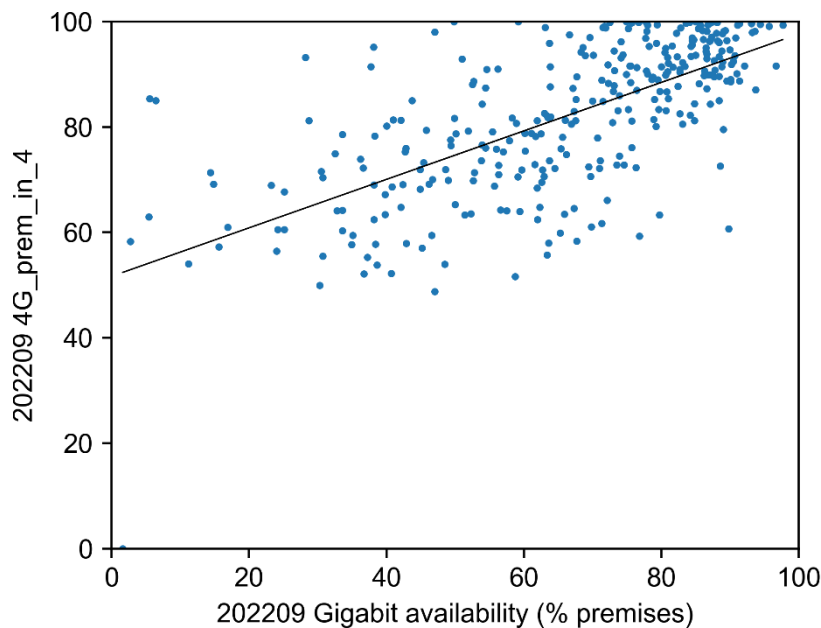
The Shared Rural Network is a £1 billion programme between the UK Government and the mobile network operators, seeking to plug 4G coverage total not-spots (where there is no 4G coverage from any operator) and partial not-spots (where there is coverage from at least one, but not all four mobile network operators) by early 2027. Across England it is forecast that 4G geographic coverage from all four operators will be 90% by the end of the programme, with 98% coverage from at least one operator⁸.

⁸ Source: [Shared Rural Network](#)

And the areas with the best fixed broadband coverage tend also to have the best mobile coverage

Unsurprisingly, given the economies of scale that drive telecoms investment, the quality of fixed broadband tends to be best in the areas with the best mobile coverage. For example, Figure 2-11 plots gigabit availability versus the indoor 4G coverage of premises from all four operators, by district/unitary local authority at September 2022.

Figure 2-11: Fixed broadband gigabit coverage versus 4G mobile indoor % premises coverage from all four mobile operators, by district/unitary local authority, as at September 2022



Source: DMS analysis of Ofcom Connected Nations datasets

At local authority level, both 4G mobile coverage and gigabit coverage currently have a fairly strongly positive correlation with the proportion of the population that is from an ethnic minority – reflecting the fact that urban areas (which have the best mobile and gigabit coverage) tend to be more ethnically diverse than rural areas.

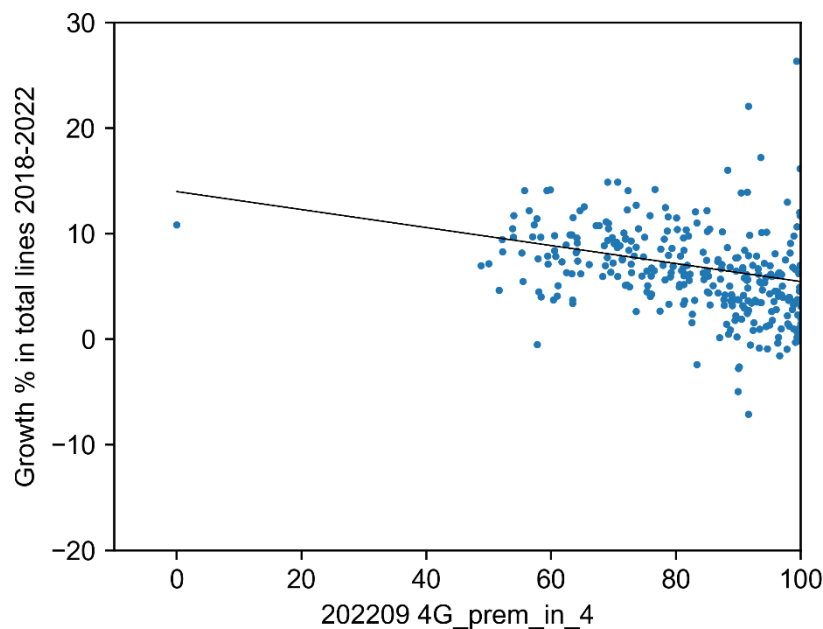
We have not found evidence in this study of socio-economically deprived areas having inherently poorer broadband coverage. On the contrary, at LSOA level there is currently a positive correlation between gigabit coverage and deprivation (as measured by IMD): the most deprived decile of LSOAs had average gigabit coverage of about 80% in September 2022, versus about 70% in the least deprived decile.

Recent growth in total fixed broadband lines has been slower in areas with the best mobile coverage

Looking at the growth in total fixed broadband lines per district/unitary local authority over the period 2018 to 2022 we note that this growth tended to be lower (even negative) in the areas with the best 4G mobile coverage (Figure 2-12).

A possible contributory factor for this is fixed-mobile substitution: the improved speeds and data allowances available from mobile services (4G and 5G) have prompted some households to forego fixed broadband lines, and to rely on their mobile contracts for internet connectivity provided there is a reliable mobile signal.

Figure 2-12: 4G mobile indoor % premises coverage from all four mobile operators (as at September 2022) versus Growth % in total fixed broadband lines 2018 to 2022 by district/unitary local authority

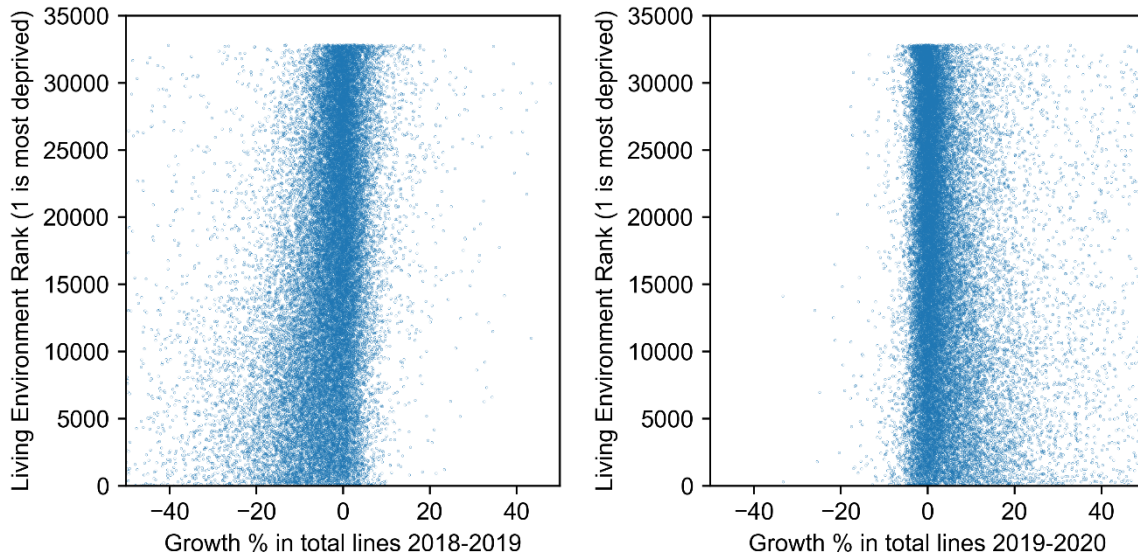


Source: DMS analysis of Ofcom Connected Nations datasets

Mobile substitution for fixed broadband seems to have been particularly marked prior to the pandemic, in areas with poorer living environments

Exploring the fixed broadband lines growth in more detail, we see that there are some interesting relationships with deprivation (Figure 2-13).

Figure 2-13: Growth % in total fixed broadband lines for 2018 to 2019 and 2019 to 2020, versus IMD Living Environment rank 2019 by LSOA



Source: DMS analysis of Ofcom Connected Nations datasets, and IMD 2019

In the year prior to the pandemic (May 2018 to May 2019), the growth of total fixed broadband lines was lowest for the areas with the poorest living environments. In that year average growth in fixed broadband lines was -8.8% in the most deprived decile of the IMD's Living Environment domain, versus -0.3% in the least deprived decile.

In the period during which the pandemic hit (May 2019 to June 2020) by contrast there was strong growth in fixed broadband lines, particularly in the most deprived areas: +11.1% growth in the most deprived decile and +3.3% in the least deprived decile by the Living Environment domain.

Clearly the pandemic lockdowns prompted many households to invest (or re-invest) in fixed broadband lines, given the extent to which we relied on online activities for work, learning and entertainment.

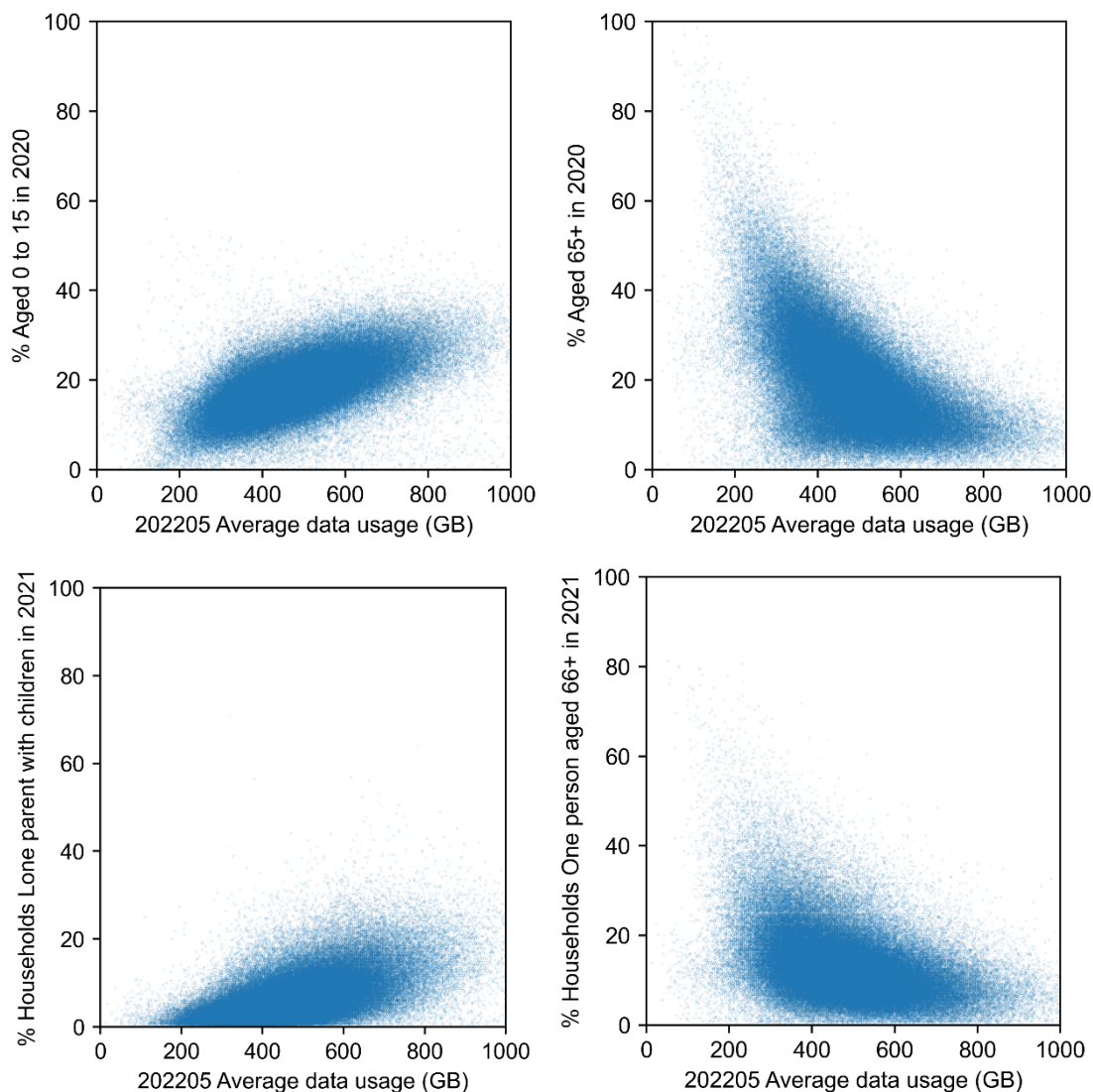
The fact that this effect is most clearly seen in the IMD's Living Environment domain (which considers quality of housing, measures of air quality and road traffic accidents) is interesting. It raises the possibility that people living in poorer housing have a greater propensity to rely on mobile connectivity – possibly reluctant (lockdowns aside) to commit to a fixed broadband contract in a place where they may only be expecting to stay for a relatively brief period?

Average data usage over fixed broadband lines is strongly influenced by demographics

There are some clear links between the average monthly data usage over fixed broadband lines and the ages and household composition of the area (Figure 2-14). Average usage increases as the proportion of the population who are children (aged 0 to 15) increases, and reduces as the proportion of the population aged 65+ increases.

Similarly, there is a clear increase in average usage as the proportion of households with dependent children increases – with a particularly strong correlation with the proportion of households which are lone parents with dependent children. As the share increases of households comprising of people aged 66 and above, so average data usage reduces.

Figure 2-14: Average monthly data usage over fixed broadband lines per output area in May 2022 versus: % of the population aged 0 to 15; % of the population aged 65+; % of households which are lone parents with dependent children; and % of households which are single person aged 66 years and over

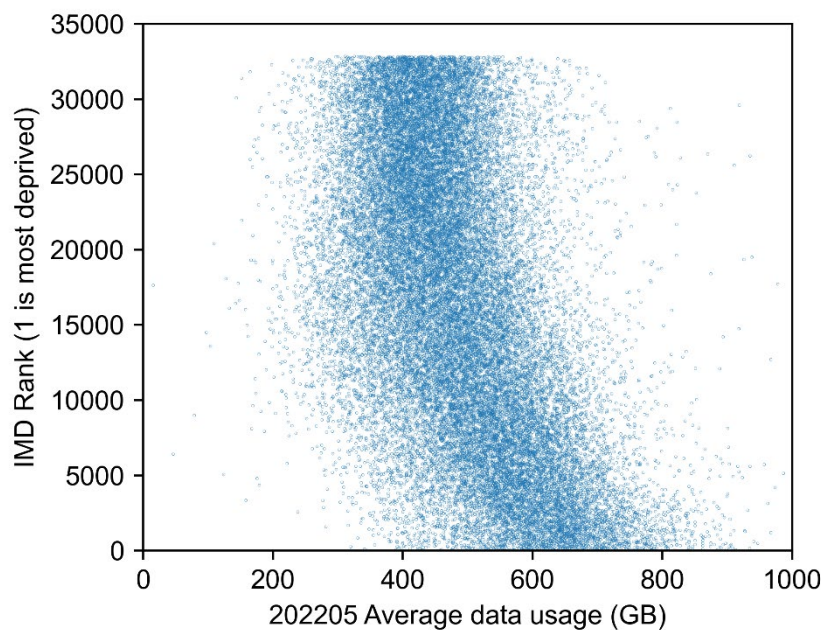


Source: DMS analysis of Ofcom Connected Nations datasets, ONS Population Estimates, and Census 2021

The more deprived areas of England tend to use their broadband lines more heavily

Figure 2-15 shows how the average fixed broadband monthly data usage per LSOA in May 2022 varied with the overall Index of Multiple Deprivation (IMD). It shows a marked increase in average usage amongst more deprived areas: average usage is 46% higher in the most deprived areas than in the least deprived areas (622 GB per month in the most deprived decile of LSOAs versus 427 GB in the least deprived).

Figure 2-15: Average monthly data usage over fixed broadband lines in May 2022 versus IMD rank (1 is most deprived) by LSOA



Source: DMS analysis of Ofcom Connected Nations datasets and IMD 2019

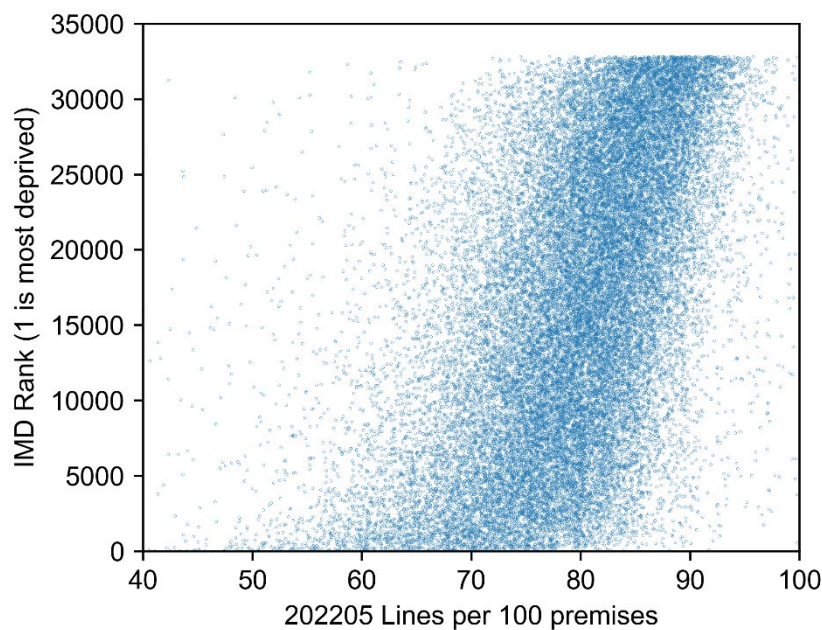
Potential contributory factors to this may include the following:

- Although average household sizes are similar, more deprived areas tend to have a higher proportion of children (aged 0 to 15) and a lower proportion of older people (aged 65+) in the population than is the case in less deprived areas – and, as we have seen, age has an important influence on usage.
- Fixed broadband penetration is somewhat lower in more deprived areas (see the next sub-section) and lighter users may have migrated to mobile-only connectivity, leaving a higher average usage for the remaining fixed broadband households.
- Economic inactivity in more deprived areas may lead to more extensive use of streamed video and gaming during the working day in some households.
- Lower income households may make heavier use of data-intensive online forms of entertainment (e.g. gaming and streamed video), in preference to more expensive offline alternatives.

Though the more deprived areas also tend to have the lowest penetration of fixed broadband

Linked to the previous observations on fixed-mobile substitution, we note that the penetration of fixed broadband lines tends to be lower for more deprived areas (Figure 2-16). Fixed broadband penetration is 15 percentage points lower in the most deprived areas than in the least deprived (71 lines per 100 premises⁹ in the most deprived decile of LSOAs versus 86 in the least deprived decile).

Figure 2-16: Total fixed broadband lines per 100 premises in May 2022 versus IMD 2019 rank (1 is most deprived) by LSOA



Source: DMS analysis of Ofcom Connected Nations datasets and IMD 2019

Affordability is the most obvious explanation for this (lower income households finding it harder to afford a fixed broadband line), but other considerations include the following:

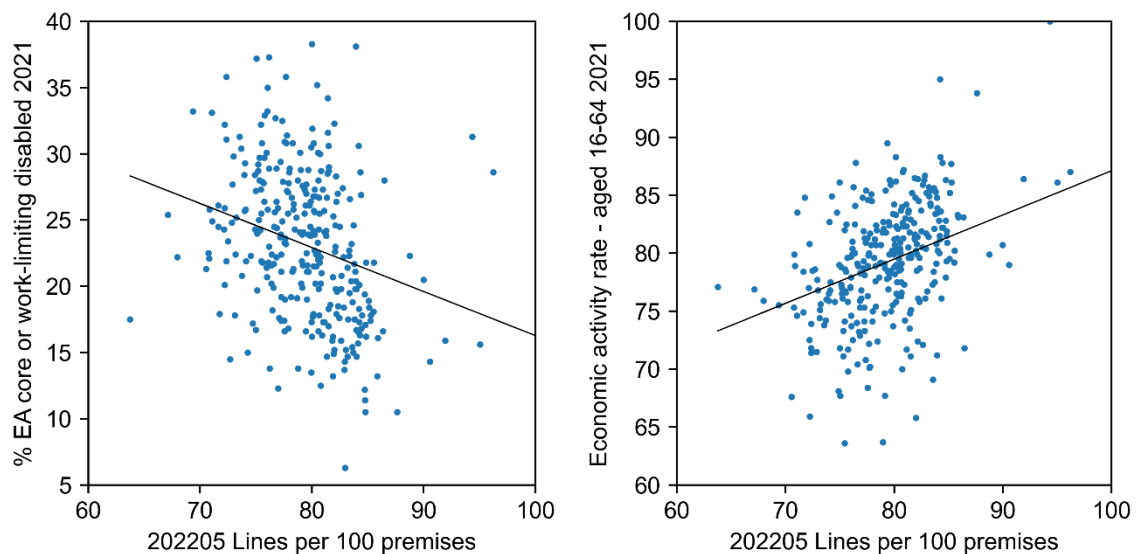
- Households in deprived areas may find it more difficult to pass credit checks for fixed broadband contracts.
- Lower skills levels in more deprived areas may, for some, reduce their willingness to engage with computers and the internet.
- Lower rates of fixed broadband penetration in these areas may contribute to some extent to the deprivation problem – making it harder to access learning and employment opportunity, and leading to lower average household incomes.

⁹ Note that the lines per 100 premises metric includes business premises as well as homes.

Fixed broadband penetration tends to be lower in areas with high rates of disability, and in areas with lower rates of economic activity

Consistent with the previous finding on the link between fixed broadband penetration and overall levels of deprivation, we see (Figure 2-17) that fixed broadband lines per 100 premises is negatively correlated with the proportion of working age population who are disabled, and positively correlated with economic activity rates per district/unitary local authority area.

Figure 2-17: Fixed broadband lines per 100 premises as at May 2022 versus per cent of population aged 16 to 64 who were Equalities Act core or work-limiting disabled in 2021 by district/unitary local authority area; and fixed broadband lines per 100 premises as at May 2022 versus economic activity rate of population aged 16 to 64 in 2021 by district/unitary local authority area



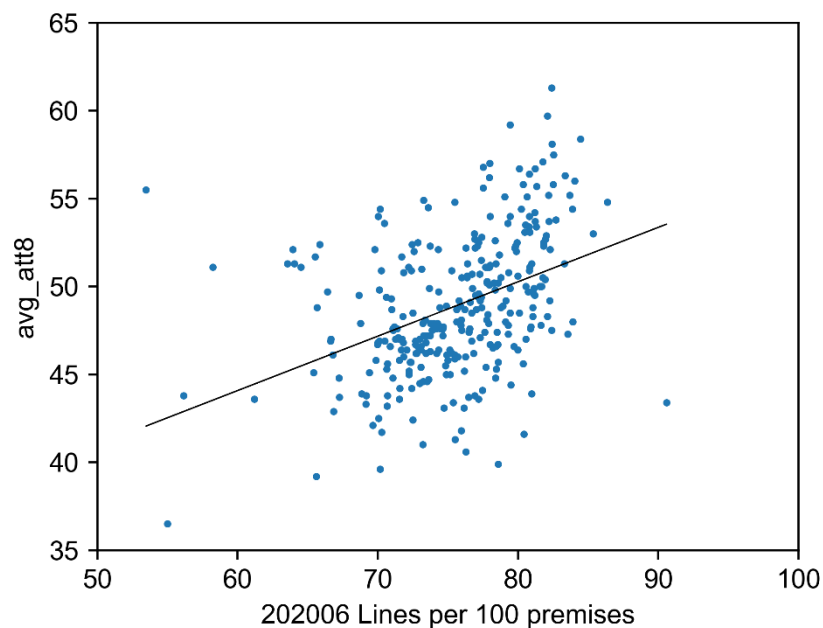
Source: DMS analysis of Ofcom Connected Nations datasets, and Annual Population Survey

A 10 percentage point increase in the fixed broadband penetration is associated with a 4 percentage point increase in the economic activity rate.

Educational attainment at Key Stage 4 tends to be higher in areas with higher fixed broadband penetration

There is also a clear relationship between fixed broadband penetration and educational attainment at Key Stage 4. For the 2021/22 Key Stage 4 results by district/unitary local authority are of the pupil's residence, this relationship is strongest with the lines per 100 premises as at June 2020: that is, the situation towards the start of the pandemic (Figure 2-18).

Figure 2-18: Fixed broadband lines per 100 premises as at June 2020 versus average Attainment 8 score at Key Stage 4 in 2021/22 by district/unitary local authority residence of pupil



Source: DMS analysis of Ofcom Connected Nations datasets and DfE Key Stage 4 Attainment for 2021/22

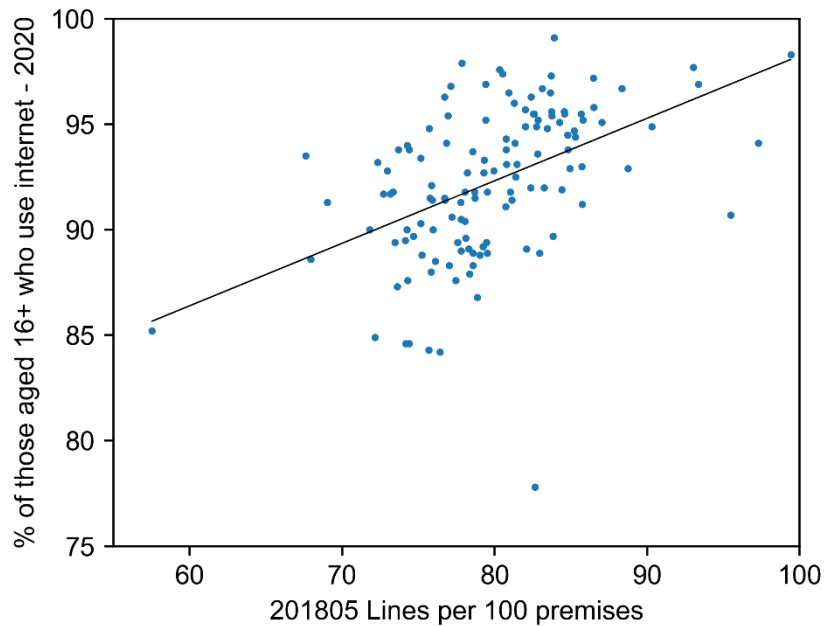
A 10 percentage point increase in fixed broadband penetration in June 2020 is associated with an increase of about 3 points in the average Attainment 8 score in 2021/22.

This would be consistent with the observation that schoolchildren with readier access to fixed broadband found it easier to participate in online learning during lockdowns. However, it should be remembered that education attainment is also linked to other factors – including deprivation – that are also correlated with fixed broadband penetration. This is an area that would benefit from more detailed research, using more granular attainment data from the National Pupil Database and controlling for other factors to ascertain the extent of any impact on educational attainment attributable to broadband.

Areas with higher rates of internet usage also tend to have higher rates of fixed broadband penetration

Finally, we note that – as expected – there is a correlation between fixed broadband penetration and the levels of internet usage amongst adults as reported by ONS at ITL3 level (Figure 2-19).

Figure 2-19: Fixed broadband lines per 100 premises as at May 2018 versus per cent of those aged 16+ who had used the internet in the last 3 months in 2018, by ITL3 region



Source: DMS analysis of Ofcom Connected Nations datasets, and ONS Internet Users

For the latest ONS data (from 2020) on the proportion of those aged 16+ who have used the internet in the last 3 months, the correlation is strongest with the fixed broadband penetration as at May 2018. The relationship gets weaker for later fixed broadband penetration data – which would be consistent with mobile connectivity becoming increasingly important as a primary means of access the internet, thereby weakening the link between internet use and the presence of fixed broadband.

3. Consultation findings on the role for councils

Having quantified various links between digital infrastructure and disadvantage in the previous section, we now turn to our qualitative findings regarding the role for councils in tackling digital exclusion. This section summarises the key points emerging from the consultations undertaken for our study (see Annex B for a list of consultees).

Digital exclusion is an issue of concern to councils

The availability of superfast broadband is an area that has been high profile, especially for rural councils, for several years. This remains the case, even with very high proportions of premises now able to access superfast services (as shown in Figure 2-1): residents and businesses in the properties remaining outside the coverage area consider themselves to be at all the more unfair disadvantage, given the widespread availability of superfast elsewhere. While the investment under Project Gigabit is welcome, there are concerns that it may not extend to these areas as they are, by definition, the hardest-to-reach with terrestrial broadband.

More widely, digital exclusion issues came to the fore during the pandemic lockdowns. As councils sought to take their services online as much as possible, they were conscious of the need to ensure that those without internet access were not excluded. Councillors themselves had to adapt rapidly to the use of online tools, instead of face-to-face meetings, for fulfilling their council duties, and this brought increased awareness of the importance of having reliable access to the internet, and in being confident in using online resources.

Channel shift is seen as a critical enabler for providing more effective, efficient services, and digital exclusion of some residents is recognised as an important constraint on this. People who are digitally excluded are some of the heaviest users of council services (e.g. in terms of adult social care, children's services and housing).

Councils have responsibilities, relationships and assets which position them to play a key role in tackling digital exclusion

In a number of our consultations it was noted that councils have a democratic mandate and duty to promote the socio-economic wellbeing of their areas, and that this includes digital wellbeing.

Many of the services delivered by councils increasingly rely on digital interactions with residents and businesses, from online booking of leisure services to planning application consultations. This provides a strong incentive to minimise digital

exclusion in their communities, and councils' existing paper communications with residents – such as quarterly newsletters delivered to each home – are an important means of reaching the households who are not yet online.

Moreover, some council functions have a particularly important practical contribution to make in helping to tackle digital exclusion. Children's services, adult social care, adult education, business support and libraries all have day-to-day contact with people who may be digitally excluded, and initiatives to tackle digital exclusion can be woven into these. For example, help with digital skills improvement is a key element in many adult community education activities run or commissioned by councils¹⁰.

We also noted that, as a proportion of their own staff computers come up for renewal each year, some councils are refurbishing the replaced equipment for donation or lending to residents who lack appropriate devices.

In terms of infrastructure provision, councils' planning departments play a key role, especially in terms of the extension of mobile coverage for 4G and 5G services; highways departments control streetworks and some are seeking to pre-provision fibre duct alongside new road schemes; housing departments provide accommodation for many of those at most risk of digital exclusion; and even recycling can play a role: waste collection vehicles can be host equipment to monitor the quality of mobile coverage on their regular drives around the area's streets.

Importantly, councils also have established relationships with a wide range of local VCS organisations who deal with some of the hardest-to-reach communities. In practice, these VCS stakeholders are often a more effective channel to some socially excluded groups than more formal council offerings.

It was also noted that some councils have been running the local Superfast Broadband Programme interventions, and this has built up a pool of internal expertise that has helped facilitate both roll-out and take-up. With the centralised management of Project Gigabit within BDUK, there was a fear that this local expertise could be lost, and this would further constrain the resources councils could apply to digital exclusion issues.

But they are not necessarily organised to tackle digital exclusion in a joined-up way

Our consultations with councils highlighted that aspects of digital exclusion were being addressed to some extent in several different functional areas, but that there was not always much or any coordination between these, to optimise the

¹⁰ See, for example, [Learning for Life: the role of adult community education in developing thriving local communities – A handbook for councillors](#), LGA, October 2020

effectiveness and efficiency of their collective efforts. In many councils there is no single clear lead for digital exclusion below the Chief Executive.

For example, numerous councils' adult social care teams are involved in managing the practical issues arising for telecare services from the migration of voice services off the traditional Public Switched Telephone Network onto digital platforms by December 2025 ('PSTN switch-off'). However, these activities are not necessarily being linked up with the councils' wider digital inclusion efforts. PSTN switch-off is potentially an opportunity that could be leveraged to help some residents who are currently offline to engage more with digital connectivity and services.

Furthermore, in two-tier areas, there can be something of a disconnect on digital exclusion between county and district – albeit that collaboration in general has been strengthened by the joint-working necessitated during the pandemic lockdowns.

In a complex digital exclusion landscape, there is little strategic guidance to councils from central government

The issue of digital exclusion is inherently complex. It is not a binary state, and the extent and impact of digital exclusion can vary for an individual depending on life events (such as losing a job, relationship breakdown, deterioration in health etc.).

The barriers to digital inclusion are different for different communities of interest. While affordability of devices and connectivity may be the key barrier for some, it may be that the fear of being made vulnerable to online scams is a primary issue for others, and frustration at poor broadband speeds may be the main concern of others.

Councils have generally fashioned their own digital inclusion approaches, and there has been little strategic guidance from central government as to how to go about this. The UK Government's current Digital Inclusion Strategy¹¹ is from 2014, and had a particular focus on the next few years, with an aim that "if we succeed, by 2020 everyone who can be digitally capable, will be". It is not now a document that councils refer to in shaping their local approaches to digital inclusion.

A more joined-up approach across central government departments could help

Individual central government departments have worked with councils on specific digital inclusion initiatives, such as DfE's Get Help with Technology scheme, the DCMS/DfE Digital Skills Partnerships, and the pilot of DWP's partnership with Talk Talk offering jobseekers free access to high-quality broadband.

¹¹ Source: [Government Digital Inclusion Strategy](#), as referenced in the most recent [UK Digital Strategy](#).

However, there is a perception amongst councils that such central government initiatives operate in siloes and are not necessarily making most effective use of the synergies between them – for example, offering skills support alongside the provision of subsidised devices or connectivity.

A structure that provides a more explicitly joined-up approach across central government initiatives in this area would not only allow for more impactful delivery, but would also help the councils themselves promote more effective coordination across their own functional areas in their digital inclusion activities.

Although demographics vary across councils, they all face similar fundamental barriers to digital inclusion

While this is a complex area, as highlighted above, in terms of the spectrum (or spectra) of different barriers to digital inclusion, there is a strong similarity across geographies for any specific community of interest. For example, the challenge of affording broadband connectivity for a low income family in Northumberland is similar to that for a low income family in North London; concerns over online scams for an older person in Newcastle may be very similar to those for an older person in Newquay. The mix of issues in any particular area will depend on its demographics, but the fundamental nature of the barriers to inclusion will be common throughout the UK¹². This suggests that national-level frameworks and guidance could and should play a part in optimising the effectiveness of digital inclusion initiatives.

The Good Things Foundation is a good example of how a national-level initiative can provide a common framework of high quality resources (such as their Learn My Way courses and the national databank), which can be drawn on by thousands of local organisations.

Digital inclusion efforts need to be embedded into core services for them to be sustainable

While the extent of digital exclusion now is less than in previous years (for example, 7.8% of adults in the UK had not used the internet in the last three months in 2020, versus 14.8% in 2014¹³), it remains a persistent issue that adversely impacts the socio-economic welfare of council residents and on the delivery of council services. However, with severe pressure on public funding, including council funds, it is difficult for councils to protect any non-statutory activities.

The point was made in our consultations that digital inclusion efforts need to be woven through the core services of councils and their partners (including VCS

¹² Although we note that the impacts of digital exclusion can vary depending on local circumstances. For example, digital exclusion may have a more detrimental impact for those who also have relatively poor access to public transport and other local services.

¹³ Source: [ONS Internet Users](#)

organisations and Integrated Care Partnerships) for them to be truly sustainable. Critically, digital inclusion should be positioned as a means through which the intended outcomes of these partners and strategies can be better realised, rather than as another ‘ask’.

Key ingredients for success are leadership, having a strategy, budget and staff, and partnership

Although the scope of this study only included a relatively small sample of consultees, it appeared to us that the most effective digital inclusion approaches by councils involved the following ingredients:

- Leadership – having clear ownership for digital inclusion at cabinet level and at senior executive level, with a mandate to work across all relevant council functions.
- Strategy – having an explicit, carefully thought-through and agreed strategy for digital inclusion (whether standalone or as part of a wider digital strategy), and ensuring that digital inclusion considerations are embedded within all other relevant council strategies.
- Budget and staff – having some dedicated resource who can coordinate digital inclusion activities across functional areas, facilitate new funding, and work to build capacity in partner organisations for improving the digital inclusion of their service users.
- Partnership – recognising that councils are not always the most effective route to some socially excluded groups, and working with whichever organisations are best placed to understand the needs of the service users and to help them access support.

And sharing lessons learned across councils is also valuable

Given that councils across England face similar fundamental challenges in tackling digital exclusion, sharing of good practice and lessons learned can clearly be helpful in shaping effective strategies. The ADEPT (Association of Directors of Environment, Economy, Planning and Transport) digital connectivity working group provides one forum for this, as does the Digital Inclusion Network organised by the LGA.

4. Recommendations

Drawing our study's findings from the quantitative analysis of the links between digital infrastructure and disadvantage and the qualitative findings from consultations, we offer the following recommendations for the UK Government, for the LGA and for councils.

For the UK Government:

- **Clarify ministerial and executive leadership on digital inclusion, bearing in mind the cross-cutting nature of this issue.**
 - It is widely recognised that tackling digital exclusion effectively can make an important contribution to various national policy objectives, including improving economic activity rates, improving the efficiency of public service delivery, reducing pressures on the health and social care system and improving health outcomes, and widening the pool of talent available to digital industries.
 - However, it is an issue that spans several different departments and it is not currently clear who, if anyone, at ministerial and senior officer level has responsibility for coordinating the UK Government's approach. Clarifying this leadership would be helpful in ensuring that the resources applied to digital inclusion efforts are used as effectively and efficiently as possible.
- **Create and maintain a new framework with national-level guidance, resources and tools that support local digital inclusion initiatives, replacing the Digital Inclusion Strategy of 2014.**
 - The current UK Digital Inclusion Strategy dates from 2014 and does not now appear to be actively shaping local approaches. However, the fundamental nature of the barriers to digital inclusion are similar throughout the UK and national-level frameworks and guidance could and should play a part in optimising the effectiveness of digital inclusion initiatives.
 - Councils are well-placed to help tackle digital exclusion and are keen to continue playing a major role in doing so, but severe funding pressures make it difficult to protect non-statutory activities. They need support from central government to ensure that local digital inclusion initiatives are continued and enhanced.
 - A new framework could objectively assess and provide guidance on best practice in this area, for example in partnering approaches, how best to

integrate digital inclusion with other local strategies, and how to leverage PSTN switch-off as a digital inclusion opportunity. Alongside national charities such as Good Things Foundation, it could also provide a means through which councils could easily draw on nationally-provided resources such as skills development materials, agreements with suppliers for software licensing on refurbished council equipment, special connectivity offers for disadvantaged groups etc.

- **Develop mechanisms for more effective cross-department coordination in tackling digital exclusion.**
 - Departments with an active interest in improving digital inclusion include¹⁴ DCMS (e.g. in digital infrastructure coverage and take-up, and skills supply for digital industries), DHSC (e.g. in improving the use of digital channels for access to health services, and exploiting telecare and telehealth), DfE (e.g. in digital skills and resources for children and adults), DWP (e.g. in digital skills and resources for job-seekers and benefits claimants), DLUHC (e.g. in improving efficiency of council service delivery and council support for vulnerable groups), and BEIS (e.g. in digital upskilling for small businesses).
 - Developing more explicit and effective mechanisms for coordinating departments' efforts in these areas should help to reduce duplication and to improve the synergies between activities (for example ensuring that initiatives around improving access to devices and/or connectivity are complemented with help on digital skills).

For the LGA:

- **Continue to facilitate the sharing of good practice and lessons learned between councils, and seek to ensure that these are widely disseminated beyond the attendees of specific events.**
 - The LGA's Digital Inclusion Network and the ADEPT digital connectivity working group already provide useful channels for sharing good practice between councils. However, there remains scope for ensuring that the information from events is disseminated as effectively as possible, and for engaging more people from more councils in digital inclusion knowledge sharing (potentially including the greater exploitation of interactive and searchable online collaboration tools such as channels on Slack or Microsoft Teams).

¹⁴ DCMS = Department for Digital, Culture, Media and Sport; DWP = Department for Work and Pensions; DHSC = Department for Health and Social Care; DfE = Department for Education; DLUHC = Department for Levelling Up Housing and Communities; BEIS = Department for Business, Energy and Industrial Strategy

- **Consider making an online digital inclusion dashboard tool available to councils, such that they can benchmark their areas' position relative to their peers by various relevant metrics.**
 - LGA provides access to many datasets relevant to councils through its [LG Inform](#) platform. We would suggest that the LGA should review what digital-related metrics are included in LG Inform (bearing in mind the quantitative analyses presented in section 2 of this report), consider whether a 'Digital' or 'Digital Inclusion' key topic should be introduced to make accessing digital-relevant metrics easier, and consider whether providing a visual depiction of a selected council's position relative to its peers across a curated and normalised set of key metrics would be helpful (similar to Office for Health Improvement & Disparities' [local authority health profiles](#) or the regional digital tech ecosystem box plots presented in a [recent report for DCMS](#)).

For councils:

- **Clarify the cabinet and senior executive leadership on digital inclusion, and ensure that the respective leadership roles of county and district councils are clear in two-tier areas.**
 - In many councils there is no clear single lead on digital inclusion at cabinet and/or senior officer level. Where this is the case, clarifying this leadership would be helpful in driving forward the development of the council's digital inclusion approach and in facilitating improved coordination in this area across the relevant directorates (see below).
 - In two-tier areas, councils should ensure that there is clear agreement on the respective roles for district and county councils regarding digital inclusion, and ensure effective information-sharing between the councils re their current and planned initiatives.
- **County/unitary councils or combined authorities should lead development of a local digital inclusion strategy (in collaboration, as appropriate, with district councils and Integrated Care Partnerships) where there is not already one in place.**
 - The development and maintenance of an explicit digital inclusion strategy (whether standalone, or as part of a wider digital strategy) can be helpful in stimulating discussions between council directorates and with external partners on areas of mutual interest, in ensuring that limited resources are targeted as effectively as possible on the area's digital inclusion priorities, and in identifying and securing external funding.

- Given the respective roles of the different types of councils we suggest that the development of such a strategy may best be led by county/unitary councils or combined authorities, while closely including district councils, Integrated Care Partnership stakeholders and other partners in the strategy development process.
- **Embed digital inclusion throughout the council's other strategies, as a means of helping to deliver their intended outcomes.**
 - The point was made in our consultations that digital inclusion efforts need to be woven through the core services of councils and their partners (including VCS organisations and Integrated Care Partnerships) for them to be truly sustainable. Critically, digital inclusion should be positioned as a means through which the intended outcomes of these partners and strategies can be better realised, rather than as another 'ask'.
 - This should help identify opportunities for leveraging existing funding sources from various areas in tackling digital exclusion.
 - While improving digital inclusion is a priority, recognition also needs to be given in these strategies to the importance of ensuring that local services should not become impossible or very difficult to access for the minority who choose not to use the internet.
- **Build capacity in the council's frontline staff and in partner VCS organisations for recognising where digital exclusion is a problem and in helping service users improve their digital inclusion where appropriate.**
 - The front-line staff of councils and their VCS partners have day-to-day contact with people who may be digitally excluded, and initiatives to tackle digital exclusion can be woven into these interactions. However, this requires capacity-building to help staff recognise situations where digital exclusion may be an issue for a service user, and on how they could most effectively be helped.
- **Establish mechanisms for cross-directorate information sharing and coordination in digital inclusion initiatives.**
 - Aspects of digital exclusion are typically being addressed to some extent in several different functional areas across a council, but there is not always much or any coordination between these, to optimise the effectiveness and efficiency of their collective efforts. As with our above recommendation re improved inter-departmental working at central government level, improved coordination and information-sharing across

council directorates would help improve the effectiveness and efficiency of the delivery of digital inclusion activities.

- **Ensure that national-level resources are effectively leveraged for local benefit.**
 - Various relevant national-level resources are already offered by the Good Things Foundation, government departments, and industry players such as telecoms operators and equipment providers; and this study calls for the UK Government to develop a new framework with national-level guidance, resources and tools that support local digital inclusion initiatives. Councils should seek to ensure that they and their VCS partners are fully aware of what national-level resources are available to support digital inclusion, and that they leverage them appropriately. For example, councils could help raise awareness amongst eligible service users of the low-cost [‘social tariffs’](#) now available from many broadband providers.

Annex A: Variables included in the data analysis

Connectivity variables

Fixed/mobile	Geographic level	Variable		
Mobile	District/unitary LA	4G_prem_in_>=1		
		4G_prem_in_4		
		4G_geo_out_4		
		4G_abrd_in_4		
		Voice_prem_in_>=1		
		Voice_prem_in_4		
		Voice_geo_out_4		
		Voice_abrd_in_4		
		Fixed	District/unitary LA; OA; LSOA; MSOA; county/unitary LA, ITL3	SFBB availability (% premises)
				UFBB availability (% premises)
Full Fibre availability (% premises)				
Gigabit availability (% premises)				
% of premises unable to receive 10 Mbps				
District/unitary LA; OA	Median upload speed (Mbps)			
	Median download speed (Mbps)			
	District/unitary LA; OA; LSOA; MSOA; county/unitary LA, ITL3		Average upload speed (Mbps)	
Average download speed (Mbps)				
% lines >=30 Mbps				
Lines per 100 premises				
Growth % in total lines 2018-2022				
Growth % in total lines 2019-2022				
Growth % in total lines 2020-2022				
Growth % in total lines 2021-2022				
Growth % in total lines 2018-2021				
Growth % in total lines 2019-2021				
Growth % in total lines 2020-2021				
Growth % in total lines 2018-2020				
Growth % in total lines 2019-2020				
Growth % in total lines 2018-2019				

Socio-economic variables

Data source	Geographic level	Variable
ONS Population Estimates	OA	Proportion of population aged 0-15 in 2020
		Proportion of population aged 16-24 in 2020
		Proportion of population aged 25-49 in 2020
		Proportion of population aged 50-64 in 2020
		Proportion of population aged 65+ in 2020
		Proportion of population - female in 2020
Census 2021	OA	% Asian, Asian British or Asian Welsh 2021
		% Black, Black British, Black Welsh, Caribbean or African 2021
		% Mixed or Multiple ethnic groups 2021
		% White 2021
		% Other ethnic group 2021
		% Non-White 2021

Data source	Geographic level	Variable
		% One person household: Aged 66 years and over in 2021
		% One person household: Other in 2021
		% Single family household: All aged 66 years and over in 2021
		% Single family household: Married or civil partnership couple: No children in 2021
		% Single family household: Married or civil partnership couple: Dependent children in 2021
		% Single family household: Married or civil partnership couple: All children non-dependent in 2021
		% Single family household: Cohabiting couple family: No children in 2021
		% Single family household: Cohabiting couple family: With dependent children in 2021
		% Single family household: Cohabiting couple family: All children non-dependent in 2021
		% Single family household: Lone parent family: With dependent children in 2021
		% Single family household: Lone parent family: All children non-dependent in 2021
		% Single family household: Other single family household in 2021
		% Other household types: With dependent children in 2021
		% Other household types: Other, including all full-time students and all aged 66 years and over in 2021
		% Households not deprived in any dimension in 2021
		% Households deprived in one dimension in 2021
		% Households deprived in two dimensions in 2021
		% Households deprived in three dimensions in 2021
		% Households deprived in four dimensions in 2021
IMD 2019	LSOA	Overall IMD Rank
		IMD Rank - Income
		IMD Rank - Employment
		IMD Rank - Education, Skills and Training
		IMD Rank - Health
		IMD Rank - Crime
		IMD Rank - Barriers to Housing and Services
		IMD Rank - Living Environment
BRES Employment	LSOA	Employment 2018
		Employment 2019
		Employment 2020
		Employment 2021
		Employment growth % 2018-2021
		Employment growth % 2019-2021
		Employment growth % 2020-2021
		Employment growth % 2018-2020
		Employment growth % 2019-2020
		Employment growth % 2018-2019
		Employment LQ in 2021 - A : Agriculture, forestry and fishing
		Employment LQ in 2021 - B : Mining and quarrying
		Employment LQ in 2021 - C : Manufacturing
		Employment LQ in 2021 - D : Electricity, gas, steam and air conditioning supply
		Employment LQ in 2021 - E : Water supply; sewerage, waste management and remediation activities
		Employment LQ in 2021 - F : Construction
		Employment LQ in 2021 - G : Wholesale and retail trade; repair of motor vehicles and motorcycles
		Employment LQ in 2021 - H : Transportation and storage
		Employment LQ in 2021 - I : Accommodation and food service activities
		Employment LQ in 2021 - J : Information and communication
		Employment LQ in 2021 - K : Financial and insurance activities

Data source	Geographic level	Variable
UK Business Counts Local Units MSOA		Employment LQ in 2021 - L : Real estate activities
		Employment LQ in 2021 - M : Professional, scientific and technical activities
		Employment LQ in 2021 - N : Administrative and support service activities
		Employment LQ in 2021 - O : Public administration and defence; compulsory social security
		Employment LQ in 2021 - P : Education
		Employment LQ in 2021 - Q : Human health and social work activities
		Employment LQ in 2021 - R : Arts, entertainment and recreation
		Employment LQ in 2021 - S : Other service activities
		Local Units 2018
		Local Units 2019
		Local Units 2020
		Local Units 2021
		Local Units 2022
	Local Units growth % 2018-2022	
	Local Units growth % 2019-2022	
	Local Units growth % 2020-2022	
	Local Units growth % 2021-2022	
	Local Units growth % 2018-2021	
	Local Units growth % 2019-2021	
	Local Units growth % 2020-2021	
	Local Units growth % 2018-2020	
	Local Units growth % 2019-2020	
	Local Units growth % 2018-2019	
DfE Key Stage 4 Attainment (by pupil residence)	District/unitary LA	Average attainment 8 score in 2021/22
ONS Sub-regional GVA	District/unitary LA	GVA (million) at current basic prices 2018 GVA (million) at current basic prices 2019 GVA (million) at current basic prices 2020 GVA growth % 2018-2020 GVA growth % 2019-2020 GVA growth % 2018-2019
Annual Population Survey	District/unitary LA	Economic activity rate of people aged 16-64 (total) for 2018 Economic activity rate of people aged 16-64 (total) for 2019 Economic activity rate of people aged 16-64 (total) for 2020 Economic activity rate of people aged 16-64 (total) for 2021 Economic activity rate of people aged 16-64 (males) for 2018 Economic activity rate of people aged 16-64 (males) for 2019 Economic activity rate of people aged 16-64 (males) for 2020 Economic activity rate of people aged 16-64 (males) for 2021 Economic activity rate of people aged 16-64 (females) for 2018 Economic activity rate of people aged 16-64 (females) for 2019 Economic activity rate of people aged 16-64 (females) for 2020 Economic activity rate of people aged 16-64 (females) for 2021 Unemployment rate of people aged 16-64 (total) for 2018 Unemployment rate of people aged 16-64 (total) for 2019 Unemployment rate of people aged 16-64 (total) for 2020 Unemployment rate of people aged 16-64 (total) for 2021 Unemployment rate of people aged 16-64 (males) for 2018 Unemployment rate of people aged 16-64 (males) for 2019

Data source	Geographic level	Variable
		Unemployment rate of people aged 16-64 (males) for 2020
		Unemployment rate of people aged 16-64 (males) for 2021
		Unemployment rate of people aged 16-64 (females) for 2018
		Unemployment rate of people aged 16-64 (females) for 2019
		Unemployment rate of people aged 16-64 (females) for 2020
		Unemployment rate of people aged 16-64 (females) for 2021
		% aged 16-64 who are EA core or work-limiting disabled - 2018
		% aged 16-64 who are EA core or work-limiting disabled - 2019
		% aged 16-64 who are EA core or work-limiting disabled - 2020
		% aged 16-64 who are EA core or work-limiting disabled - 2021
		Economic activity rate of people aged 16-64 (EA core or work-limiting disabled) for 2018
		Economic activity rate of people aged 16-64 (EA core or work-limiting disabled) for 2019
		Economic activity rate of people aged 16-64 (EA core or work-limiting disabled) for 2020
		Economic activity rate of people aged 16-64 (EA core or work-limiting disabled) for 2021
		Unemployment rate of people aged 16-64 (EA core or work-limiting disabled) for 2018
		Unemployment rate of people aged 16-64 (EA core or work-limiting disabled) for 2019
		Unemployment rate of people aged 16-64 (EA core or work-limiting disabled) for 2020
		Unemployment rate of people aged 16-64 (EA core or work-limiting disabled) for 2021
		Economic activity rate of people aged 50+ (total) for 2018
		Economic activity rate of people aged 50+ (total) for 2019
		Economic activity rate of people aged 50+ (total) for 2020
		Economic activity rate of people aged 50+ (total) for 2021
		Unemployment rate of people aged 50+ (total) for 2018
		Unemployment rate of people aged 50+ (total) for 2019
		Unemployment rate of people aged 50+ (total) for 2020
		Unemployment rate of people aged 50+ (total) for 2021
		% of ethnic minority aged 16+ for 2021
DfT Road Traffic Statistics	County/unitary LA	Motor vehicle traffic (vehicle miles) - 2018
		Motor vehicle traffic (vehicle miles) - 2019
		Motor vehicle traffic (vehicle miles) - 2020
		Motor vehicle traffic (vehicle miles) - 2021
		% growth in motor vehicle miles 2018-2021
		% growth in motor vehicle miles 2019-2021
		% growth in motor vehicle miles 2020-2021
		% growth in motor vehicle miles 2018-2020
		% growth in motor vehicle miles 2019-2020
		% growth in motor vehicle miles 2018-2019
ONS Internet Users	ITL3	% 16+ who have used the internet in the last 3 months - 2018
		% 16+ who have used the internet in the last 3 months - 2019
		% 16+ who have used the internet in the last 3 months - 2020

Annex B: Consultees

We are grateful to the following people who were consulted in the course of this study:

Table B-1: Consultees

Consultee	Role	Organisation
Chris Fridlington	Assistant Director, Development & Planning	Bolsover District Council
Laura Khella	Commissioning and Contracts Officer	Bolsover Partnership
Jesam Eyong	Head of Public Sector Engagement, Barrier Busting Taskforce	DCMS
Richard Keyte	Lead Analyst, Demand-Side Products	DCMS/BDUK
Keri Denton	Head of Economy, Enterprise and Skills	Devon County Council
Debbie Stafford	Senior Economic Development Officer - Youth and Inclusion	Devon County Council
Alex Mather	Head	Digital Connectivity Forum
Mark Hawthorne	Leader	Gloucestershire County Council
Helen Milner	Group CEO	Good Things Foundation
Jason Tutin	Digital Inclusion Manager	Leeds City Council
Geoff Connell	Director of IT and Chief Digital Officer	Norfolk County Council
Ceren Clulow	Digital Connectivity Manager	Nottinghamshire County Council

We are also grateful to the stakeholders who participated in a conference call in December 2022, in which our study's draft findings and recommendations were tested.