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Transforming Business and Society

dot.rural
Transformation through Digital Innovation

# Two-Speed Britain: Rural and Urban Internet

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# Contents

# Two Speed Britain: Rural Internet Use

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There is a digital divide that separates urban and rural areas in Britain. The quality of Internet connection varies depending on geography, leaving many rural areas with a fraction of the service that is enjoyed in urban areas. By systematically analysing data produced by the RCUK Digital Economy Research Hub at the University of Aberdeen and the Oxford Internet Institute, this report is the first detailed study highlighting the constraints that "deep rural" communities face when trying to use the Internet, and the impact of a divide which is not only stark, but likely to grow as broadband speeds in well-connected areas increase at a faster rate than in rural Britain.

## BACKGROUND

The regulator Ofcom says that Superfast broadband of at least 30Mbps is available to 78% of the UK population over the age of 14. But while it is generally understood that quality of Internet access varies between urban and rural areas, the true nature of this divide may be under-estimated. Approximately 48.4 million people in the UK – or 80.7% of the population – are based in urban areas, and the definition of a "rural" area can include communities close to urban centres as well as those far from them.

By separating the 11.6 million people in rural communities into "shallow" and "deep" rural, this report sheds more light on a group of 1.3 million people that are "digitally excluded" by their location. Many of these areas struggle to receive 3G and 4G mobile reception, and some do not have access to a broadband connection stronger than 2Megabits (Mbits/s). In an era in which services are moving online, this can have a marked social and economic impact.

## FINDINGS

- Superfast broadband (30+Mbits/s) was not available to any of the deep rural respondents sampled in a survey of 1090 rural residents across Britain.
- The highest broadband speed in any of the sampled deep rural areas, 17.4Mbits/s, was lower than the average speed for the urban areas.
- 48% of Internet users in deep rural areas and 36% in shallow rural areas, who had speeds of 3.5Mbits/s or less, believed their connection was too slow.
- Those with connection speeds of less than 3.5Mbits/s were less likely to try "data-heavy" activities such as streaming, gaming, and creation of content such as video. They were also less likely to get involved in social networking online.
- As urban areas receive faster speeds, the "speed gap" between urban and deep rural areas that have not yet received an adequate connection is likely to continue to widen.
- Poor connection has an impact on businesses, from creative businesses unable to create and send video and music for clients, to farmers unable to complete online forms, cattle passports and registrations.
- It also affects the Government's aim to make certain services "Digital by Default" and the "universal" broadband target of 2Mbits/s is inadequate for this to work.
- Young people can feel excluded from peer groups who have better connections, especially after becoming accustomed to faster connection at school or university. Older people are also excluded from the connections they can find in social networking, and the savings from shopping online.
- These issues can have a sizeable impact on poorly-connected rural areas, including the loss of businesses, failure to attract new businesses, and increased household or business costs. They can also contribute to the loss of young people from rural areas and deter people from moving in.

## CONCLUSION

The gap between the service provided to urban and remote rural areas will become an increasingly significant problem for communities that find themselves with limited or non-existent connections, as digital services take on a more prominent role in our society. The UK's rural areas are now at a "tipping point", to which poor digital connection is contributing. Poorly-connected "deep rural" communities will suffer increased costs, economic disadvantage and a population drain if services are not improved. The Governments' commitments to making some services "digital by default" will not be feasible when some areas struggle for connection of 2Mbit/s or less. It is recognized that state intervention in infrastructure provision is constrained by EU competition law, and that state-supported rural broadband rollout will help in the short term, but the report recommends that the interfaces between public, private and community sectors be improved, led by governments, to improve collaborative working and information flows to help find suitable solutions for this issue, and to further improve speeds in deep rural areas.

# 1. Introduction

It is widely understood that an urban-rural digital divide exists, and this is supported by study of the geography of telecommunication services in Great Britain (Ofcom 2013a, 2013b). This divide is related to the consequences of differing speeds of connection to the Internet in different areas. Nevertheless, studies based on survey research of individuals and households in the UK have not been able to document an urban-rural divide (e.g., Dutton and Blank 2011).

A large majority of the British population – 81% or almost 48.4 million people – live in urban areas and any surveys that proportionally sample urban and rural households might not incorporate a large enough number of rural households in the total sample to be able to look meaningfully for urban-rural patterns in Internet use. Furthermore a simple 'urban' and 'rural' sampling frame overlooks the fact that rural Britain is not homogenous: there are considerable differences between the characteristics of the more accessible, or 'shallow rural' (close to urban areas) and remote, or 'deep rural' areas. Remoteness in particular introduces specific challenges to the development of infrastructure, be it transport or the communications infrastructure required to be able to use the Internet.

Differences in Internet use between different types of geographical areas that have been identified in earlier research have been marginal, or could be explained by controlling for other factors (also related, in part, to geography), such as age and socioeconomic status. Such null findings have led to a relative neglect of research with an explicit aim to find systematic evidence of an urban-rural digital divide, to substantiate abundant anecdotal evidence – such as that presented in the illustrative case vignettes in Section 4 of this report – of such a divide.

**Table 1.1: Selected attributes of the British rural population**

| | England | Wales | Scotland |
|---|---|---|---|
| **Total population** | c. 51.8 million | c. 3 million | c. 5.2 million |
| **Rural population** | 18.6% | 18.4% | 33.9% |
| **'Remote' or 'sparse' rural population** | 1.2% | 2.4% | 6.5% |
| **% of land area defined as rural** | 79.1% | 94% | 87% |
| **% land area defined as 'remote' or 'sparse' rural** | 15.3% | 68.8% | 59.9% |

Derived from population estimates contained in Pateman (2011) derived from mid-2009 population estimates.

Opposite: Photo courtesy of Dr Lorna Philip; not to be reused without prior permission.

Approximately 19.3% of the British population – c. 11.6 million people – live in areas defined by the Government as being 'rural'[1] (Pateman, 11). Although a minority of the British population, the rural population is a very sizeable minority whose characteristics, we argue, should not be overlooked. As reported in Table 1.1 there are marked differences between England, Wales and Scotland masked by the British average. Of particular importance in terms of infrastructure provision, including the ICT infrastructure necessary to facilitate Internet connectivity, is the proportion of the total land area defined as rural and that defined as remote rural. To date, the digital connectivity experienced by the c. 1.3 million people who live in the 'remote' and 'sparse' rural areas that comprise such a large proportion of the British land area is inferior to that serving the larger numbers of people who live in a much smaller proportion of the land area.

In the research reported here we have systematically examined the attributes of urban, 'shallow rural' and 'deep rural' areas (deriving 'deep' and 'shallow' rural from officially defined 'rural' classification systems) and, for the first time for research concerned with Internet use, have explored characteristics of the (sizeable) minority of the British population who live dispersed across the vast majority of the British land area.

A key focus of the 2013 Oxford Internet Survey (Oxford Internet Institute, 2013) was to address this lack of strong evidence about the urban-rural divide in Britain. Specifically, a stratified survey sample was designed, which included a disproportionately larger number of rural residents, so that any real urban-rural patterns could be identified. This sample allowed crucial distinctions to be made not only between urban and rural areas, but also between 'deep' and 'shallow' rural areas ('deep' rural areas are more remote and more sparsely populated, as described in detail below).

This report draws upon analysis of data produced as the outcome of a partnership between the Oxford Internet Institute (OII) and the RCUK Digital Economy Research Hub (dot.rural) at the University of Aberdeen. OII's authoritative biennial survey of Internet use, the Oxford Internet Survey (OxIS) (part of the World Internet Project) identifies and explores new trends in Internet use across Britain (http://microsites.oii.ox.ac.uk/OxIS/). Dot.rural's research focuses on the use of digital technologies in transformative change in rural Britain's society and economy (www.dotrural.ac.uk). This collaborative research partnership enabled the disproportionately boosted rural sample for the OxIS 2013 survey, which was critical to discovering the differences identified in this survey.

## 1.i Background Context

Much has been written and said in academic and policy domains, as well as in day-to-day discourses of communities in rural Britain, about the potential for digital technology to play a key role in achieving a more sustainable and resilient rural society and economy (e.g., Department of Culture, Media and Sport 2009). However, sample surveys of UK adults have not identified a strong urban-rural divide (e.g., Dutton and Blank 2011, 2013), and differences can be explained in part by other factors that are related to urban-rural life differences, such as age, income, and educational experience.

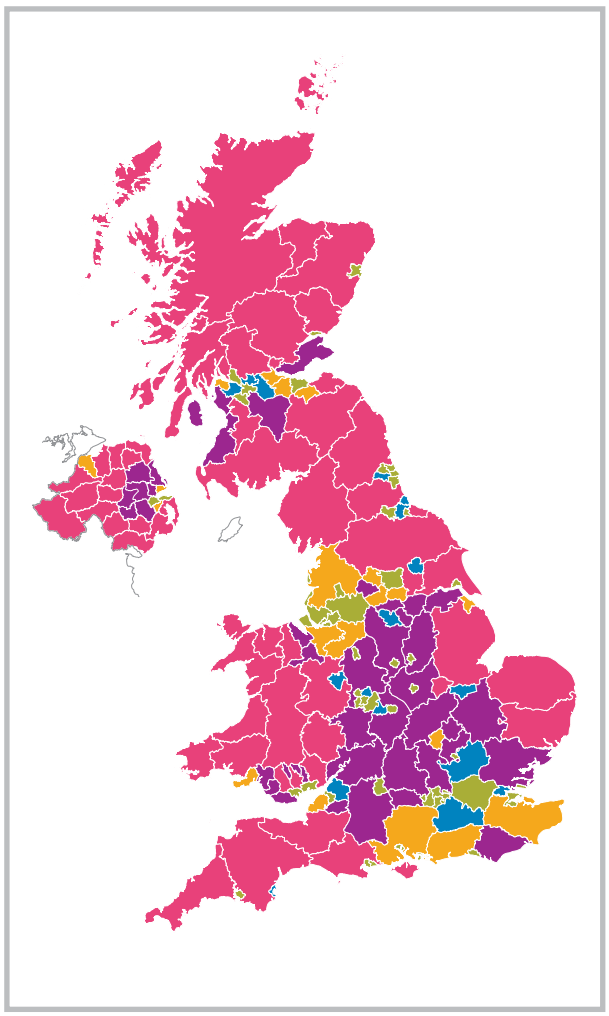
If conventional wisdom is correct – and as demonstrated in the illustrative examples from research conducted in various projects funded recently by the RCUK Digital Economy Research Hub presented in this report – a sizeable minority of rural residents cannot participate fully in the digital economy and society that is enjoyed by the majority of residents in Britain, where 78 percent of adults aged 14 and over have access to the Internet. If incorrect, however, a great deal of resource and effort in public and/or private sectors could be wasted in trying to close a divide that does not exist, such as by investing in unnecessary infrastructure projects. Clearly it is important to have more definitive information on the existence of any urban-rural digital divide, and what it might mean for those who may be experiencing it. A recent study of communication infrastructures and services in the UK, based on industry data assembled by the communications regulator, Ofcom, shows generally less availability of high speed broadband and mobile phone networks in rural areas compared with urban areas across the UK. The local authority level maps available on Ofcom's website to visualize the ICT infrastructure data they hold show that 3G mobile phone coverage and fast, reliable broadband coverage is very poor across large swathes of northern and southern Scotland, northern England, East Anglia, south-west England, and Wales (Ofcom 2013a, b) – reproduced as Map 1.1. While the three maps conceal large variations in connectivity they usefully highlight regional variations.

[1] See Appendix 1 for details about the different government urban-rural definitions used for England, Wales and Scotland.

## 1.ii A Rural Focus

An 'urban-rural digital divide' in the availability and up-take of digital technologies and services, particularly broadband Internet access and use, is the product of both infrastructure and socio-economic capabilities. (Hindman, 2000; Furuholt and Kristainsen, 2007). The technical, infrastructure divide has been the focus of UK government-led initiatives (in England, Wales and Scotland) which, in partnership with Internet Service Providers (ISPs), such as the dominant provider, BT, are rolling out broadband infrastructures to rural areas, but not of an equivalent capacity to that installed in more densely populated urban areas. One consequence is that the available speeds, especially in the rural (and most especially in the more remote and more sparsely populated) areas, are often low in comparison with those available, and being deployed, in urban areas. It is natural that market forces will tend towards this situation, but it means that the rural-urban digital divide in terms of access to broadband speeds in excess of 2Mbit/s (let alone the 10 to 30Mbit/s regarded increasingly as a basic requirement for effective digital participation) is increasing, and is likely to continue to do so: the 'faster' areas with better connection are getting 'faster, faster'. The implications for rural users of such differences in speed are the focus of the analysis presented in Section 2.

This geographical digital divide is being addressed through a variety of approaches and policy initiatives including large-scale deployments of high speed broadband through the Broadband UK (BDUK) programme. Current UK Government policy includes, for example, a commitment to provide superfast broadband to at least 90% of premises in the UK, to ensure universal access to standard broadband of at least 2Mbit/s, and funding to provide mobile phone coverage to the 0.3% of premises in the UK that are not currently served at all by a mobile phone operator (Ofcom, 2013b). Current commitments to roll out superfast broadband exclude as much as 10% of the UK population, in the region of 6.5 million people. In some rural areas, communities have organised themselves and raised the funds to develop their own broadband infrastructure: such bottom-up activity is exemplified by the activities of community enterprises such as Cybermoor in Cumbria, B4RN (Broadband For the Rural North, which is deploying connection with 1Gbit/s capability) in north-west England and B4GAL (Broadband for Glencaple and Lowther) in south-central Scotland. Vignette number 5 in Section 4 illustrates how feeling 'badly served' by low speed Internet led to some individuals becoming involved with the B4RN community broadband project.



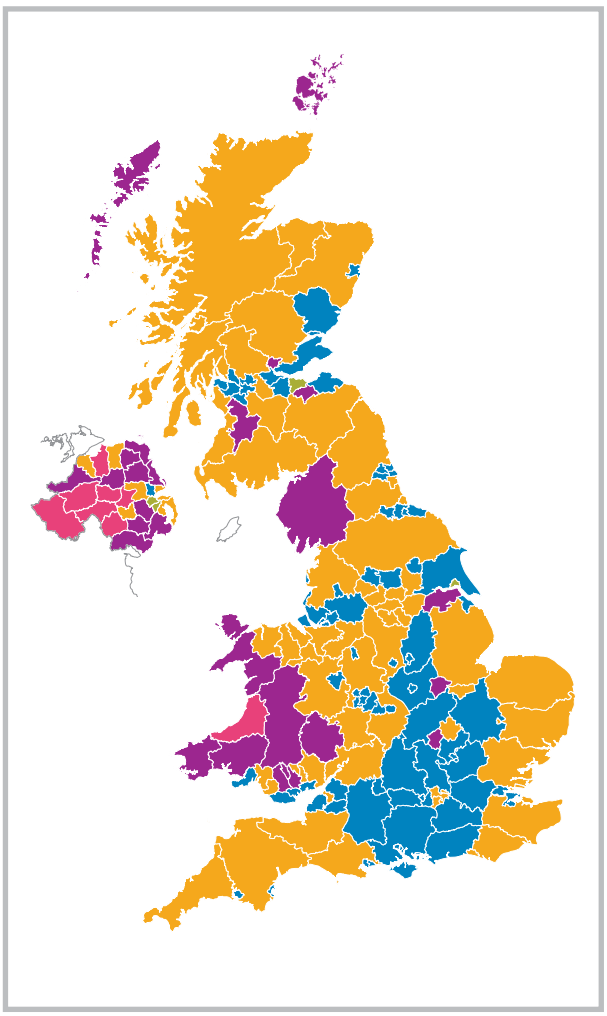
## Map 1.1: Territorial Coverage of 3G Mobile Services in the UK

The % of premises at which all operators have 3G coverage (outdoor reception). Data published November 2013.

3G coverage by premises.

Each area has been ranked from 1 to 5 on the level of mobile coverage.

1. 95% or more
2. 90% - less than 95%
3. 80% - less than 90%
4. 60% - less than 80%
5. less than 60%



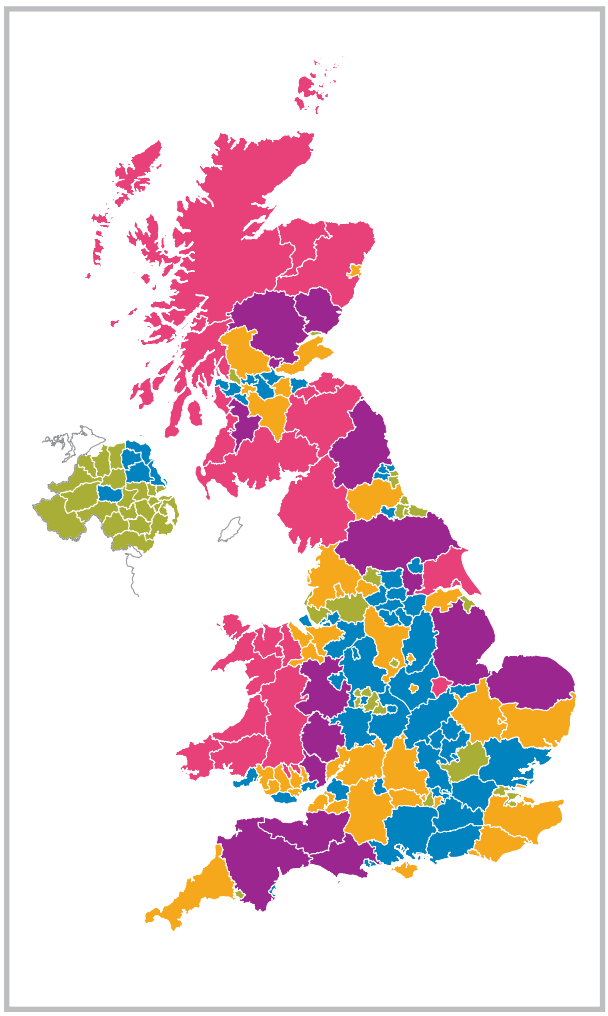
## Map 1.2: Territorial Coverage of Broadband Connections of Less than 2.2Mbit/s in the UK

The percentage of broadband connections that have sync speeds of less than 2.2Mbits/s. Data published November 2013.

Percentage receiving less than 2.2Mbit/s.

Each area has been ranked from 1 to 5 on the percentage of broadband connections that have modem sync speeds of less than 2.2Mbit/s.

1. less than 5%
2. 5% - less than 10%
3. 10% - less than 15%
4. 15% - less than 20%
5. 20% or more



## Map 1.3: Territorial Coverage of Superfast Broadband Availability in the UK

The % of residential and non-residential premises where either Virgin Media cable, Openreach Fibre to the Cabinet or Digital Regional networks (superfast broadband) is available. Data published November 2013.

Superfast broadband availability.

Each area has been ranked from 1 to 5 on the percentage of residential and non-residential premises where either Virgin Media cable, Openreach Fibre to the Cabinet or Digital Region networks are available.

1 90% availability or more

2 70% - less than 90%

3 50% - less than 70%

4 30% - less than 50%

5 less than 30%

Ofcom (2014b) reported that UK average broadband speed in November 2013 was 17.8Mbit/s, up from 11.1Mbit/s in November 2008. This increase is largely due to the take up of 'superfast' (30Mbit/s or higher) services, and ISPs upgrading customers to faster broadband packages. In May 2010, the headline speed of 76% of UK residential broadband connections was 'up to and including 8Mbit/s to 10Mbit/s' and no residential connections were 30Mbit/s or higher. In November 2013 the proportions were 11% and 25% respectively (Ofcom, 2014b). However, despite the overall picture being one of residential customers having faster broadband over this time period, the gap between average download speeds in urban and rural areas is marked and was reported to have widened from 9.5Mbit/s in May 2011 to 16.5Mbit/s in May 2013 (Ofcom, 2013a). Average urban speed in May 2013 was 26.4Mbit/s, and average 'suburban' speed was 17.9Mbit/s. Contrast these figures with the average rural speed, cited as 9.9Mbit/s (ibid.). This widening of the urban-rural gap is claimed to be due to: "the lower availability of superfast broadband services in rural areas compared to urban areas, and because ADSL broadband speeds are also generally slower in rural areas because the average line between the home and the nearest telephone exchange needs to be longer[2]. Broadband speeds are also generally slower in rural areas because the average line between the home and the nearest telephone exchange needs to be longer" (Ofcom, 2013a:3).

Ofcom expect that this gap will widen in the short term, but that it will "begin to decline over time, as the availability of superfast broadband increases in rural areas" (Ofcom ibid). Overall, Ofcom note that: "The availability and speed of fixed broadband Internet access is subject to much greater variation [than fixed telephony and postal services, and digital terrestrial television]…partially because of variability in the speed provided by current generation broadband, and partially because the deployment of superfast broadband is still underway, especially in more rural areas…. [and] the same is true of mobile services…" (Ofcom 2013b).

Section 3 of this report considers attributes of the ICT infrastructure, with a specific focus on broadband speeds as publicised by Ofcom, and explores how the infrastructure capability affects Internet use.

Against this digital landscape, rural areas in Britain have, in recent decades, changed, and are still changing, in several fundamental ways. There are well-established movements of people in and out of rural areas. For example, younger age groups are moving from rural to urban areas, and middle aged and older residents from urban to rural areas. Some rural areas have witnessed a 'population turnaround' whereby the population decline evident since the latter decades of the nineteenth century has been reversed, but others remain areas of long term population loss. Incomers to many rural areas often have above-average educational qualifications and wealth. A demographically ageing rural population is resulting from sustained out-migration of young adults, ageing of pre-existing, long term residents and the ageing of those who move into rural areas in mid or later life (Philip et al 2012). These ageing trends add resource, service delivery and staffing challenges to public sector services in particular. Innovative solutions to these challenges often rely on new ICT applications which cannot be deployed in areas with poor digital infrastructure capability.

A further consequence of these population movements is the isolation that can often result from ageing, especially as other family members are likely to be located more distantly. Working from home, either as a 'removed' person within a business or institution located elsewhere, or as a local producer of physical or (especially) digital products becomes increasingly difficult or non-viable without a good Internet connection. Participation in globalising markets poses particular challenges for small rural businesses. Even downloading and installing the software that (urban) clients require the (rural) producer to use, as a condition of business, can be either impossible or extremely time-consuming.

Moreover, participation in many day-to-day activities, from education to civic society, to retail shopping and professional services such as banking, is increasingly associated with online delivery. Thus, exclusion from digital connections implies exclusion from a wide range of activities regarded as normal in a networked society. Compounding this issue is the fact that those in rural Britain who are most disadvantaged are least likely to be connected (Royal Society of Edinburgh 2010), presenting a further layer of exclusion within rural society. Section 4 presents case vignettes drawn

[2] (A)DSL – (Asymmetric) Digital Subscriber Line*: DSL lines use existing 2-wire copper telephone lines to carry digital data over the 'final mile' to the users' home / business premises. The length of the final mile copper connection determines the speed of the connection. A next generation of copper lines, ADSL lines, were introduced in the UK in 2000 but even on Very-high-bit-rate DSL download, speeds are compromised if the final mile exceeds 1.2km.

from research projects conducted under the auspices of the dot.rural Digital Economy Hub at the University of Aberdeen. These illustrative examples demonstrate both how important those who live in rural areas consider it is to be online, but also highlight the challenges, frustration and difficulties experienced by Internet users who live in rural areas.

The implications of territorial variations in digital infrastructure for those living, working, and running businesses in rural areas, and/or those visiting rural communities, are considerable in terms of rural social and economic development, sustainability and resilience. A move to on-line service delivery, such as banking, retail and Post Office services has contributed to service decline in rural areas. However, the impact of poor digital infrastructure and low connection speeds as a blocker to economic development is arguably more significant. If new and existing businesses, those with young families, those with greater educational experience, and those with incomes capable of adding to the economic base of rural areas, are not able to move into, or remain in, rural Britain, then the socio-economic and demographic sustainability and resilience of rural Britain will be further challenged.

For rural areas to respond effectively to the various challenges associated with an increasingly digital society, a better understanding of Internet use in urban and rural communities is required. The work reported here provides one of the first attempts to provide systematic survey evidence of Internet use across areas of rural Britain.

## 1.iii A 'Rural Boost' to OxIS 2013

In order to improve on past attempts to explore geographical patterns in Internet use across Britain, the Oxford Internet Survey in 2013 developed a disproportionate stratified sample that boosted the number of respondents from rural areas, aged 14 years or over.

By having more rural respondents than we would have from a strictly random sample, it is possible to have better, more statistically robust estimates of rural patterns, and to examine differences within rural areas. To that end, the sample was also stratified to ensure adequate numbers of respondents from deep and shallow rural areas.

## 1.iv Defining 'Deep' and 'Shallow' Rural Areas of the UK

There is no single accepted definition of 'rural' globally, across Europe or across Britain. The academic literature, for example, suggests that attempts to define 'rural' draw, variously, upon functional attributes, political economy approaches, and social representations (Cloke and Thrift, 1994), among other approaches. In government and across public policy (the most relevant to this context, as they comprise the framework within which digital infrastructure and applications operate), functional definitions of rural are common. Quantifiable attributes such as population size, density, proximity to urban centres, and land use, are variously combined to classify territorial units as small as census output areas or as large as local authority areas. (Appendix 1 provides further details on the government classifications currently in use across England, Wales and Scotland that have been used in this research). Official classifications, including those relied upon for this research, differentiate between different types of rural areas, making an important distinction between rural areas in close proximity to large urban centres, and those associated with more remote areas. In terms of digital infrastructure, it is the most remote, least densely populated areas that studies reported by, for example, Ofcom (2013b), identify as being most affected by the urban-rural digital divide. For the OxIS 2013 survey sample, in order to capture these most remote areas, we therefore move away from a simple urban-rural binary to employ three geographical categories: urban, shallow rural and deep rural. These were defined as follows: 'remote rural areas' and 'very remote rural areas'.

Urban

*Urban*
England and Wales: urban/rural classification categories 'urban – less sparse' and 'urban – sparse';
Scotland: urban/rural definition categories 'large urban areas' and 'other urban areas'.

*Shallow Rural*
England and Wales: urban/rural classification categories 'town & fringe – less sparse' and 'village, hamlet & isolated dwelling – less sparse';
Scotland: urban/rural definition categories 'accessible small towns' and 'accessible rural areas'.

*Deep Rural*
England and Wales: urban/rural classification categories 'town & fringe – sparse' and 'village, hamlet & isolated dwelling – sparse';

In order to provide a large enough response set for meaningful analysis of patterns between these three types of geographical area to be possible, rural areas were oversampled. The number of those sampled in both shallow and deep rural areas was higher than would have been drawn from a random sample that was designed to reflect the characteristics of the British population as a whole. However, our sampling strategy enables us to move from a main sample, drawn to represent the general population, to the boosted sample, depending on the type of analysis to be conducted (Table 1.2). Weighting of respondents enables us to use the boosted sample without distorting results for the population as a whole. The Oxford Internet Survey 2013 report (Oxford Internet Institute, 2013) contains further information about sampling.

### Table 1.2: Oxford Internet Survey 2013 sample size: main and boost

| | Main Sample | Boosted Sample | Total |
|---|---|---|---|
| **Deep rural** | 32 | 232 | 264 |
| **Shallow rural** | 454 | 372 | 826 |
| **Urban** | 1567 | 0 | 1567 |
| Total | 2053 | 604 | 2657 |

Derived from population estimates contained in Pateman (2011) derived from mid-2009 population estimates.

In numerical terms the boosted deep rural sample represents 1.3 million residents in Scotland, Wales and England and covers in the region of 50% of the British land area. The shallow rural sample represents approximately 10.3 million people.

This report presents data from the 2013 Oxford Internet Survey for the three urban, shallow rural and deep rural areas. A geographical weighting has been applied throughout for the analysis reported in Sections 2 and 3. The data were weighted to allow for the disproportionate sampling of urban, shallow rural and deep rural populations. All survey estimates are calculated using the weighted data so that averages are weighted averages and percentages are weighted percentages. In essence, this means that we can be sure that any differences observed between the three geographical area types are true differences, and where they are identified as being statistically significant we have used the 95% confidence limit throughout.

In order to reproduce population proportions we used post-stratification weighting based on gender, age, ACORN type, region, number in household, and urban/rural. We used two different weights. WALL, a mnemonic for 'weight all', weights the entire survey N = 2,657 to the population proportions for Great Britain. This weight is used when we analyse the dataset as a whole. WUDS, a mnemonic for 'weight urban-deep-shallow', weights each stratum separately to the population proportions for that stratum only. This weight is used when the three strata are used as independent variables in tables and analyses. In Section 2, WUDS is used in all reported analyses. In Section 3, we indicate in each Figure whether WALL or WUDS is used.

# 2. Patterns of Internet Access and Use Across Britain in 2013

The Oxford Internet Survey 2013 data reveal a variety of similarities and differences between urban, shallow rural and deep rural areas. These are reported below under the following headings:

**1. Access to the Internet in urban and rural areas.**

**2. Characteristics of Internet users by location.**

**3. What do urban and rural Internet users do online and where do they access the Internet?**

**4. Use of information and services online in urban and rural areas.**

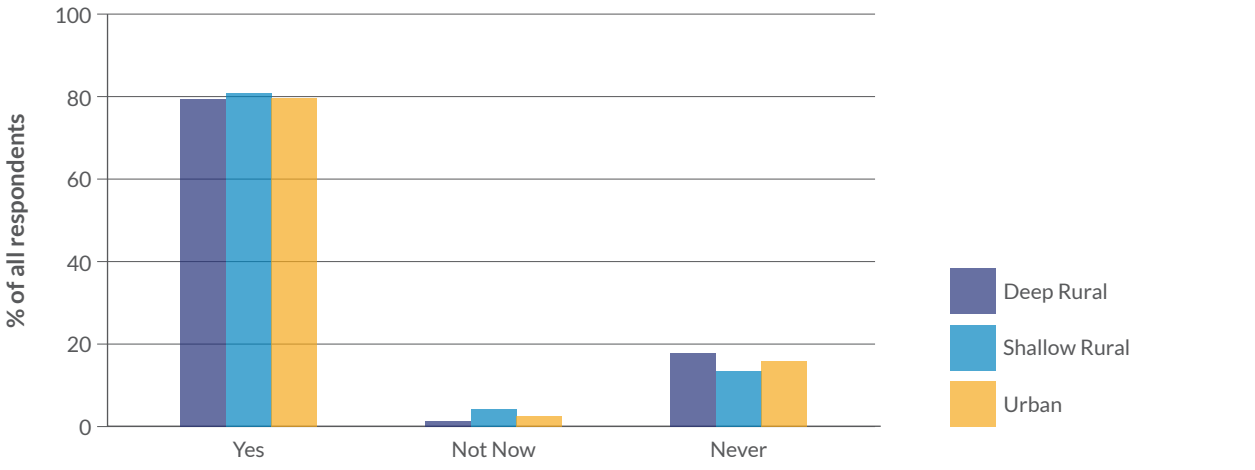
**5. Use of the Internet in working lives and family lives.**

## 2.i Access to the Internet in Urban and Rural Areas

Over three quarters of households in Britain had home-based access to the Internet in 2013, according to the survey findings. This figure is very similar to that reported by the National Audit Office (2013), drawing on a survey conducted in England. Households in shallow rural areas are slightly more likely than those in deep rural and in urban areas to have access to the Internet at home. However, deep rural households are the most likely to have never had Internet access, 18% compared with 16.5% in urban areas and only 14% in shallow rural areas.

As is apparent from Figure 2.1, the geographical differences in household access to the Internet are not simply urban–rural differences. The attributes of shallow and deep rural areas differ, a variation that is reflected throughout the findings presented in this report.

**Figure 2.1:**
**Does the Respondent's Household have Access to the Internet by Urban, Shallow Rural and Deep Rural**




*Source: OxIS 2013, n = 2657*

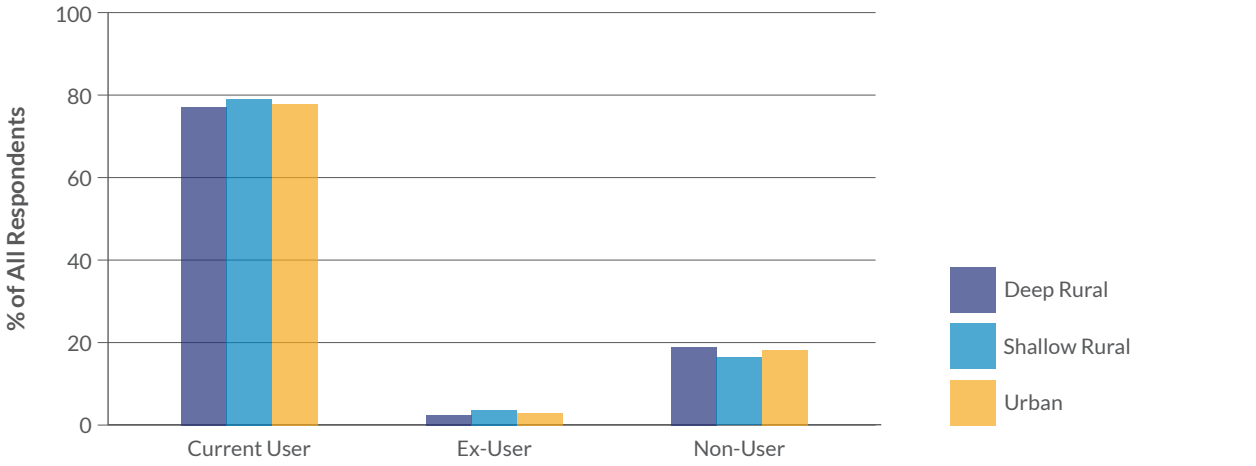
## Table 1.2: Oxford Internet Survey 2013 sample size: main and boost

| Does this household have access to the Internet? | Is this household planning to get access to the Internet in the next year? | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Deep rural | | Shallow rural | | Urban | | Total | |
| | No | Yes | No | Yes | No | Yes | No | Yes |
| **Not now, in the past** | 27.7% | 72.3% | 51.9% | 48.1% | 50.3% | 49.7% | 49.6% | 50.4% |
| **No, never** | 96.8% | 3.2% | 86.9% | 13.1% | 91.6% | 8.4% | 90.9% | 9.1% |

*n=724*

Less than 10% of non-users of the Internet reported that they are planning to get access to the Internet and there is little difference by location. Ex-users (the small 'not now' group in Figure 2.1) are much more likely than non-users to say that they are planning to get access in the near future. Ex-users living in deep rural areas were more likely to express a desire to be Internet users again than respondents living elsewhere.

## Figure 2.2:
## Use of the Internet at Any Location by Urban, Shallow Rural and Deep Rural



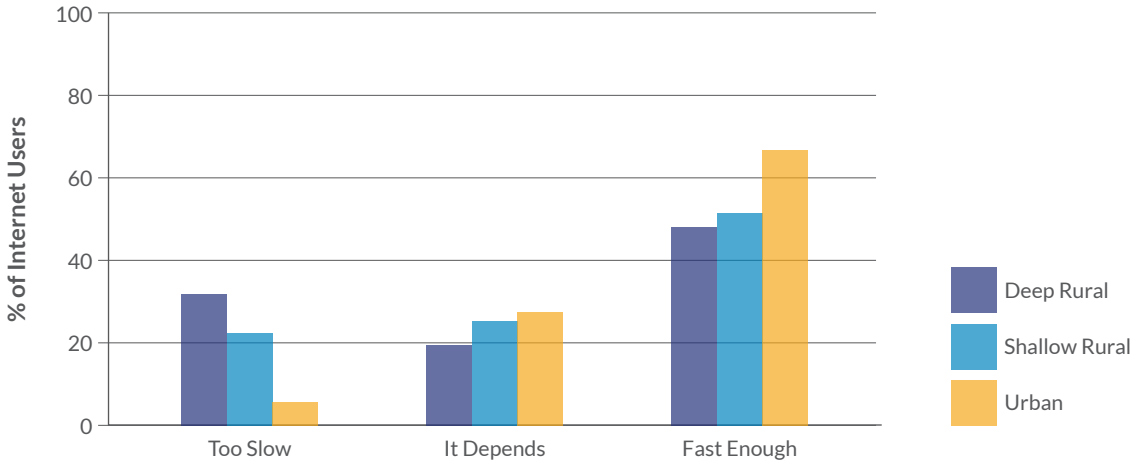

*Source: OxIS 2013, n = 2657*

The age profile of Internet users captured in the Oxford Internet Survey 2013 accords with patterns reported elsewhere (e.g. Office for National Statistics, 2013; Scottish Government, 2014) where it has been reported that Internet use decreases with increasing age. It is worth noting, however, that the proportion of older Internet users has increased notably across the UK in recent years and age related differences in Internet use are less marked now than a decade ago. The most recent analysis of Scottish Household Survey data reported that there is a marked difference between the proportions of those aged 60- 74 and those aged 75+ who are Internet users: 63% compared with 25% respectively (Scottish Government, 2014). As noted in section 1, deep rural areas have a higher proportion of their population in the older age cohorts than do urban and shallow rural areas and, because the Oxford Internet Survey sample was a proportional sample this demographic pattern is reflected in the survey responses.

As shown in Figure 2.2, 78% of people in Britain currently use the Internet (at home, work, school, college or elsewhere). Differences between deep rural, shallow rural and urban areas are negligible. Broadband Internet has replaced all but a handful of dial-up connections in the UK. It is a technology that allows the simultaneous transfer of voice and data over a single line and its introduction has facilitated higher speed Internet connections than were possible over dial-up connections. However, broadband reliability and speed varies considerably across Great Britain, with some connections being no better than an old dial-up connection (less than 2Mbit/s) whilst others are 'superfast' (defined by the UK Government as download speeds of more than 24Mbit/s and by the EU and Ofcom as download speeds in excess of 30Mbit/s). We asked users if they thought their Internet connections were fast enough to do what they wanted to do online, or too slow to do some things they would like to do. We expected rural users to have more difficulty in doing what they wished to do online, and this was the case.

Overall, a majority of Internet users thought that their connection was fast enough all of the time (60% of users, see Figure 2.3). However, those Internet users living in rural areas are significantly less likely to say that the speed of the Internet is fast enough for what they want to do all of the time. Fifty two per cent in shallow rural areas and 48% in deep rural areas reported that their connection was fast enough compared with two thirds in urban areas. Notably, nearly a third (32%) of those living in deep rural areas say that their Internet speed is always too slow for what they want to do compared with only 6% in urban areas and 22% in shallow rural areas.

## Figure 2.3:
## Adequacy of Speed of Internet as Reported by Internet Users in Urban, Shallow Rural and Deep Rural

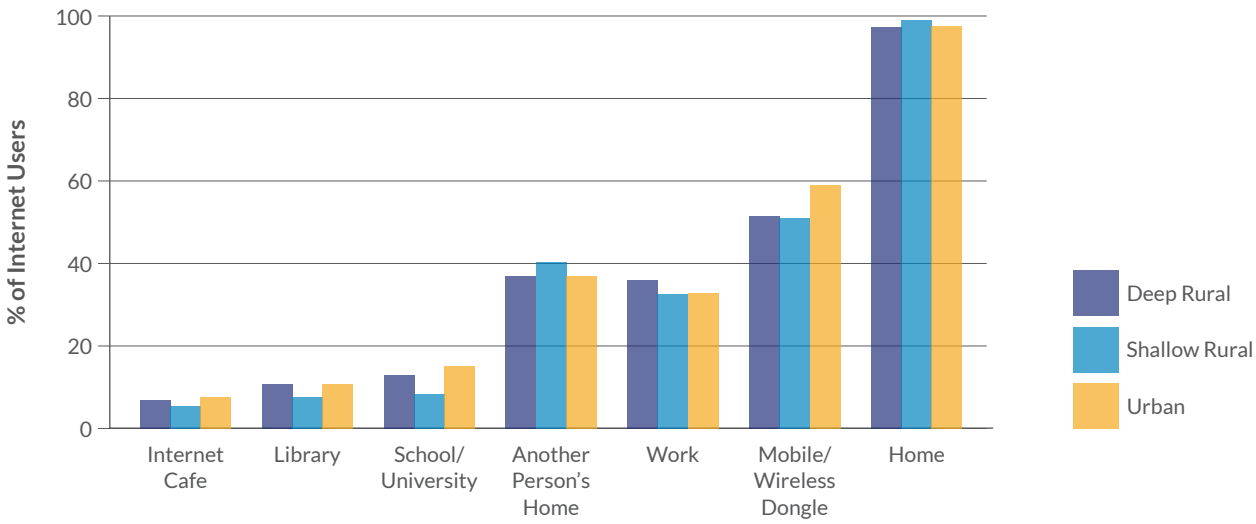



*Source: OxIS 2013, n= 1839*

The association between area type and perceptions of the adequacy of speed was statistically significant ($x^2$ = 147, p = 0.00). These findings are quite dramatic. They reinforce findings from studies of the availability of infrastructures and services which show that a large proportion of the British land mass does not have a sufficiently fast Internet connection to allow those who live in remote communities to do what they expect to be able to do online; by inference, they are significantly digitally disadvantaged compared with the large majority of people, in urban and shallow rural areas.

Figure 2.4 shows that almost all Internet users access the Internet at home with negligible differences between the 3 location types. While over half of Internet users access the Internet using a mobile or wireless dongle, those living in urban areas (59%) are more likely to do so compared to those living in shallow rural areas (51%) and deep rural areas (52%). This illustrates an urban-rural divide but the geographical difference was not large enough to be statistically significant at the 95% confidence level. About a third of Internet users access the Internet via a computer at work, with negligible differences by location observed. Only a minority of users access the Internet at public libraries (10%) and Internet cafes (7%). Thirty-eight per cent access the Internet at someone else's house, shallow rural dwellers (40%) being more likely to do so than urban or deep rural dwellers (both 37%). These differences were not statistically significant.

## Figure 2.4:
## Where Respondents Use the Internet by Urban, Shallow Rural and Deep Rural

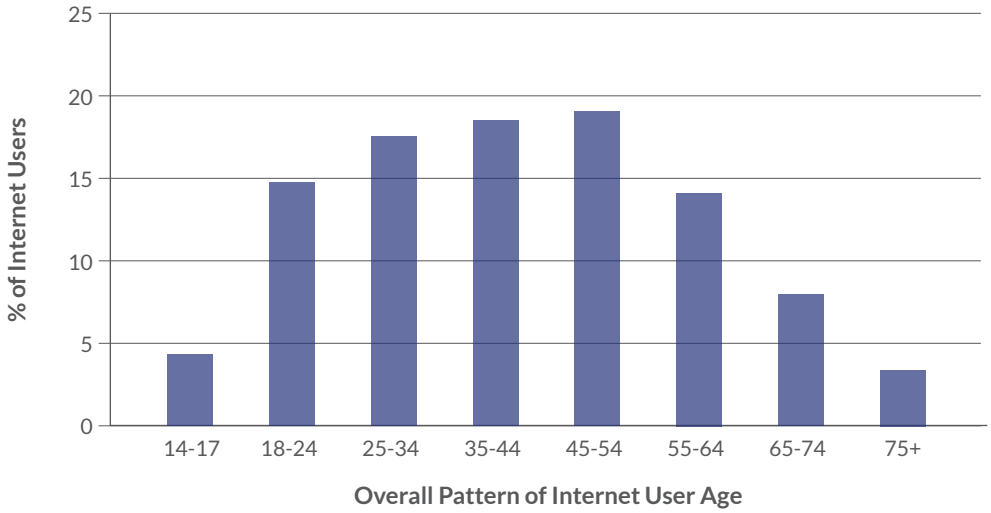



*Source: OxIS 2013, n= 1839*

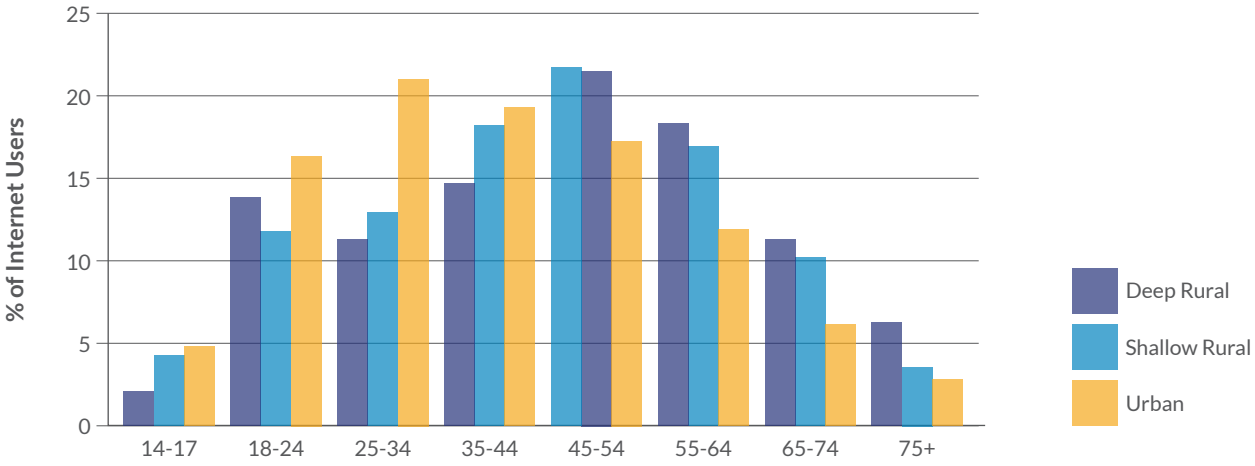
## 2.ii The Demographic Characteristics of Internet Users by Location

There are no statistically significant differences in the gender of Internet users by urban-rural location. However, as shown in Figure 2.5, the age profiles across the three area types differed in a statistically significant manner ($x^2 = 82$, $p = 0.02$). Internet users in deep rural areas are older than those living in both shallow rural and urban areas. Thirty-six per cent of Internet users living in deep rural areas are over 55 years, and 58% are over 45 years, compared with 21% over 55 years and 38% over 45 years in urban areas. Demographically, shallow rural areas sit between deep rural and urban areas. This finding, because of the weighting used, is a good reflection of the demographic structure of deep rural areas, whose populations are demographically older than those in shallow rural and urban areas (Philip et al 2012). Vignettes number 4 and 9 in Section 4 illustrate contrasting views of older generation non-Internet users and highlight some barriers to becoming Internet users as perceived by older rural residents.

## Figure 2.5:
## Proportions of Internet Users in Different Age Groups: Overall and by Urban, Shallow Rural and Deep Rural




*Source: OxIS 2013, n= 1839*

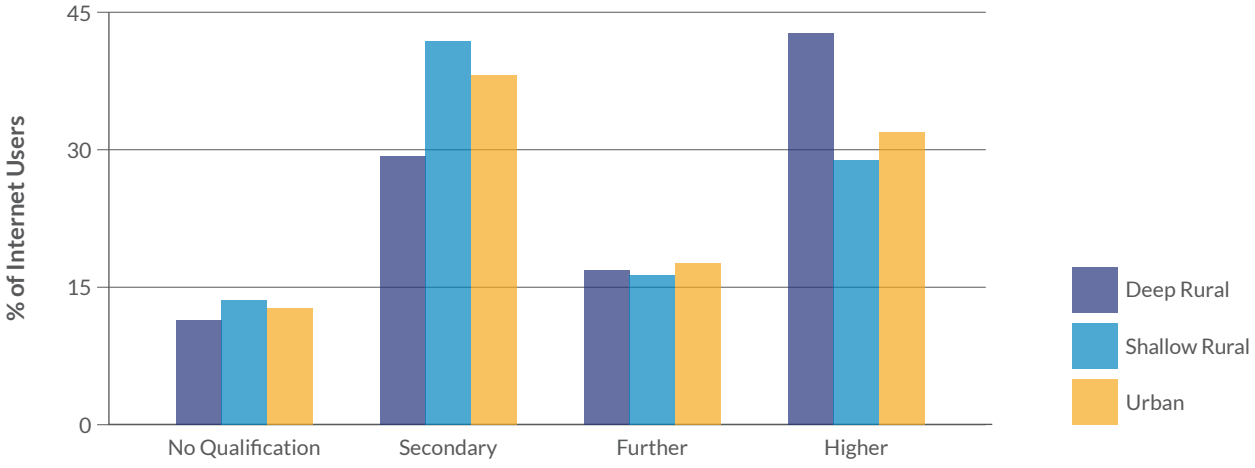



*Source: OxIS 2013, n= 1839*

Figure 2.6 presents educational attainment levels for Internet users. Almost a quarter of Internet users, regardless of location, have no qualifications. However, those in deep rural areas are the best educated, being the most likely to have a higher educational qualification compared to those living in urban or shallow rural locations (43% compared to 29% and 32% respectively). The differences in educational attainment level are not statistically significant.

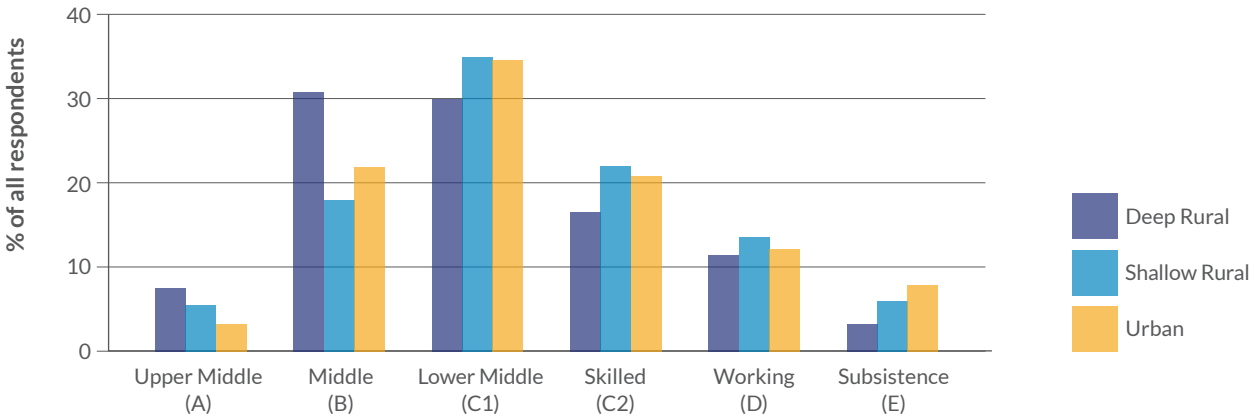
While the income patterns of Internet users do not vary noticeably by location (the incomes of Internet users who responded to the survey broadly follow the UK income distribution pattern), the educational attainment patterns noted above are reflected in the socioeconomic characteristics of Internet users, shown in Figure 2.7, which vary between the three area types ($x^2 = 50.66$, $p = 0.08$). Deep rural Internet users are more likely to be in upper middle and middle-grade socio-economic groups (38% in total) than Internet users in urban (24%) or shallow rural areas (24%). This could be because in deep rural areas it is the lower social grades who are more likely not to be Internet users, perhaps due to income status and the higher likelihood of those on the lowest incomes not being able or willing to pay for an Internet connection and the hardware necessary to access the Internet.

## Figure 2.6:
## Educational Attainment Level of Internet Users by Urban, Shallow Rural and Deep Rural




*Source: OxIS 2013, n= 1839*

## Figure 2.7:
## Social Grade of Internet Users by Urban, Shallow Rural and Deep Rural

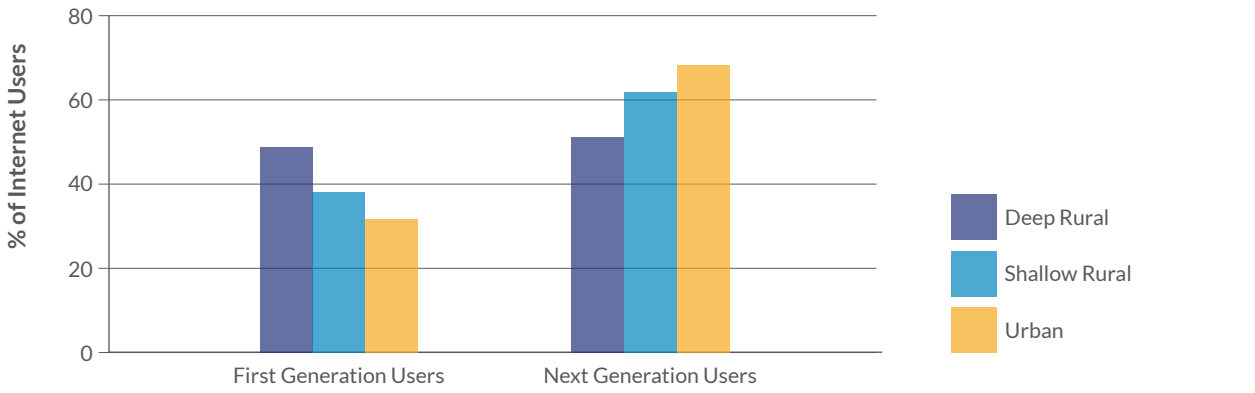



*Source: OxIS 2013, n= 1839*

OxIS 2011 identified *Next Generation Internet Use* as being related to the emergence of portability and access through multiple devices, and offered the definition of a Next Generation User as "someone who accesses the Internet from multiple locations and devices. Specifically, we operationally define the next generation user as someone who uses at least two Internet applications out of the four applications queried in the survey, namely browsing the Internet, using email, updating a social networking site, or finding directions, or who fits two or more of the following criteria: they own a tablet, own an e-reader (such as a Kindle), or own three or more computers" (Blank and Dutton, 2011: 4).

Almost two thirds of Internet users who responded to the OxIS 2013 are next generation users. However, Figure 2.8 shows that deep rural Internet users are much less likely to be Next Generation Users, and thus more likely to be 'First Generation Users' (49%) than urban dwellers (32%) and shallow rural dwellers (38%). These differences were statistically significant ($x^2$ = 21.43, p = 0.02). After controlling for age it was found that those living in urban and shallow rural areas are both around 1.5 times more likely to be Next Generation Users of the Internet than those in deep rural areas. In other words, our findings clearly report a locational effect. This reflects the infrastructure limitations in the more remote and sparsely populated parts of the UK, where connectivity on the move is limited (even if a deep rural resident wanted to use the Internet on the move, they would often be unable to do so) and where low broadband speeds make it difficult for more than one user per connection to be online at any one time. Vignette 7 in Section 4 illustrates how ICT infrastructure makes it difficult, if not impossible, to be a next generation user household in a remote rural area.

## Figure 2.8:
## *Next Generation Internet Users* by Urban, Shallow Rural and Deep Rural

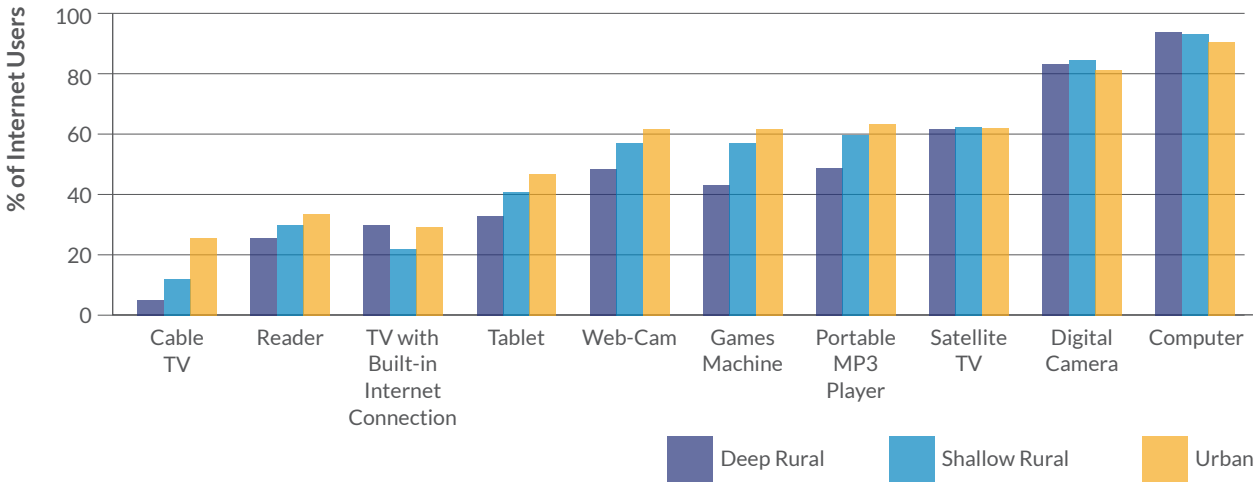



*Source: OxIS 2013, n= 1839*

## 2.iii Use of the Internet

Individuals in households that use the Internet have a wide range of digital devices and, overall, have higher levels of media ownership than do individuals in households without an Internet connection. Eighty-three percent of households that use the Internet have a digital camera and over three-quarters have at least one computer. More than half of Internet user households have satellite TV (62%). However, Figure 2.9 shows a general pattern whereby deep rural households are generally less likely to own digital devices than households in other locations: the notable exception is of a TV set with a built-in connection to the Internet, where deep rural household ownership, at 30% is almost the same as ownership in urban areas but 8% higher than the rate in shallow rural areas. This could be an attempt to overcome the more limited Freeview service in deep rural areas (the number of channels available on Freeview varies considerably across Britain, with the number being lowest in the least densely populated areas). The gap between deep rural household digital device ownership compared with other locations is especially noticeable in the cases of a games machine ($x^2$ =19.36, p = 0.01) and a tablet computer ($x^2$ = 12.82, p = 0.04). The former could be related to the age profile of the deep rural sample (fewer young adults, the demographic most likely to use a games machine etc.) and the latter could reflect the fact that the coverage of the 3G mobile Internet signals required to use the Internet on the move on a tablet is much poorer in deep rural than in other types of area. While just over a quarter of households in urban locations have a cable TV connection, only 12% in shallow rural locations and 5% in deep rural locations do ($x^2$ = 69.52, p = 0.00). This is almost certainly a reflection of cable TV infrastructure, which is related to population density across Britain.

### Figure 2.9:
### Information Communication Technologies in Internet Users' Households by Urban, Shallow Rural and Deep Rural




*Source: OxIS 2013 Internet Users, n=1839*

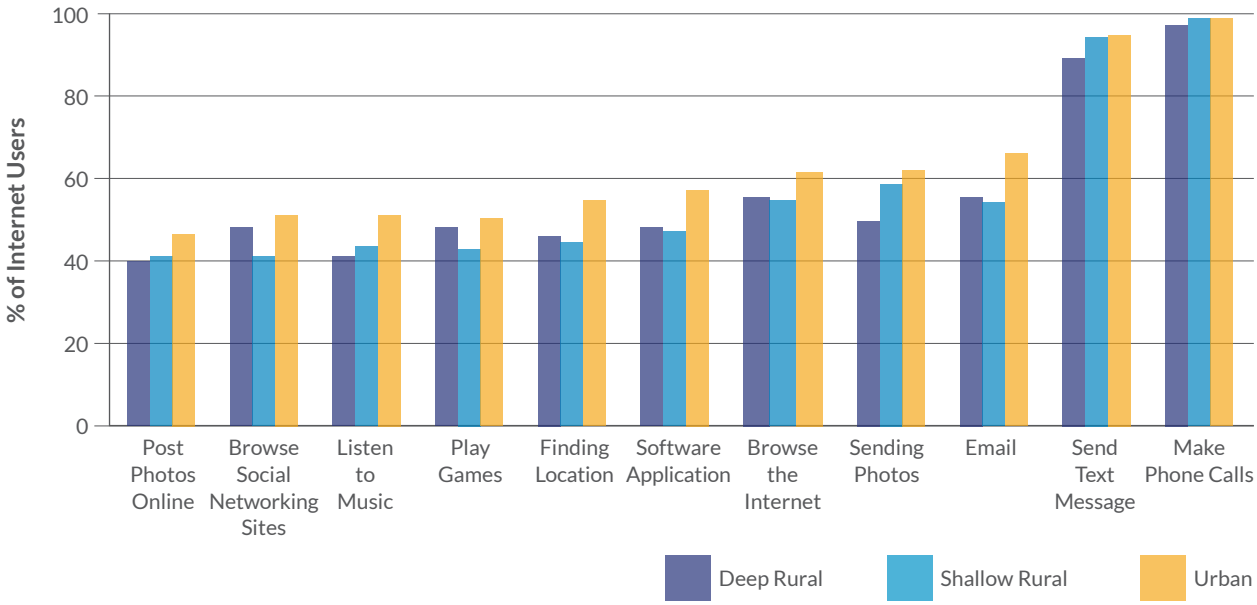
Ninety-one per cent of all people living in Britain (aged 14 years and over) have a mobile phone. At 87%, the proportion of those living in deep rural areas is lower than in urban and shallow rural areas (91% and 92% respectively). Scrutiny of responses from only those who lived in a household with Internet access showed that in these households mobile phone ownership was higher, at 99%, and that there were no geographical differences in ownership rates. Respondents were not asked to distinguish between different types of mobile phone (e.g. basic model, smart phone, 4G enabled etc.).

As Figure 2.10 shows, for all the mobile phone features recorded, there is a general pattern of use being highest in urban areas and lowest in rural areas. For example, rural residents are less likely than urban residents to use their mobile phones to send or read emails (55% and 54%, respectively, in deep and shallow rural areas compared to 66% in urban areas, a statistically significant difference – $x^2$ = 24.85, p = 0.00), post pictures or video online (40% in deep rural, 41% in shallow rural and 47% in urban areas), browse the Internet (56% and 55%, respectively, in deep and shallow rural areas compared to 62% in urban

areas), listen to music (42% in deep rural areas, 44% in shallow rural areas and 51% in urban areas) and send text messages (90% in deep rural areas, and roughly 95% in both shallow rural and 91% in urban areas, a statistically significant difference ($x^2 = 8.66$, $p = 0.04$)). Internet based applications on mobile phones can only be used 'on the move', away from a home or public Wi-Fi network, in areas with outdoor 3G or 4G coverage: deep rural areas have the most limited 3G coverage in the UK and have negligible 4G coverage. Rural Internet users are not using Internet enabled mobile phone features in the way urban Internet users do because they live in areas without the infrastructure to fully support these 'on the move' activities.

Taking age into consideration, there are statistically significant differences between Internet users' use of mobile phone features by age for all uses except making calls or sending texts. This is unsurprising: younger adults – those who have grown up with technologies such as mobile phones and the Internet – are, in general, more likely than older adults to use the non-telephony functions of mobile phones.

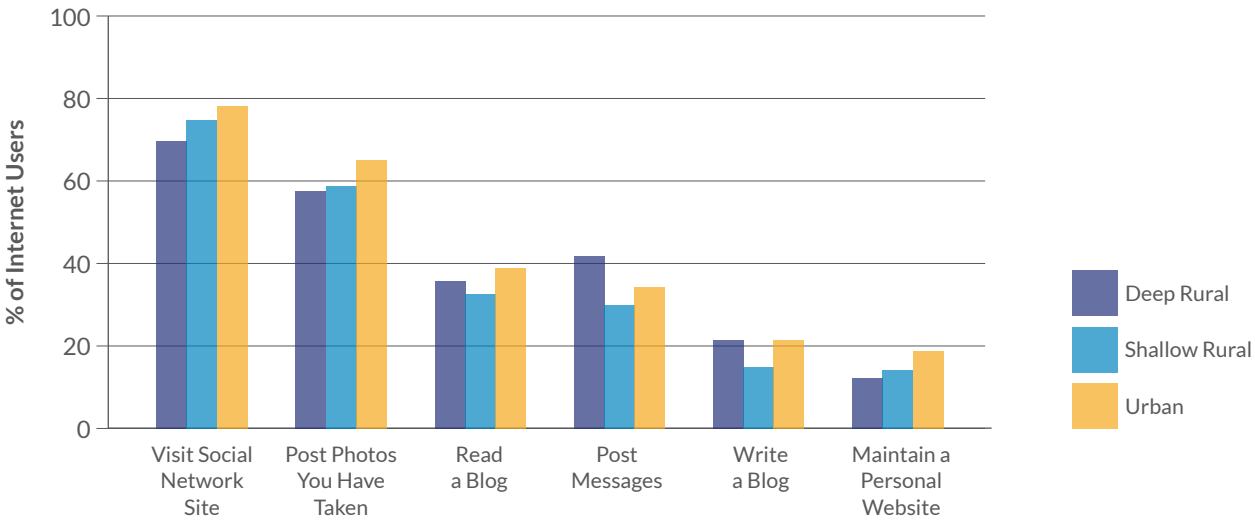
**Figure 2.10:**
**Internet Users' Use of Features on Mobile Phones by Urban, Shallow Rural and Deep Rural**




*Source: OxIS 2013, n= 1839*

The most common creative online activities (associated with Web 2.0 and user generated content activities) are visiting social network sites and posting photographs taken by the user online. Deep rural dwellers are less likely to participate in these two popular activities than those living in other locations (Figure 2.11) but the differences were not large enough to be statistically significant. Interestingly, deep rural Internet users were the most likely to post messages on discussion or message boards (42% compared to 34% in urban areas and only 30% in shallow rural areas) – this difference was only statistically significant at 90%. Overall, deep rural Internet users reported lower levels of activity in the types of Internet functions (e.g. posting photographs) that require higher upload and download speeds and/or more reliable Internet connections than are often available to households in more remote rural areas. Vignette number 2 in Section 2 illustrates the frustration felt by young adults in remote rural areas who cannot use 3G functionality on their mobile phones where they live. Vignette number 11 includes the image of a hillwalker using their online banking application on top of a mountain. It would be very unusual for someone to actually be able to use an app on their mobile phone in this way: advertising may promote potentially misleading pictures of what online activities can be undertaken where. Other research has suggested that deep rural residents are less likely than others to use online social networking (OxIS 2011, Wilson 2012), being more accustomed to being socially connected through local, off-line networks.

## Figure 2.11:
## Creativity and Productivity Online by Urban, Shallow Rural and Deep Rural

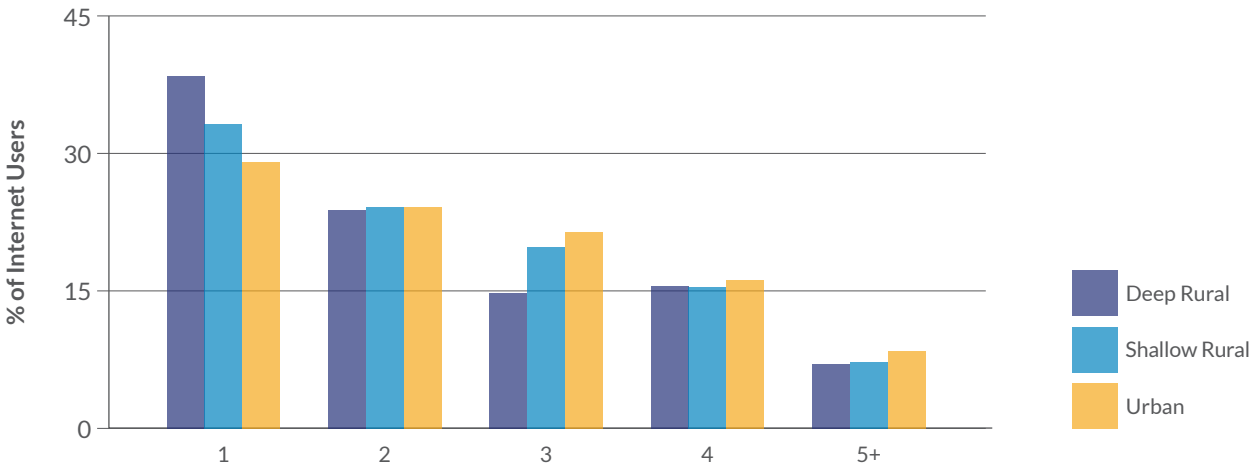



*Source: OxIS 2013, n= 1839*

Just over a half of all Internet users access the Internet at more than one location (Figure 2.12). However, deep rural dwellers are the most likely to access the Internet from a single location only (38% compared with 33% and 29% respectively). The corollary is that deep rural dwellers are the least likely to access the Internet from multiple locations. It is probable that these findings reflect the fact that deep rural residents are more reliant upon fixed/home based Internet connections than those who live elsewhere because of poor 3G mobile coverage.

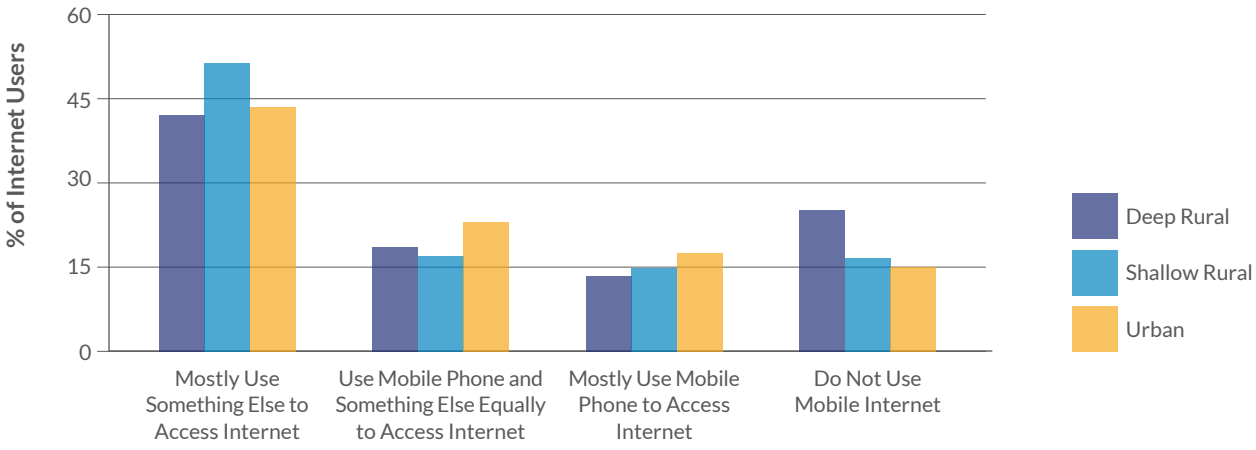
In other words, they are accessing the Internet from fewer locations than their urban and shallow rural counterparts most probably because it is more difficult in deep rural areas to be online 'on the move' due to a lack of mobile connectivity. Figure 2.13 provides some evidence that supports this conclusion: it shows that deep rural dwellers are the most likely not to use their mobile phone to access the Internet (25% in deep rural areas compared with 16.9% in shallow rural and 15% in urban areas).

## Figure 2.12:
## Number of Locations Where Internet is Accessed by Urban, Shallow and Deep Rural




*Source: OxIS 2013, n= 1839*

## Figure 2.13:
## Use of Mobile Phone & Other Devices for Mobile Access to the Internet by Urban, Shallow Rural and Deep Rural

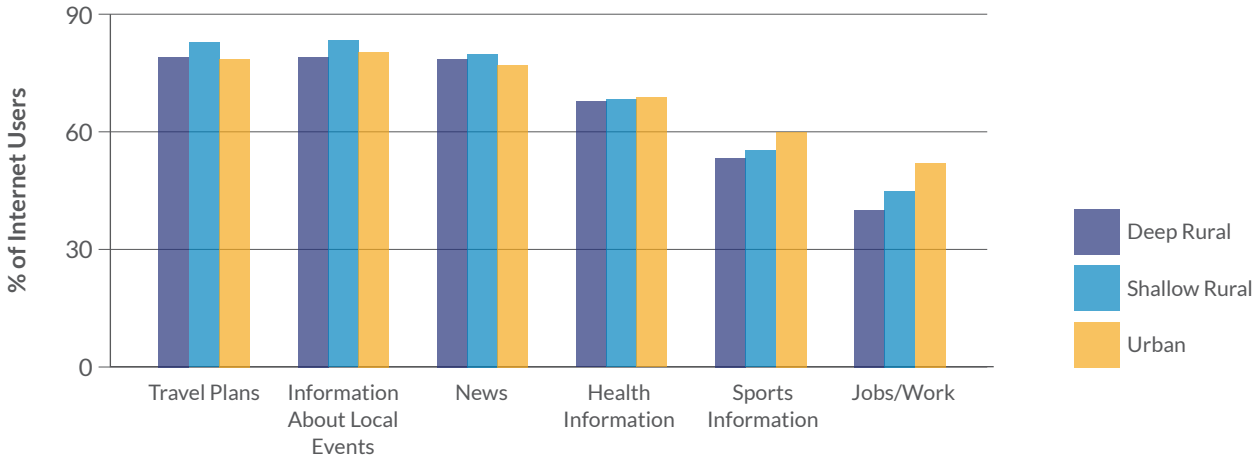



*Source: OxIS 2013, n= 1839*

## 2.iv Use of Information and Online Services

Internet users mainly use search engines or a combination of search engines and specific web sites to access the content they want to view online. As shown in Figure 2.14, most Internet users, regardless of where they live, make use of the Internet to find information about topics such as local events, news, travel planning etc., but deep rural dwellers are less likely than those living in other locations to use the Internet for any of the activities reported in Figure 2.14. There is a statistically significant difference between those in the different types of area who report looking for information about jobs or work online ($x^2 = 19$, $p = 0.04$). Those living in deep rural areas are much less likely use the Internet for job seeking than those in urban areas. This could be because of the higher proportion of Internet user respondents in deep rural areas who are retired (i.e. not looking for employment opportunities) or could reflect the fact that more traditional methods of advertising local jobs (e.g. word of mouth, local print newspapers) are most common in deep rural areas and their use has not been supplanted by online notifications.

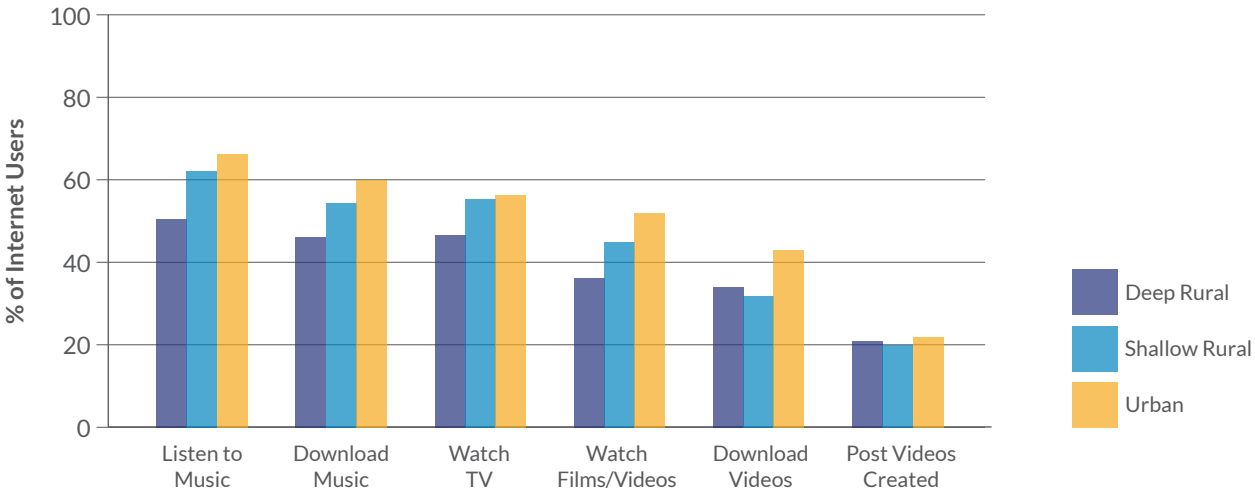
## Figure 2.14:
## Information Seeking Online by Urban, Shallow Rural and Deep Rural




*Source: OxIS 2013, n= 1839*

Figure 2.15 shows that urban and shallow rural residents are much more likely to use the Internet for various forms of entertainment than those in deep rural areas, with the exception of posting a video where the differences are not statistically significant (listening to music online $x^2 = 16.63$, $p = 0.02$; downloading music $x^2=13.7$, $p=0.08$; download videos $x^2 = 30$, $p = 0.03$). Once again this is likely to reflect connection/infrastructure capabilities: deep rural areas are least likely to have fast enough and reliable enough download speeds to download or stream TV, films, or video.

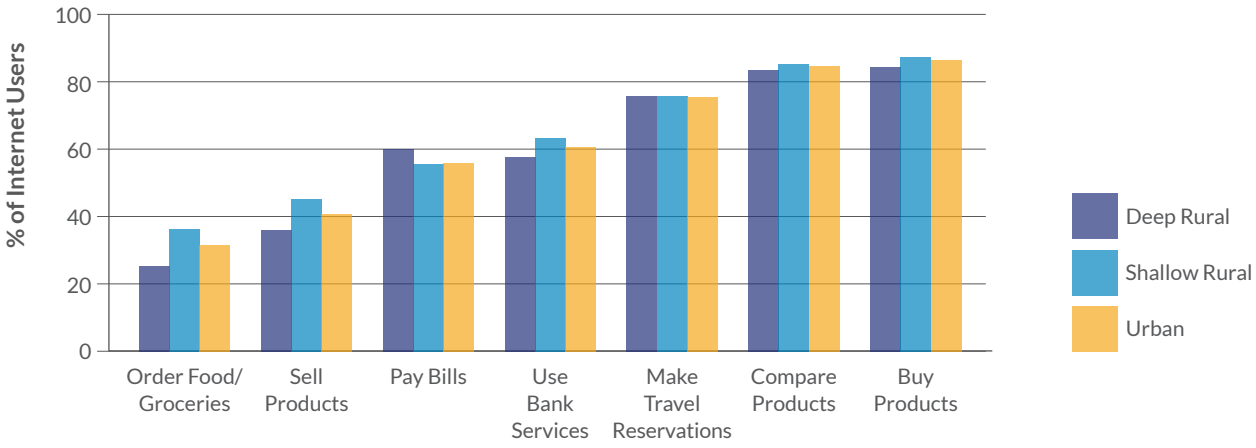
## Figure 2.15:
## Entertainment and Leisure Online by Urban, Shallow Rural and Deep Rural




*Source: OxIS 2013, n= 1839*

Figure 2.16 reports findings related to the use of online services, such as e-commerce. A high proportion of Internet users engage in e-commerce. There are only small geographical differences in the proportions of Internet users who make travel reservations, compare products or buy products online. Noticeable geographical differences are, however, reported for selling online, for online grocery shopping and for paying bills. At 36%, shallow rural dwellers are the most likely to buy groceries on-line whilst deep rural dwellers are, at 26%, the least likely. Penetration of supermarkets' home delivery services is variable across Britain and, in many remote areas, not available. Shallow rural residents are also the most likely, at 45%, to sell goods online compared with those living in the other locations. The lower proportion of deep rural respondents purchasing or selling items online could reflect the often higher delivery/postal charges of non Royal Mail carriers that are imposed on consumers living in many remote and rural locations. It is also likely to reflect the age profile of deep rural areas: the over 65s are less likely than those in younger age groups to make purchases over the Internet (Office for National Statistics, 2013) and deep rural areas have the highest proportion of residents in this age group. Interestingly, deep rural Internet users are the most likely to pay bills online; perhaps this reflects the greater difficulties in accessing paypoints such as banks or post offices in the deep rural areas.

## Figure 2.16:
## Buying and Using Services Online by Urban, Shallow Rural and Deep Rural



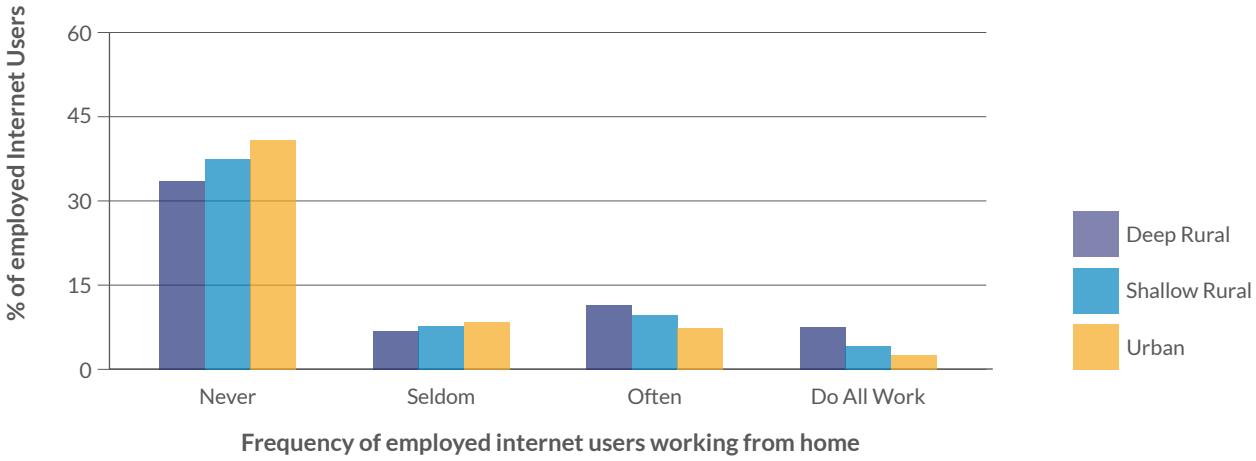

*Source: OxIS 2013, n = 2657*

## 2.v Use of the Internet at Work and Home

A third of Internet users access the Internet at work: the lack of significant differences by location probably reflects the ubiquity of being online in many workplaces (Figure 2.17). Deep rural residents are the most likely to often or always work at home: 32% compared to 24% of shallow rural dwellers and 17% of urban ones. This is likely to reflect self-employment (and, by inference, working from home) patterns: the proportion of self-employed (and thus those most likely to work from home) is highest in remote rural areas across the UK (for example, the Scottish Government (2012) reported that 29% of economically active men in 'remote' rural areas are self-employed compared to 23% in 'accessible' rural and 13% in urban Scotland).

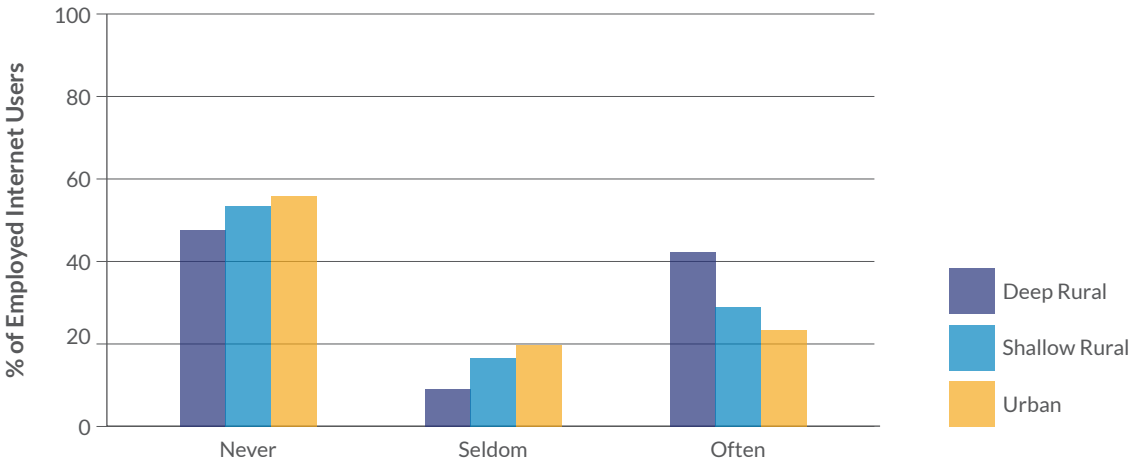
Deep rural Internet users who are in employment are also significantly more likely to often use the Internet at home for work related activities: 42% compared to 27% of the in employment Internet users as a whole (Figure 2.18). This could be another reflection of patterns of home working (deep rural Internet users are more likely to work from home), but it could reflect the fact that many deep rural residents cannot access

## Figure 2.17:
## Working from Home by Urban, Shallow Rural and Deep Rural




*Source: OxIS 2013, n=989*

## Figure 2.18:
## Frequency of Use of Internet at Home for Work Related Activities

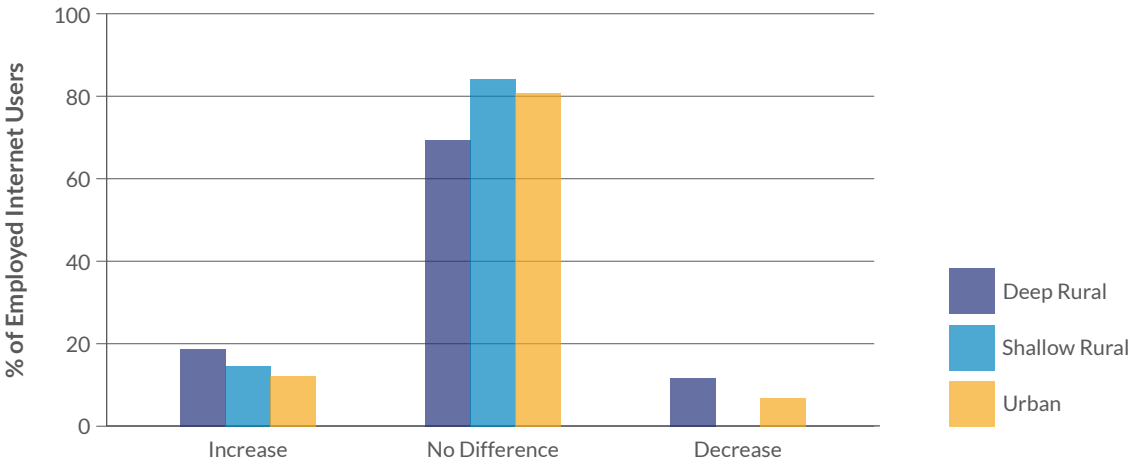



*Source: OxIS 2013, n=989*

mobile Internet services, which leads to a reliance upon home-based Internet provision when they are not at their place of work. Vignettes number 8 and 10 illustrate how poor Internet connectivity at home makes it difficult for an employee who is frequently 'on call' to fulfil the demands and expectations of an employer. In contrast, vignette number 12 reports what a good Internet connection at home can allow a remote rural home-worker to achieve.

Some people use the Internet at home for work related activities. For most respondents, having home Internet has not changed the amount of work they do from home. However, as shown in Figure 2.18, employed Internet users in deep rural areas were the most likely to often use the Internet at home for work, and those living in urban areas were the most likely to never use it. The geographic differences reported in Figure 2.19 are statistically significant ($x^2 = 44.53$, $p=0.005$). As reported in Figure 2.19, most respondents reported that having access to email and the Internet at home had not changed the amount of work they did at home. Deep rural respondents were the most likely to report that it had increased the amount of work they did at home, which could be a reflection of gradual improvements in IT infrastructure making home working more feasible than before.

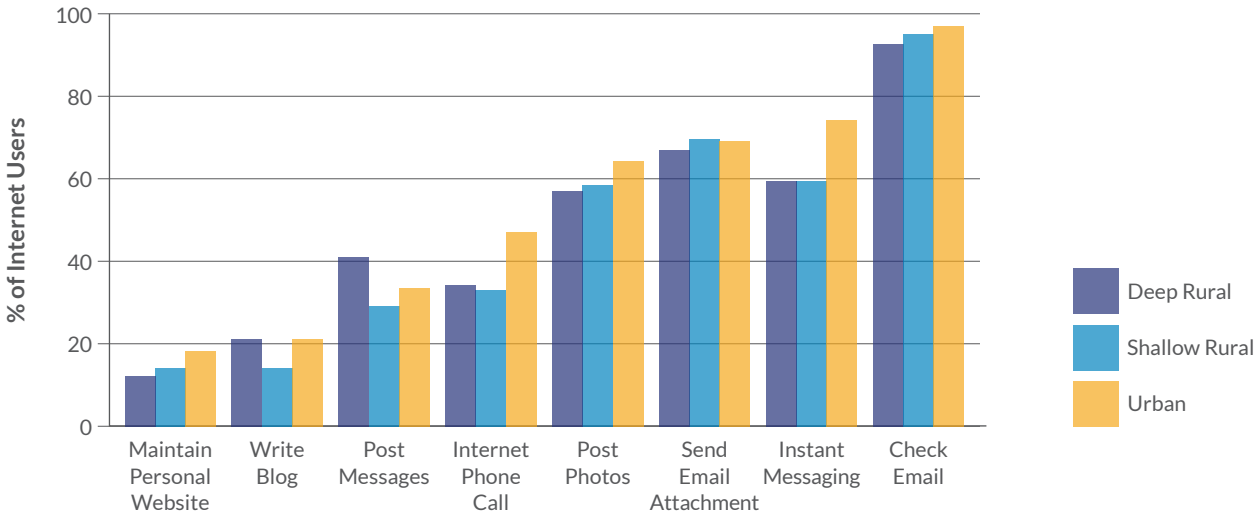
## Figure 2.19:
## Does Having Access to Email and Internet Change the Amount of Work You Do at Home?




*Source: OxIS 2013, n=989*

With respect to the use of the Internet for social communication online, the most common activity for all Internet users, regardless of where they live, is checking email. Geographical differences were observed for this very common activity: 2% of urban Internet users did not use email, compared to 4% in shallow rural and 7% in deep rural areas ($x^2 = 13.22$, p = 0.02). Other modes of communication also show geographical differences – see Figure 2.20. Residents of urban areas are significantly more likely to use the Internet for making or receiving phone calls than those in rural locations ($x^2 = 33.63$, p = <0.00). This is likely to be a reflection of geographically variable infrastructure: more urban Internet users live where there is capacity in the ICT network to support applications such as Skype. Urban Internet users are also significantly more likely to use instant messaging than those in shallow rural areas or deep rural areas ($x^2 = 45.96$, p = 0.00), possibly a reflection of the fact that urban residents are more likely to be users of social networking sites with embedded instant message services than deep rural residents are, as noted in Figure 2.20.

## Figure 2.20: Communication Online by Urban, Shallow Rural and Deep Rural

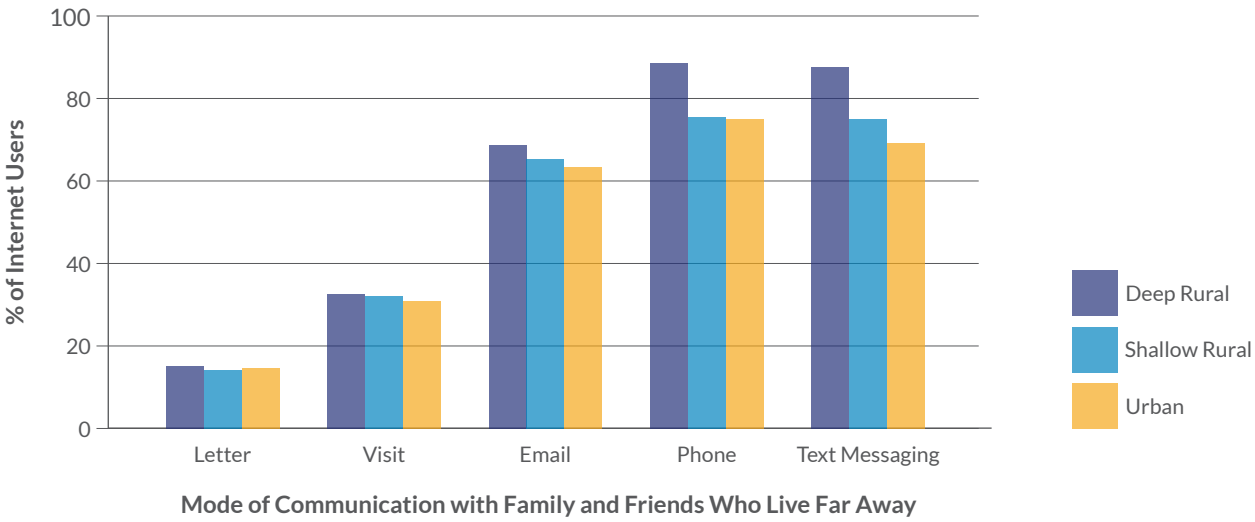



*Source: OxiS 2013, n=1839*

Internet users in deep rural areas are the least likely to use social networking sites (Facebook, LinkedIn, Twitter, Pinterest, Instagram etc.), with 70% doing so compared with 75% of users in shallow rural areas and 79% in urban locations. This might be a reflection of age profiles: the proportion of older people is highest in deep rural areas and this age group is less likely to use social networking than younger age groups (Office for National Statistics, 2013). Amongst those who use social networking sites, there are few differences in the number of sites that were reported as being used by residents in the three types of area.

The Internet has opened up new ways of communicating with friends and family. OxIS 2013 respondents from urban, shallow and deep rural areas reported no notable differences in their modes of communicating with family and friends who live nearby. However, as shown in Figure 2.21, there are differences in the ways that people in urban, shallow rural and deep rural areas communicated with friends and family who lived far away. Deep rural dwellers are more likely to use text messages and the telephone to keep in touch with relatives who live far away than those living in urban locations. Examination of the frequency of contact with family and friends who live far away using different modes of communication found that phone, text and email were the most commonly used methods and that while email use varied little by geographical location, deep rural respondents were the most likely to have weekly or daily contact by phone and by text message.

## Figure 2.21:
## Communication with Family and Friends who Live Far Away by Urban, Shallow Rural and Deep Rural




*Source: OxiS 2013, n=1839*

## 2.vi Key Findings

This section of the report has described some aspects of Internet use and has shown where Internet use in urban, shallow rural and deep rural areas is similar or different. Most striking are differences between urban and shallow rural Internet users, and deep rural Internet users, and it is likely that they can be explained, at least in part, by the variations in ICT infrastructure nationwide. Key findings include:

- Non-use of the Internet is most common in deep rural areas and least likely in shallow rural areas.
- Deep rural Internet users are the most likely to think that their Internet connection is 'too slow' and are over 5 times more likely than urban Internet users to think that their connection is 'too slow'.
- Deep rural Internet users are more likely to be in the upper middle and middle socio-economic groups than Internet users who live in shallow rural and urban areas.
- Next Generation Users are least common in deep rural areas, even when age is controlled for.
- The use of Internet-enabled features on mobile phones (e.g. email, browsing the Internet) is lowest in deep rural areas.
- Deep rural Internet users are the least likely to access the Internet from multiple locations and are least likely to use their mobile phones to access the Internet. Deep rural Internet users are thus the most likely to be limited to home-based, fixed broadband or publically availably Wi-Fi connections for their Internet connectivity.
- Urban and shallow rural Internet users are much more likely to use the Internet for entertainment (e.g. streaming films) than deep rural Internet users.
- The increase in home working facilitated by having email and Internet access is most pronounced in deep rural areas.

# 3. ICT infrastructure: Internet Use, Broadband Speeds and 3G and 4G Availability

The most recent Ofcom data reported in Maps 1.1, 1.2 and 1.3 clearly show that the provision of telecommunications infrastructure that supports Internet access is variable across the United Kingdom. The areas worst served by 3G coverage (which supports mobile Internet access), and those areas most likely to have a high proportion of households connected to a fixed broadband connection with a speed of 2.2Mbit/s or less, are concentrated in peripheral and remote rural areas.

These areas are the least likely to have superfast broadband available and they have no 4G coverage at present. A recent Ofcom report that published an analysis of download speeds by geography (Ofcom, 2014a, p1) notes:

" …the average urban download speed in November 2013 was 31.8Mbit/s, a 21% increase since May 2013; the average suburban download speed in November 2013 was 21.8Mbit/s, a 22% increase since May 2013. The research also suggests that average speeds in rural areas increased from 9.9Mbit/s to 11.3Mbit/s between May and November 2013".

Whilst the increases in average download speeds in urban and suburban areas between May and November 2013 were statistically significant, the increase reported for rural areas was not (Ofcom, 2014a and b). The difference between average urban and rural download speeds increased over the six month period of May to November 2013, from 16.5Mbit/s to 20.6Mbit/s (Ofcom, 2014b). As fibre broadband (which supports superfast broadband) availability increases in rural areas (c.f. the BDUK supported roll out of superfast broadband) this differential is expected to contract but, in the short term, the differences may increase.

Average download speed data hide considerable variations, notably the extent to which download speeds are affected by network contention such as that which occurs at peak times. Peak time speeds, on all types of broadband connection, are reported by the UK communications watchdog to be lower than average maximum speeds and the 24 hour average speed (Ofcom, 2014b). ADSL connections are particularly badly affected by peak time contention: 'for ADSL connections capped at 10Mbit/s or less, the peak-time download speed was 3.2Mbit/s, 86% of the average maximum speed, and 98% of the 24 hour average' (Ofcom, 2014b p5). Cable and fibre connections are, to date, far less common in rural areas than in urban areas. In consequence, the peak time contention experienced on ADSL connections has a considerable impact on the broadband speeds available to much of the rural population and the impact of contention is, arguably, of more importance in rural areas because it reduces download speeds such that some online activities become difficult if not impossible. Recent Ofcom reports have not included information about satellite broadband in their download speed analysis.

Less data about upload speeds are published than is the case for download speeds. The importance of upload speeds is recognised by Ofcom: " … upload speeds matter to those sharing large files, using real-time two-way video communications and for some online gaming" (Ofcom, 2014b, p6). Across the UK average upload speeds increased in 2012 and 2013, but the rate of improvement was most pronounced for households with an 'up to' 30Mbit/s and higher broadband connection. In other words, the increase in upload speeds is largely due to increased take-up of superfast broadband services which support higher upload speeds than broadband connections provided via older technologies, such as the ADSL connections serving many remote rural areas.

Opposite: Photo courtesy of Dr Lorna Philip; not to be reused without prior permission.

## 3.i Broadband Speeds for Respondents to the Oxford Internet Survey 2013

Broadband speed data is published by Ofcom for local authority areas and at unit postcode (i.e. AB24 3UF) level. The unit postcode is the smallest of the geographical units represented by UK postcodes and in 2011 there were 1.7 million unit postcodes across the UK. A unit postcode represents a group of adjacent premises: the UK's Office of National Statistics notes that "A single small user postcode may contain up to 100 addresses, but 15 is a more typical number" (http://www.ons.gov.uk/ons/guide- method/geography/beginner-s-guide/postal/index.html). The sampling strategy for OxIS was based on unit postcodes (see Oxford Internet Institute, 2013 for full details of the sampling procedure).

Data made available at unit postcode level such as the broadband speed data, therefore represent micro-scale geographical units. The most recent unit postcode level broadband speed data were published in December 2013 (available at http://maps.ofcom.org.uk/broadband/). These data were matched to the unit postcode of each respondent to the Oxford Internet Survey (there were 965 unit postcodes in total) and variables from the OxIS dataset were analysed against speed data. Our analysis shows that respondents to the OxIS 2013 survey lived in unit postcode areas that experienced a wide range of broadband sync speeds[3].

The average broadband sync speed available to OxIS 2013 respondents varied by the type of location in which respondents lived. Selected findings from this analysis are presented in Table 3.1. Speeds experienced by the deep rural sample were the lowest, whilst the highest speeds were available to respondents living in urban areas. Average sync speeds were highest for the urban sample, which was twice as high as the shallow rural average and three times as high as the deep rural average. The highest sync speed for any deep rural sampling unit postcode, 17.4Mbit/s, was lower than the average sync speeds for the urban sample. As already noted in this report, broadband speeds directly influence what can and cannot be done online. Low speeds make 'data heavy' download and upload activities either very slow or impossible.

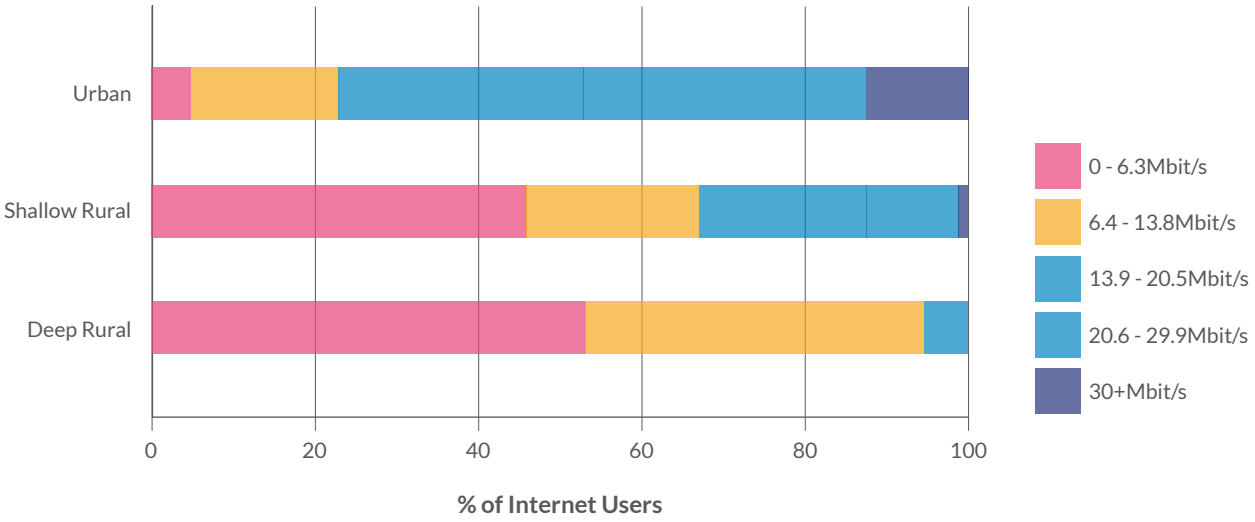
### Table 3.1: Selected speed by location data for OxIS 2013 sample

| | Urban | Shallow Rural | Deep rural |
|---|---|---|---|
| **Average sync speed (Mbit/s) for postcodes of sampling points** | 19.2 | 10.5 | 6.2 |
| **Minimum and maximum sync speeds (Mbit/s) for postcodes of sampling points** | 1.5 – 30+ | 0.8 – 30+ | 0.6 – 17.4 |
| **% of respondents living in an area with superfast broadband available** | 86% | 30% | 0% |

*Source: Based on Ofcom UK broadband speed data at postcode level 2013 and all OxIS 2013 responses*

[3] Also known as Sync rate, Downstream rate or DSL Connection rate, Sync speed is "the 'physical' speed of the connection between your router (or modem) and your local telephone exchange. It's determined by the characteristics of your line e.g. line length and quality" (Plusnet Broadband terminology guide, available at http://www.plus.net/support/broadband/speed_guide/broadband_terminology.shtml).

## Figure 3.1:
## Average Sync Speeds (Five-Fold Grouping) by Urban, Shallow Rural and Deep Rural




Note: 30+Mbit/s sync speed available either via Virgin Media cable, Openreach Fibre-To-The-Cabinet or Digital Region networks

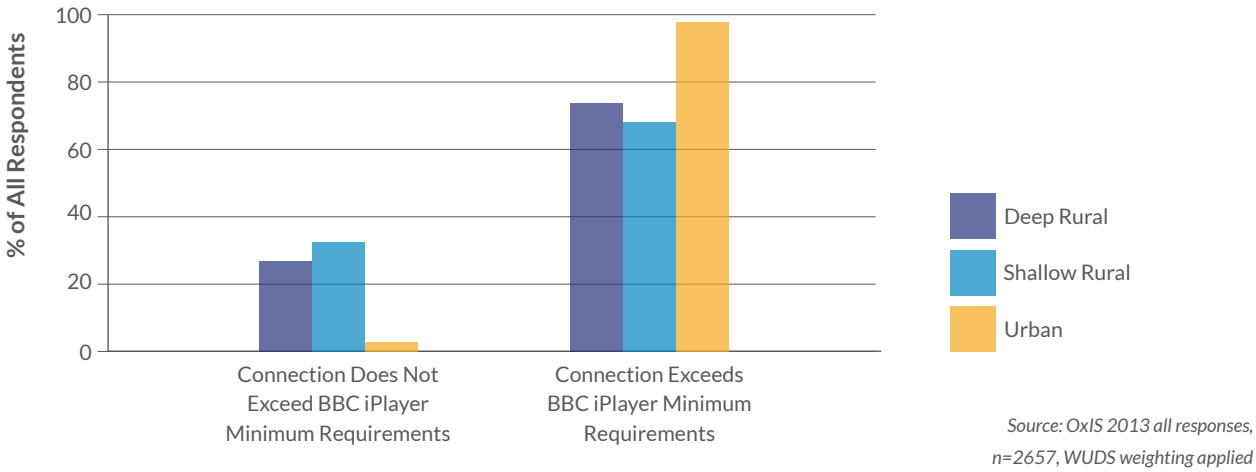
*Source: OxIS 2013 all responses, n=2657, WUDS weighting applied, and Ofcom UK broadband data postcode level 2013*

Figure 3.1 displays a five-fold average sync speed (each category was determined by an evaluation of the distribution of average sync speeds for the entire OxIS 2013 sample of 965 unit postcode data points) for all respondents to the study by the type of area they lived in (urban, shallow rural and deep rural). Whilst 53.2% of the deep rural sample lived in unit postcode areas where the average sync speed was less than 6.3Mbit/s, only 4.9% of the urban sample lived in an area with this speed. Conversely, whilst almost a half of the urban sample lived in an area with average speeds of at least 20.6Mbit/s, only 12.6% of shallow rural respondents lived in an area with speeds of this level and none of the deep rural sample lived in areas with this speed. The area based differences in speed were statistically significant ($x^2 = 860.32$, $p = 0.000$). These speed data clearly show there is a 'Two speed Britain' in that the lowest speeds are most commonly found in rural areas whilst the highest speeds are most commonly found in urban areas. It also highlights the difference within rural Britain, further demonstrating the usefulness of the 'rural boost' to the OxIS 2013 survey.

Unfortunately, 3G coverage data is not available at unit postcode level in a standardised format from Ofcom so we have been unable to link the survey sampling points with mobile services data. However, as shown in Map 1.1 in Section 1, the geographical coverage of a reliable outdoor mobile signal being available from any operator is highly variable, with the best coverage corresponding to densely populated areas and the worst coverage corresponding to less densely populated areas. It is thus reasonable to infer that the OxIS 2013 respondents least likely to live in an area with a reliable 3G signal are those who live in deep rural areas.

To what extent does broadband speed influence responses to questions about online behaviour and experiences? Two speed variables were used to explore this: (i) average connection speeds that exceeded the minimum requirements to watch the BBC iPlayer in High Definition – that is, 3.5Mbit/s (as stated on the BBC website) and (ii) whether or not superfast broadband was available at that postcode. In the absence of robust data about upload speeds, variable (i) was created to represent a proxy for the minimum speed that would allow a user the ability to download and upload photographs, stream movie clips etc. although we recognise that these data heavy online activities would be very slow at this speed. The effect of peak time contention on speed, as noted above, is likely to mean that respondents whose average connection speed was 3.5Mbit/s or less are likely to experience times when their speed is much lower than the average. Figure 3.2 shows that the proportion of the differences between the three different types of area was statistically significant ($x^2 = 434.24$, $p = 0.000$). Respondents living in rural areas are much more likely than those living in urban areas to live in a unit postcode with the lowest speed.

## Figure 3.2:
## Connection Speed by Location: Connection Exceeds Minimum Required to Watch the BBC iPlayer




*Source: OxIS 2013 all responses, n=2657, WUDS weighting applied*

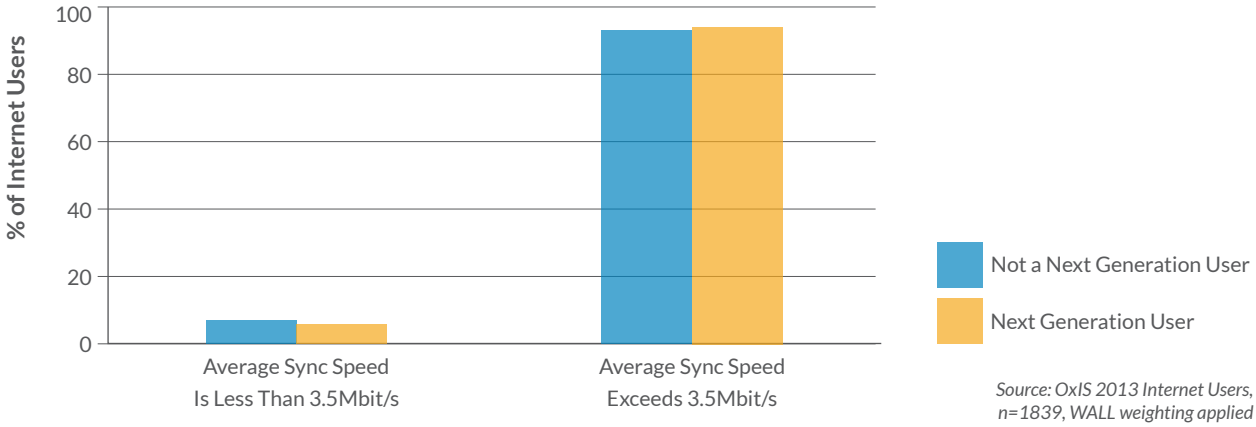
## 3.ii Broadband Speed, Location and Internet Behaviour

This section attempts to explore some of the place based differences in Internet behaviour identified and discussed in Section 2 of the report to establish whether they are associated with broadband speed. In so doing we attempt to explore whether infrastructure attributes are influencing behaviour (bearing in mind that infrastructure variations are directly linked to geography).

### Next generation users and low broadband speed

Slow Internet connections are unsuitable for multiple, simultaneous use (by multiple individuals in a household being online at the same time and/ or multiple devices being connected to a single Internet connection simultaneously). Our analysis shows that speed only has a very weak association with the likelihood of an Internet user household being a next generation user household (Figure 3.3). This suggests

## Figure 3.3:
## Next Generation Users and Low Broadband Speed



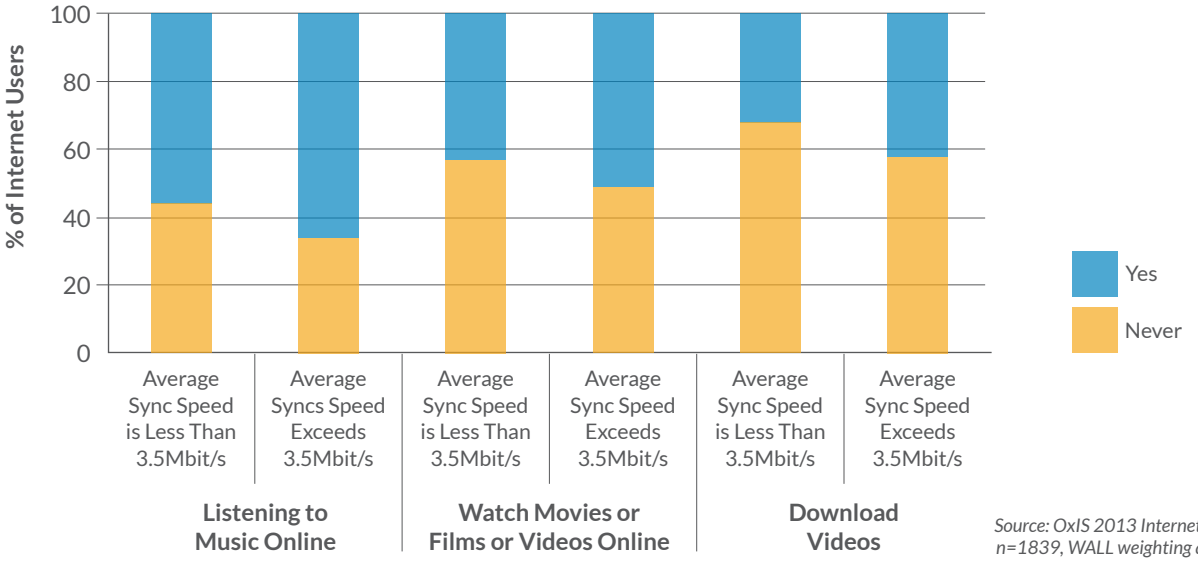

*Source: OxIS 2013 Internet Users, n=1839, WALL weighting applied*

that households that want to make use of a variety of technologies to use the Internet try to do so. However, these findings say nothing about whether or not all next generation users are satisfied with their Internet connection when multiple use of it is being made. Vignette number 7 in Section 4 illustrates the challenges faced by next generation households with low broadband speeds.

## 'Data heavy' online activities and low broadband speed

In Section 2 it was postulated that some online activities, such as listening to music online, watching movies online etc, were not as common in deep rural areas as elsewhere because Internet speeds in many deep rural areas were not sufficient to support these activities. As shown in Figure 3.4, Internet users with the lowest low sync speed were less likely than those with sync speeds exceeding 3.5Mbit/s to report that they participated in 'data heavy' activities including watching TV programmes on the Internet, posting videos including music videos, and downloading music online. Statistically significant differences were observed for listening to music online ($x^2 = 4.53$, $p = 0.03$) and downloading videos ($x^2 = 4.59$, $p = 0.05$), both activities that require large quantities of digital data to be streamed in real time and are beyond the capabilities of a slow broadband connection.

### Figure 3.4:
### Selected *'Data Heavy'* Online Activities and Sync Speeds of Less than 3.5Mbit/s

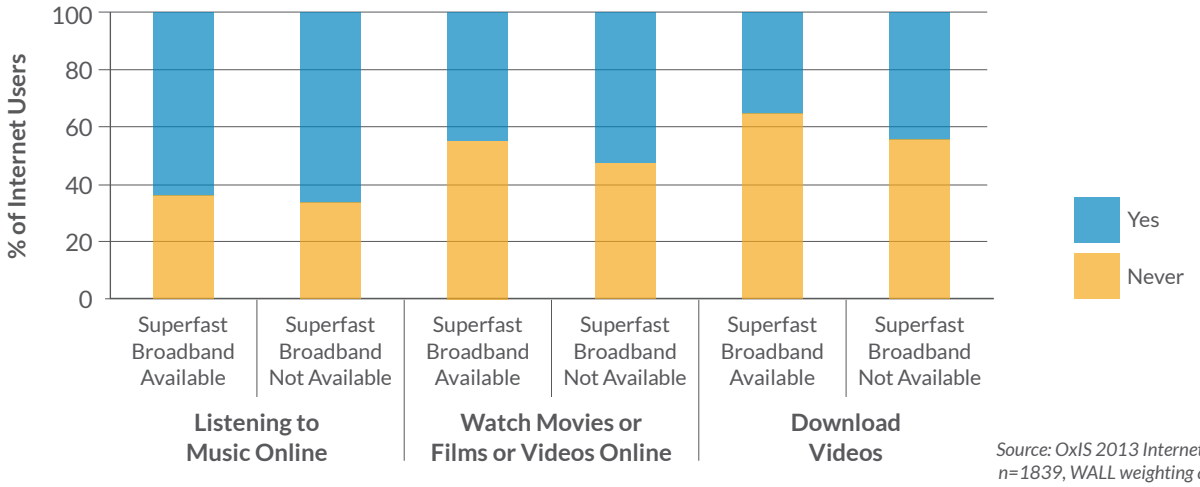



*Source: OxIS 2013 Internet Users, n=1839, WALL weighting applied*

Respondents who lived in areas where superfast broadband was available were more likely than those without access to superfast broadband to participate in 'data heavy' online activities, as illustrated in Figure 3.5. On a fast connection, Internet users can undertake these 'data heavy' activities far more quickly and reliably than on slower connections, even at peak times when contention can create difficulties for those using the Internet. Statistically significant differences were observed for 'watch movies or films online' ($x^2 = 8.85$, $p = 0.03$) and 'download videos' ($x^2 = 11.35$, $p = 0.02$).

The comparison of slow speeds and fast speeds and 'data heavy' online activities could mean that, irrespective of broadband speed, if someone wants to participate in 'data heavy' online activities they do so. However, it must be noted that the Oxford Internet Survey respondents were not asked how often they undertook these activities or questioned about whether they found undertaking these online activities problematic in any way (e.g. had continuity or buffering problems, or found the activity too slow).

## Figure 3.5:
## Selected *'Data Heavy'* Online Activities and Superfast Broadband Availability

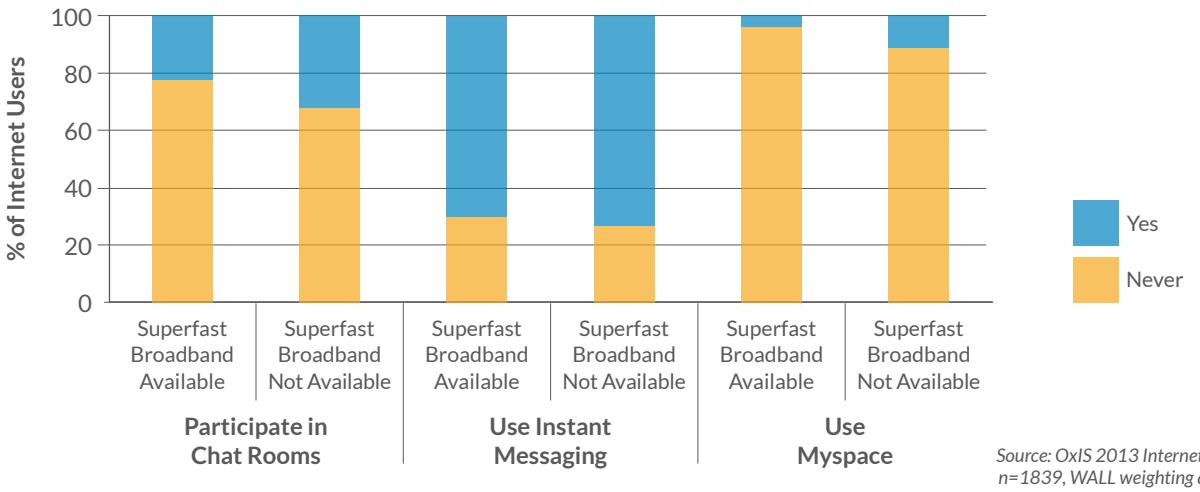



*Source: OxIS 2013 Internet Users, n=1839, WALL weighting applied*

## Social networking and broadband speed

Social networking sites have opened up new modes of keeping in touch with friends and family, developing new personal relationships and keeping in touch with special interest groups. Their use may be associated with the speed of broadband connection available. Internet users from areas with average sync speeds of less than 3.5Mbit/s did not make use of social networking opportunities such as instant messaging or chat rooms any differently from respondents with higher connection speeds. However, use of social networking and associated applications was observed to be more common amongst those Internet users who lived in areas where superfast broadband was available, as illustrated in Figure 3.6. Statistically significant differences were observed for 'participate in chat rooms' ($x^2 = 12.70$, $p = 0.02$), and 'use MySpace' ($x^2 = 18.05$, $p = 0.001$). Internet users living in an area with superfast broadband available were also more likely to use the social networking site Bebo than those without access to superfast broadband; however, it should be noted that across the UK there are regional patterns associated with the use of different social networking sites, such that whilst Bebo might be commonly used in one area, its use in another is uncommon.

## Figure 3.6:
## Social networking and Superfast Broadband



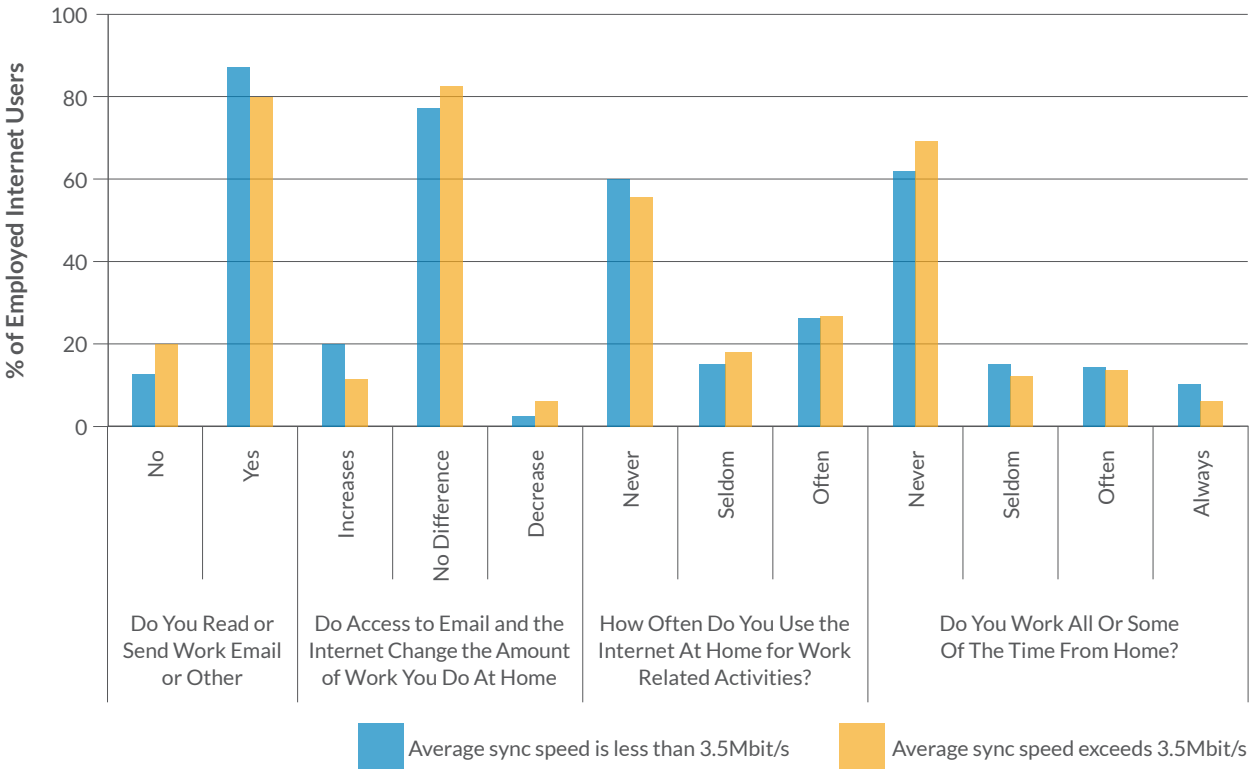

*Source: OxIS 2013 Internet Users, n=1839, WALL weighting applied*

## Working lives, online behaviour and broadband speed

Figure 3.7 suggests that online behaviour associated with working lives has a relationship with the speed of an employed Internet user's broadband connection. It appears that the likelihood of respondents using the Internet to read or send work email or other electronic messages is highest for those with the slower sync speed. Likewise, those with the slower sync speed are the most likely to report that having access to email and the Internet has increased the amount of work they do at home. Those most likely to report that they often used the Internet at home for work related activities were in the lowest sync speed group, as were those who always worked from home. However, none of the relationships presented in Figure 3.4 show differences large enough to be statistically significant. No statistically significant differences between the online behaviour associated with working lives and the availability of superfast broadband were observed, but this could well be a reflection of the fact that the nature of an individual's work varies (whether or not they are office or desk bound, travel regularly, work indoors or outdoors etc.).

The illustrations of Internet behaviour and speed presented above presented some rather puzzling findings. While it could be assumed that slow speeds would prevent people from undertaking data heavy online activities this does not appear to be the case. Respondents appear to be engaging in online activities despite the problems their low speed connections bring: vignette number 6 illustrates that despite having to wait minutes for a web page to load the users persevered because they wanted the information to which the Internet facilitated access. People want to be online, they want to participate in the types of activities seen as being increasingly ubiquitous across the UK, and if they have never had personal experience of a faster broadband connection they do not know how poorly their broadband compares with connections found elsewhere. This would certainly explain why some next generation users are found in low speed areas. Some Internet users have no choice but to be online. For example, some farm regulatory paperwork must be submitted online, and many small businesses feel that they must have an online presence. In such cases, if an activity has to be conducted online, then it must be done, regardless of how long it takes.

### Figure 3.7:
### Selected Work Related Online Activities and Speed



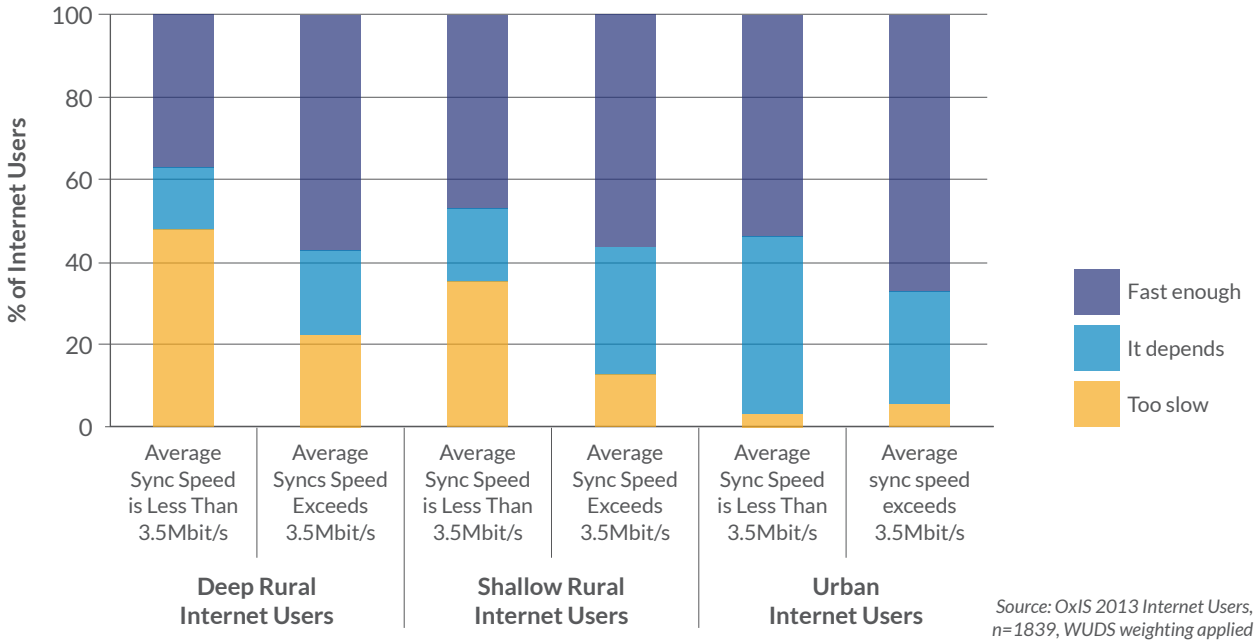

*Source: OxIS 2013 Internet Users, n=1839, WALL weighting applied*

## 3.iii Does Broadband Speed Influence Internet Users' Ability to do What They Want Online?

In section 3.ii it was established that, regardless of broadband speeds, Internet users in urban, shallow rural and deep rural areas are engaging in a wide variety of online activities. Use does not, however, provide any evaluation of user satisfaction. Figure 2.3 in Section 2 clearly shows that deep rural Internet users were the most likely to think that their Internet connection was 'too slow' to allow them to do the things they wanted to do online. We hypothesise that this view is directly related to the low speeds commonly found in deep rural areas. The following section considers whether this observation is borne out, i.e. if speed of a broadband connection influences whether or not Internet users think they can do what they want to do online.

Figure 3.8 reports users' perceptions of the Internet speeds they experienced, using the terms 'too slow', 'it depends' and 'fast enough', and distinguishing whether or not their average speed exceeded the minimum for using the BBC iPlayer. Responses are shown by location in urban, shallow rural or deep rural areas. For users with speeds exceeding 3.5Mbit/s, satisfaction with their Internet speed was statistically different for deep rural, shallow rural, and urban respondents. ($x^2 = 47.31$, p = >0.001). Deep rural and shallow rural respondents with speeds of less than 3.5Mbit/s were the most likely to report that their Internet connection was not fast enough to do what they want to do online: 48% of deep rural and 36% of shallow rural respondents with this connection speed expressed this view. In urban areas, those with a perceived need for greater speed are likely to have switched away from <3.5 Mbit/s, since they have more options, leaving only users with minimal needs who might be content with slower speeds, such as for handling email. Conversely in deep rural areas, many users with an interest in applications for which higher speeds would be very valuable, such as video conferencing, might be stuck on <3.5Mbit/s, unable to upgrade to a higher speed connection. Therefore, they are most likely to consider their connections as 'too slow'. But deep rural users on >3.5 are also more likely to say that their connection is 'too slow', than are shallow users, or urban users on >3.5. This may reflect weaker and less reliable connections in deep rural areas when compared to shallow rural and urban areas.

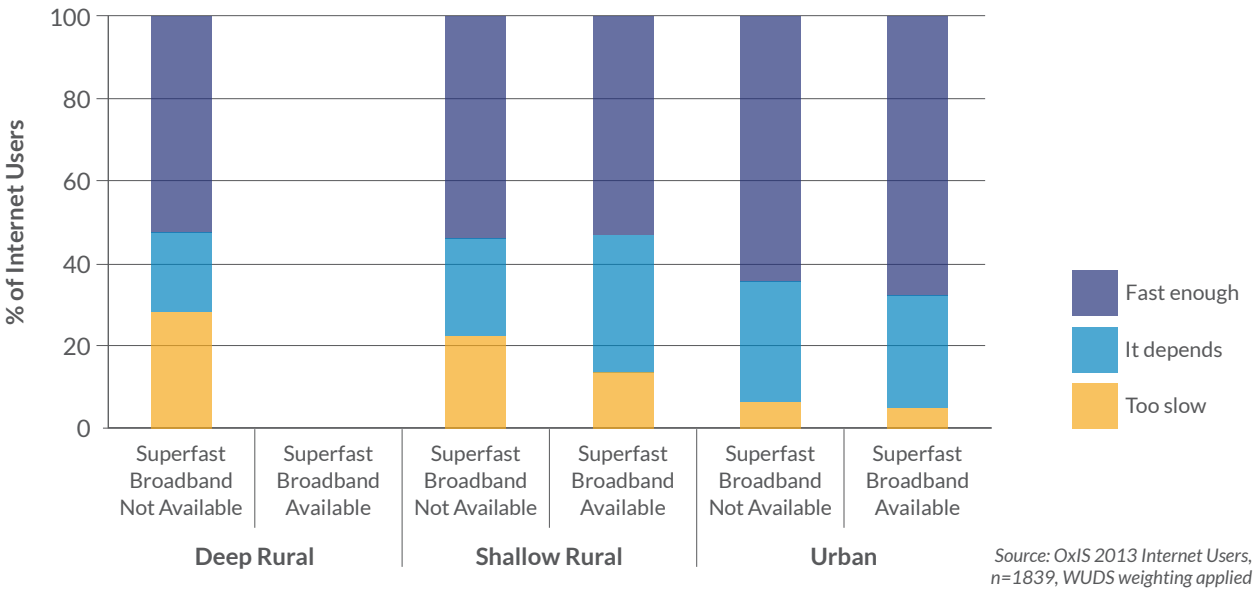
### Figure 3.8:
### Is Your Internet Connection Fast Enough to do what You Want Online by Urban, Shallow Rural and Deep Rural, and Speeds Greater and Lower than 3.5Mbit/s




*Source: OxIS 2013 Internet Users, n=1839, WUDS weighting applied*

It could reasonably be expected that those with access to superfast broadband would report that they could do what they wanted online all the time. The findings reported in Figure 3.9 do not support this assumption. Approximately two thirds of urban Internet users and half the shallow rural Internet users who lived in a unit postcode area where superfast broadband was available thought their connection was 'fast enough'. This leaves a sizeable minority of urban and shallow rural Internet users reporting that, despite access to superfast broadband, their Internet connection was not fast enough. Shallow rural respondents were the most likely to consider that their Internet connection was 'too slow'. These area-based differences were statistically significant ($x^2 = 23.79$, $p = 0.03$) and could reflect the fact that consumers always want more from the services they pay for: with so many daily activities now being conducted online, some people may have unrealistic expectations of what even the most up-to-date digital infrastructure can support.

**Figure 3.9:**
**Is Your Internet Connection Fast Enough to Do What You Want Online by Urban, Shallow Rural and Deep Rural, and Speeds Greater and Lower than 30Mbit/s ('superfast broadband')**

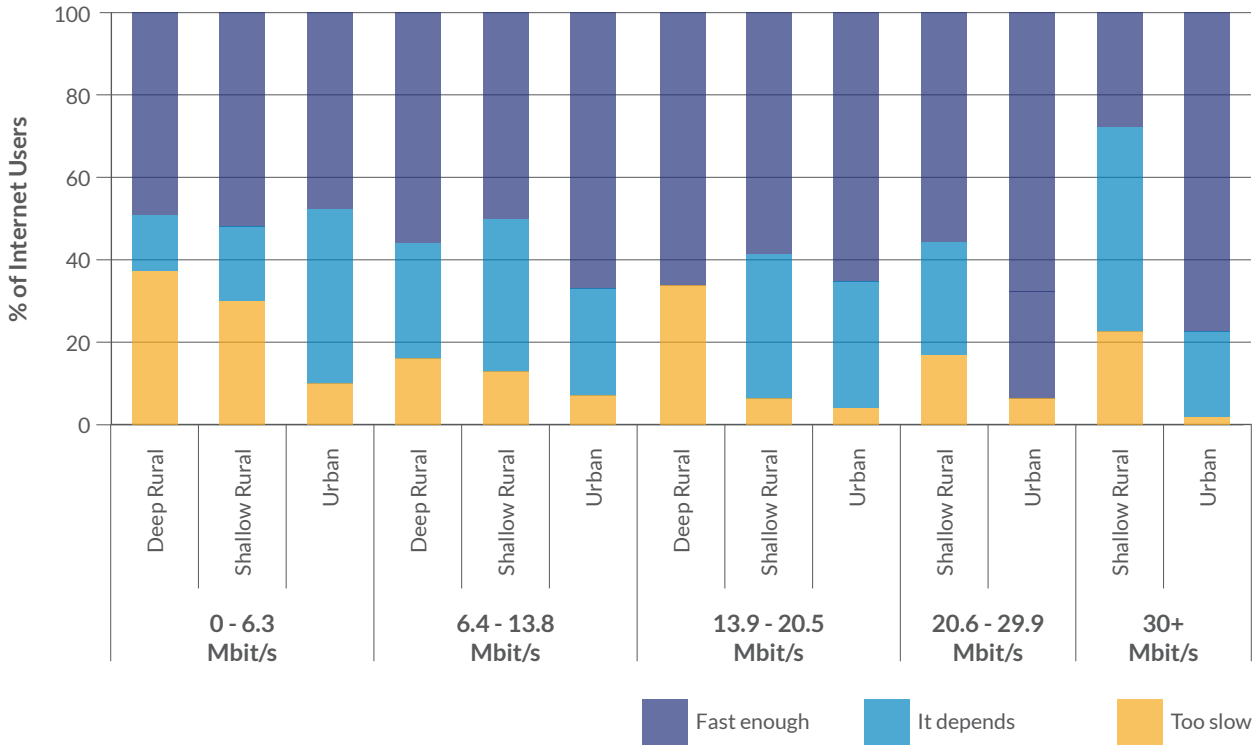



*Source: OxIS 2013 Internet Users, n=1839, WUDS weighting applied*

Is there is a speed threshold above which perceptions that an Internet connection is not fast enough to allow people to do what they want online declines? Figure 3.10 considers Internet users' perceptions of the speed of their Internet connection by a five-fold speed classification. A complex picture of respondent opinions is evident. Note that none of the deep rural respondents lived in a unit postcode where Ofcom reported that average sync speeds greater than 20.5Mbit/s were available and very few lived in areas where speeds in excess of 13.8Mbit/s were available. This limited the statistical analysis that could be performed on the data reported in Figure 3.10.

Shallow rural Internet users appear to be the most critical of their broadband speeds even when they live in unit postcodes with access to the highest speeds: they are much less likely than their urban counterparts to think that superfast broadband is 'fast enough'. Perhaps this is a reflection of the socio-economic composition of suburban areas (home to many who live in areas classified as 'shallow rural') which are characterised by being home to more households in the higher income groups than are found in urban and deep rural areas. It could also reflect the fact that single person households are less common in shallow rural areas than elsewhere (the suburbs in close proximity to large urban areas are popular locations for families) and in households where even a fast Internet connection may suffer a drop off in speeds when multiple users want to be online simultaneously resulting in the households' connectivity being viewed unfavourably.

## Figure 3.10:
## Is Your Internet Connection Fast Enough to do what You Want Online by Urban, Shallow Rural and Deep Rural and Five-Fold Speed Classification




*Source: OxIS 2013 Internet Users, n=1839, WUDS weighting applied*

In deep rural areas, a speed of up to 6.3Mbit/s was considered 'too slow' by 38% of Internet users but 48% thought it was 'fast enough'. Contrast this with the 34% of deep rural Internet users who though that a speed in the 13.9Mbit/s – 20.5Mbit/s range was 'too slow' whilst 66% thought this speed was 'fast enough'. One reading of this finding is that the slowest speeds are satisfying deep rural Internet users' needs. However, we caution against such an assumption. Many people who live in deep rural areas only have personal experience of being online in deep rural areas, and they may never had personal experience of using an Internet connection faster than the one they have at home or work: they can thus only base their speed satisfaction ratings on what they know and what they are able to use the Internet for. The fact that so many urban and shallow rural Internet users living in areas with speeds of 20.6-29.9Mbit/s and 30Mbit/s and above (superfast broadband) do not think that their broadband connection is fast enough is evidence that the deep rural findings should not be read as tacit acceptance of the current Government target of 2.2Mbit/s broadband being a realistic speed to offer remote communities.

## 3.iv Key Findings

Our analysis demonstrates that infrastructure capability does influence what people do online. Clear urban – shallow rural – deep rural variations in broadband speed were identified. However, the findings also suggest that Internet users with poor connectivity engage in online activities despite the limitations of a low speed broadband connection. Key findings include:

- Superfast broadband was not available to any of the deep rural respondents.
- The highest sync speed for any deep rural sampling unit postcode, 17.4Mbit/s, was lower than the average sync speeds for the urban sample.
- Broadband speeds exceeding the minimum required to use the BBC iPlayer (3.5Mbit/s) were most common in urban areas.
- Only 4.9% of the urban sample lived in a unit postcode area where the average broadband sync speed was 6.3Mbit/s or less, compared to 46% of shallow rural respondents and 53% of deep rural respondents.
- Low broadband speeds do not appear to prevent next generation use of the Internet (but the user experience will be influenced by the available ICT infrastructure).
- Internet users living in unit postcode areas with the lowest broadband speeds (≤3.5Mbit/s) were less likely to participate in 'data heavy' online activities than those with speeds ≥3.5Mbit/s.
- Internet users living in unit postcode areas with superfast broadband were more likely to participate in 'data heavy' activities than those in areas without superfast broadband.
- Social networking was less common amongst Internet users living in unit postcode areas with the lowest broadband speeds (≤3.5Mbit/s) than those who lived in areas with speeds ≥3.5Mbit/s.
- Social networking was more common amongst Internet users living in unit postcode areas with superfast broadband than amongst those living in areas without superfast broadband.
- The analytical limitations of using self-reported views of broadband speeds are illustrated by the fact that Internet connections were considered to be 'too slow' by respondents who lived in areas with the lowest broadband speeds and in areas with superfast broadband available.
- 48% of Internet users in deep rural areas who lived in areas with broadband speeds ≤3.5Mbit/s considered their Internet connection was 'too slow'.

The next section presents a selection of vignettes that effectively illustrate the facts that many rural people want to be online, many have to make do with a slow connection, and many are not at all satisfied with their online connectivity.

The vignettes are of intrinsic interest, but also illustrate how improving Internet connectivity in the currently 'difficult to reach' areas is important for individuals and businesses.

# 4. Does Being Digitally Connected Matter in Rural Britain Today?

Whilst survey data is very useful in providing statistically representative overviews of attitudes and opinions it, like all data sources, has some limitations. The Oxford Internet Survey 2013 did not set out to explore, for example, why respondents' online behaviour was as they reported. Nor did it seek to explore any of the challenges and compromises that individuals make in their online activities, or explore whether different types of people (e.g. by age or place of residence) have different expectations of their connectivity that would, in turn, influence their behaviour. It is these factors that concern us when we consider the urban-rural digital divide, or, more accurately, the deep rural – all other areas digital divide in the UK.

In an attempt to overcome some of the limitations of the survey data illustrative vignettes[4] drawn from some of the research projects undertaken in the University of Aberdeen's dot.rural Rural Digital Economy Hub are now presented. Often using the voices of people who live in remote rural areas of Britain, they illustrate the perceived importance of being online, and the frustration and difficulties experienced by rural residents in accessing and using the Internet in rural Britain today.

## 1. Difficulties in securing a home broadband connection

Evan* is a third generation hill farmer. He runs the farm business in partnership with his parents. Apart from a period at University, Evan, in his 40s, has lived on the farm all of his life. His wife Vicky* moved to the farm seven years ago. At this time the couple attempted to get broadband at the farmhouse. Vicky spoke of the challenges:

*"… it was really dodgy wasn't it and I used to spend virtually every Saturday on the phone to [providers] to try and get them to fix it. … And then they re-laid the whole cable […] and it got even worse after that, after they laid new cable. And they said sorry there's nothing we can do to get you Internet please don't phone us again."*

In the absence of an alternative, Evan and Vicky use a dongle to access a broadband service via a mobile signal, a means of access that is proving increasingly ineffective. At the time of interview, Vicky loaded a Sheep Society page – this took 4 minutes and 49 seconds.

Source: Interview conducted by Fiona Williams with participants from the dot.rural Rural PAWS project, 2014.

## 2. Young people feel excluded

Julie* is 19 and lives in a remote rural area. Like most young adults today she uses her mobile phone to communicate with others via Facebook, texting, email and YouTube. Her home Internet service is poor and she often goes to a café in a nearby village to use the Internet. She complains that the 3G phone coverage where she lives is sporadic and this inhibits her using her smart phone.

*"Oh, you mean, like, on your mobile phone? That, yeah, in [town] it's absolutely rubbish. It's awful. There's some streets where you can't get it at all and there's some streets where you can't really get it in the middle of the house; you just have to like go up to the windows and put it against the windows. And that's… pretty much [town] in a nutshell. Because everyone's like 'oh, I'm going to [town], so I probably won't speak to you tonight because I won't get any signal' [laughs]".*

Source: Interview conducted by Claire Wallace as part of 'Communities and Culture Network+' research, 2013.

[4] Note: the names of all respondents have been anonymised and marked with an asterisk. The vignettes illustrate recent research undertaken in remote and rural northern and north-eastern Scotland, the North West of England and the Welsh Marches.

## 3. Challenges faced by a farming family

Sheila* and her husband farm in a community which developed its own broadband access. The telephone lines where they lived did not have the capacity to support traditional broadband. Before the community service was installed they had relied on a dial-up connection which was then withdrawn by the service provider. She said:

*"Internet, yes. Well, for business, I need it for registering calves; when calves are new-born, they have to be registered within 28 days, which has to be done online with BCMS [British Cattle Movement Service]. So I use it for that, and for tax purposes, doing my tax work online, my VAT returns have to be done online now: you've no option, now they have to be done online, so I'm grateful that we've got it. Other things... Personally I do a lot of my shopping online; quite a lot. Not so much my food shopping, but household goods and things, and clothing".*

Sheila's comments indicate how important a reliable Internet connection is for their farming business: without the community broadband service their business would be compromised.

Source: Interview conducted by Fiona Ashmore for her PhD research entitled "Exploring superfast broadband provision in rural UK: A qualitative study of community-based broadband development and use and the potential for community resilience", 2012.

## 4. Internet use amongst rural older people

As part of research to explore the relationship between accessibility and social exclusion, 62 older people living in rural Aberdeenshire were questioned about their relationship with the Internet. 48% said they had never used the Internet. 45% (28 people) said they do use the Internet. They learned how to do so in different ways: most worked it out for themselves and some went on a training course. A local IT training social enterprise closed recently and this may make it difficult for non-Internet users in the future to learn how to use this now ubiquitous technology. Older rural non-Internet users may become increasingly disadvantaged as, for example, government services transition to online delivery and other service providers assume the entire population is digitally connected.

Source: Selected findings from a survey conducted as part of Rob Craig's PhD research entitled "Accessibility and the Capabilities Approach: Towards an Aid to Decision Taking," 2014.

## 5. Feeling that you are 'badly served' and missing out

Living rurally meant, that, for John* and Sarah*, they felt *"badly served"* with their Internet connection, and wanted to sign up with the B4RN (Broadband for the Rural North) service since, *"the way the world is developing everything is being connected electronically".* So how does the divide hit home? *"It's the rural communities that miss out...hardly equal is it?"*

Source: Interview conducted by Fiona Ashmore for her PhD research (as above), 2012.

Matthew* lives and works as a dairy farmer outside Lancaster and is connecting to the new B4RN 1 gigabit per second service. Currently, however, his ability to access the Internet is non- existent: a consistent lack of digital accessibility filters into his personal life as well:

*"I sometimes feel we're excluded from certain aspects of what you might call 'modern life' because things come on iPlayer...lots of things, they put 'want to know more, go to our website'. You sort of feel a bit excluded from things that a lot of people take for granted".*

Source: Interview conducted by Fiona Ashmore for her PhD research (as above), 2012.

## 6. Challenges of using the Internet to source factual information

In the Technology to Support Older People's Personal and Social Interaction (dot.rural TOPS) project, a patient and her spouse who lived on a very remote island in Scotland were asked whether they used the Internet to look for information about their medical condition. Problems with the speed of their Internet connection were mentioned.

Patient 1's spouse commented: "*I've got a couple of websites that actually come up automatically every so often, one is an American thing and they are very much into the things to help <specific medical condition>, it's a particular <medical condition> site and it is interesting. But again, a problem here is that the Internet is so slow so you've got to have time to sit and let it – it can take two or three minutes for a page to load but there's quite a bit of information with that.*"

Source: Interview conducted by Anne Roberts for the dot.rural TOPS project, 2013.

## 7. ICT infrastructure makes it difficult, if not impossible, to be a next generation user household

John*, Fran* and their two teenage daughters live in a small village. John is home-based as a maintenance electrician for a large utilities company and Fran works at the local primary school. The family attempt to operate two laptops, two iPads, two mobile phones, a desktop, an iPod and their satellite television (recordings) off their broadband service. The demands made on the *"half a Meg to a Meg"* service cause tensions within the household:

*"When we are all on our devices it's so slow isn't it? And then things start crashing. You know. I mean I'm only getting my emails and doing my online shopping and sometimes it just takes so long I may as well have just gone over to [the nearest town]. … The biggest bug bear I hear is 'God this is so slow, why's it going so slow, oh it's buffering, oh it's dropped out' and well, you're saying, 'there's too many of us online now'. …"*

One of the teenage girls complains: "*It drops out quite regularly and I've got friends complaining that I have such bad Internet – I shouldn't be on the Internet with such bad Internet.*"

The situation for the family is compounded by the absence of a mobile signal in the village where they live.

Source: Interview conducted by Fiona Williams with a participant household from the dot.rural Rural PAWS project, 2014.

## 8. Reflections on how a business suffers from poor connectivity

Edward* lives and works as a business consultant in the B4RN region outside Lancaster. Not having yet connected to the 1 gigabit per second service, he found that *"at the moment the speed is pretty useless for anything"*. This had a impact on his work: *"from a business point of view it means you can't effectively download videos, transmit video clips, it's just not practical"*. As a business in an increasingly digitally connected economy, *"we're dealing with suppliers online a lot more than we ever did"* making the lack of connectivity even more apparent.

Source: Interview conducted by Fiona Ashmore for her PhD research (as above), 2012.

## 9. Contrasting views of older generation non-Internet users

**Marian and Jack**

Marian* lives in the village with her husband Jack*. They are both in their late 60s and have not used computer technology or had broadband in their home. John takes the view that *"If you've never had it, you don't miss it"* but Marian is aware that a number of her friends are online and regularly access information – sometimes for her. She relays:

*"…there might be the odd occasion like when I couldn't find this hotel in Bournemouth, I couldn't find the number so [friend] did it and looked and could see that there were only two rooms left or something.*

*You know – I can be on the phone with [friend] or somebody and she'll talk about something and say 'Oh just hang on' and she's on the phone and she's checking something and then she's telling me about it, perhaps something we've just been talking about and she's 'Just hold on a minute and I'll have a look. [Friend] has looked up a lot of things [health-related] for me, because there's been a lot as you know and then she's read it all out over the phone."*

Marian is very cautious about buying and using services online, particularly submitting personal or business financial information:

*"I don't know I'd have to think about that one, I mean because you know like when [family members], when that happened with them and the bank and that, it just worries you. I had something, for instance, the other day, they ring up occasionally and see if you want to buy something for [a charity] and she always says do you want to pay over the phone, and I always say no I'll send it and I sent a cheque the next day, but maybe that's a bit old fashioned I don't know."*

**Richard and Linda**

Richard* and Linda*, both in their 60s, moved from their farmhouse to the village some years ago. Richard talked about an opportunity to undertake some computer training in the local community centre, nearly 15 years ago, but stated that he had encouraged his wife and son to attend because *"I thought it would be more applicable to them than me"*. More recently however, Richard has sought out a beginner's computer course. When asked why he had changed his mind, the couple's response:

*R: Yeah well it's widespread now isn't it – everyone.*

*L: No matter what you're watching. If you're watching the weather on television, they'll say look it up on such and such and then there's this little thingy at the bottom that you can – it is on everything now isn't it?*

*R: Well it's about spoilt conversation … well they just go, get their pad out of their pocket.*

*L: They haven't got to think anymore.*

*R: You don't have a debate because it's there in black and white – I suppose I'm just talking about pub discussions and that sort of thing you know. It's certainly changed. And I thought it was about time I could do the same you see!*

Source: Interviews conducted by Fiona Williams with participants from the dot.rural Rural PAWS project, 2014.

## 10. Poor connectivity makes it difficult to fulfil the demands and expectations of an employer

John's* work mobile operates off the broadband and he accesses his work schedule for the day online via a work laptop. He is often 'on call'. The household's broadband connection and speed cause problems for John:

*"I'm meant to be anywhere within two hours so when they ring me I've got to be where I've got to be within two hours […] So to go from here to [large conurbation] in two hours you don't want to spend three quarters of an hour trying to get the job down on your laptop. … like I was called out last night, I stopped on the way home to send my job back … because I knew that when I came home I'd have to try and log on via the Internet at home and I may or may not get it in which case if I haven't sent my job back they don't know I've left site. Well the job is still there so eventually they're going to turn around and say the job is still there and try and send it out again. So I do end up cancelling my lone worker forty-five minutes drive away because if I don't I'll forget to do it and when I get home I can't do it."*

Source: Interview conducted by Fiona Williams with a participant from the dot.rural Rural PAWS project, 2014.

## 11. Catering for a rural clientele with slow Internet connections

Alongside the link to download a pdf property for sale schedule the Dumfries and Galloway Solicitors Property Centre web page noted: *"As a guide, on a 56K modem, a 200K pdf file may take up to 4 minutes [to download]"*. The size of each property schedule file is always stated.

Source: Dumfries and Galloway Solicitors Property Centre Website, October 2013


## 12. What good Internet access in remote rural areas enables

James* is a professional who lives in a small village in remote rural Scotland. He sometimes works from home and is able to use many wireless applications.

*"What do I use it for? Yeah. The usual: surf Internet type, access for web browsing, information, booking holidays, all the usual stuff. We have a TV connected wirelessly through Apple TV, so we use that for movies and things like that… But, you know, I got snowed-in last winter, so in December I couldn't get to work. I didn't try very hard to be honest. But it was snowing like crazy. I deemed it unsafe to try and get to work. But I could quite easily work from home because the speed of the service is pretty good quality. Ahm... we use Skype quite a bit. And that's pretty decent. I think it relies a lot on what the person at the other end's got…"*

Source: Interview conducted by Claire Wallace as part of 'Communities and Culture Network+' research, 2013.

# 5. Conclusion

c. 11.6 million people live in rural Britain, and experience the socio-economic and infrastructure conditions that go with rural dwelling. Of this total, c. 1.3 million people live in deep rural areas, and c. 10.3 million in shallow rural areas. Deep rural areas cover approximately half the total land mass of the UK, and include resources associated with agricultural production, tourism and recreation, biodiversity, and creative and entrepreneurial activity and potential.

By exploring rural Internet use for the first time in such detail, and by distinguishing between people in deep and shallow rural areas, we have been able to uncover major differences between the ways in which urban and rural – specifically, deep rural – dwellers make use of the Internet. These include the recognition that, as expected, online behaviour generally reflects constraints on the connections to the Internet. The effects of these include an overall limitation on what people are able to do online compared with what they want to do. Deep rural dwellers are significantly less likely to be – and to be able to be – Next Generation Users.

The overall findings point to a geographically defined, excluded group, who by implication are less likely than other groups in Britain to be able to engage online with the creative, social, commercial, and civic life regarded as normal in other areas. Previous research masked this effect due to the research obstacles to gaining a sufficient sample to discern them, but also due to the degree that patterns of use in shallow rural areas tend to compensate for and hide the deficiencies in access within the deep rural areas when analysis does not discriminate between different types of rural area.

A particularly difficult issue for policy is whether it is preferable to aim at deploying low speeds universally and rapidly, or to systematically plan to proceed more slowly (say, over a five-year period) and achieve a higher universal speed. The rapid growth of high-demand services and content delivery suggest that unless the latter strategy is adopted, universal low speed broadband is not future-proofed, and could be obsolete by the time it is achieved. The context of 'digital by default' in the provision of Government services is especially pertinent, as the constraints of low-speed connection highlighted in this report question the viability of a universal model of online service delivery.

Some community-led broadband projects confirm this view: for example B4RN (Broadband for the Rural North) in northern England, have committed to providing speeds of 1 Gbp/s (1,000Mbit/s). Furthermore, technical issues mean that the installation of higher speed infrastructure via fibre or copper is unlikely to reach the most remote households, and a mix of technologies including wireless and satellite will be required: some of these are less likely to provide such high speeds as fibre-based systems.

Clearly, there are many policy issues raised by the deep rural divide discovered and documented in this study, and reinforced by related research on communication infrastructures (such as in reports published by the telecommunications regulator, Ofcom). We hope this study provides additional evidence of this divide and stimulates and informs serious debate over the policy and regulatory responses necessary to address it.

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# Appendices

# Appendices

## APPENDIX 1 :
## Urban and rural classifications in Scotland, England and Wales

In the UK different urban-rural classifications are in place for the four constituent nations. (Pateman, 2011) provides a very useful overview of the different 'official' (i.e. government) classifications currently in use. The OxIS 2013 report referred to two of these classifications which apply to Scotland and to England and Wales respectively. The Scottish Government's urban/rural definition, based on data zones, can be expressed as two-fold, three-fold, six- fold or eight-fold area types (see http://www.scotland.gov.uk/Topics/Statistics/About/Methodology/UrbanRuralClassification) and the England and Wales rural/urban definition, at middle layer super output areas, is a six- fold classification (http://www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/rural-urban-definition-and-la/index.html). The Scottish classification is based around settlement size and proximity (expressed as drive time) to a sizeable urban centre.

The England and Wales definition is based around settlement type and a population density (sparsity) variable. Settlement and population distribution patterns vary considerably across the UK and these differences have informed the development of these classifications and are in large part the reason why a single, UK-wide urban/ rural classification is not in use. In Scotland, for example, 82% of the population live in an urban area, 8% live in accessible rural, 6% in remote rural and 4% in very remote rural areas. The urban Scottish population occupies c. 6% of the Scottish land area: 18% of the population lives in the remaining 94%, and very remote rural areas cover half the Scottish land area. In England, by contrast, 20.9% of the land area is urban and only 1% of the population live in a 'sparse' area, concentrated in the northern and south-west fringes of the country (Pateman, 2011).

## APPENDIX 2:
## Contributors of case vignettes and the research projects referred to Contributors

**Fiona Williams** is a dot.rural Post-doctoral Research Fellow (in Geography) at the University of Aberdeen. She is currently working on the Rural Public Access Wi-Fi project (Rural PAWS) which explores means of enabling digital inclusion in rural areas. In her previous employment with the Institute of Rural Health Fiona led the Welsh component of the dot.rural TOPS project

**Claire Wallace** is Professor of Sociology at the University of Aberdeen. Her research is about the impact of digital communications on social life and the quality of society in international comparisons.

**Anne Roberts** is a Research Assistant at the Centre for Rural Health, University of Aberdeen. Her current research includes an evaluation of the Paediatric Unscheduled Care Telehealth pilot where paediatric consultants use video link to support A&E clinical staff in making decisions about paediatric patients in remote hospitals across the north of Scotland. Anne was a researcher in the dot.rural funded TOPS project, responsible for most of the Scottish fieldwork.

**Rob Craig** is a Postgraduate Research Student in the University of Aberdeen's Rural Digital Economy Research Hub, dot.rural. He is interested in the concepts of, and the relationship between, accessibility and social exclusion in the context of social justice. His interest in social justice also extends to his philosophical and methodological approach to his work, and in particular the notion of action research.

**Fiona Ashmore** is a Postgraduate Research Student in Geography at the University of Aberdeen. Her PhD research explores community-based superfast broadband organisations and the extent to which superfast broadband development and use enhances community resilience. Within dot.rural she is affiliated with the Digital Engagement and Resilience (DEAR) project.

## Projects

The Technology to support Older adults – Personal and Social Interaction (TOPS) project is one of the dot.rural healthcare theme projects. With a focus on older adults with chronic pain in rural areas, this project has explored personal and social interaction between older adults and their health and social care providers within the context of widespread upscaling in the use of electronic healthcare technologies (sometimes known as telehealthcare) to support patients in their own homes.

The Rural Public Access Wi-Fi Services (RuralPAWS) project is focused on enabling access to broadband services in rural areas by developing technology that will pave the way for new access methods that will allow for commercially viable, 'fit-for-purpose' Internet services in traditionally hard to reach areas. Rural PAWS is funded by dot.rural as a partnership project with the Horizon Digital Economy Hub (University of Nottingham), MLAB (University of Cambridge) and industrial partners including BT and Avanti.

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