



# Communications Market Report: Scotland

Research Document

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# About this document

The report contains statistics and analysis of the Scotland communications sector and is a reference for industry, stakeholders and consumers. It also provides context to the work Ofcom undertakes in furthering the interests of consumers and citizens in the markets we regulate.

The report contains data and analysis on broadcast television and radio, fixed and mobile telephony, internet take-up and consumption and post.

We publish this report to support Ofcom's regulatory goal to research markets constantly and to remain at the forefront of technological understanding. It also fulfils the requirements on Ofcom under Section 358 of the Communications Act 2003 to publish an annual factual and statistical report. It also addresses the requirement to undertake and make public our consumer research (as set out in Sections 14 and 15 of the same Act).



# Introduction

This is Ofcom's ninth annual review of communications markets in Scotland, offering an overview of the take-up and use of communications services across the nation.

In many of the areas we report on, Scotland is showing signs of becoming a more connected nation, catching up with the UK average. In fact, consumers in Scotland spend the most time consuming media across an average day of any nation in the UK.

Internet access is now in line with the UK average and tablet ownership in Scottish households has almost doubled. There has also been a big increase in the percentage of mobile phone users who own smartphones and are using them to connect to the internet. Other highlights include a large increase in DAB radio ownership, an increase in smart TV take-up and in catch-up viewing on mobile or computer.

In TV, network production from Scotland has again experienced growth. The increase in network expenditure is evidence that the slight decrease reported in last year's *Communications Market Report* may have been a blip. Our report also shows the increasing popularity of watching TV on demand and the continuing reliance on TV for news consumption.

In radio, commercial stations accounted for around half of adults' total share of listening hours in Scotland, higher than in any other nation and above the UK average.

In post, the report shows continuing high levels of satisfaction with the Royal Mail in Scotland, as revealed in the last two communications reports.

This year's report also includes detailed findings on how SMEs in Scotland view communications services.

The information set out in this report does not represent any proposal or conclusion by Ofcom in respect of the current or future definition of markets. Nor does it represent any proposal or conclusion about the assessment of significant market power for the purpose of the Communications Act 2003, the Competition Act 1998 or any other relevant legislation.

# Contents

Introduction	1	
Setting the scene	3	
<b>1</b>	<b>Scotland's communications market</b>	<b>5</b>
1.1	Key findings for Scotland	5
1.2	SME telecoms research 2014	10
1.3	Mobile coverage	18
1.4	Availability of communications services in Glasgow and Inverness	25
1.5	Digital Day 2014 Scotland	40
<b>2</b>	<b>Television and audio-visual content</b>	<b>47</b>
2.1	Recent developments in Scotland	47
2.2	Digital television take-up in Scotland	49
2.3	Broadcast television viewing	53
2.4	TV programming for viewers in Scotland	57
2.5	Gaelic-language programming	62
2.6	PSB television quota compliance	63
<b>3</b>	<b>Radio and audio content</b>	<b>67</b>
3.1	Recent developments in Scotland	67
3.2	Radio station availability	67
3.3	Patterns of listening to audio content	68
3.4	Digital radio set ownership and listening	70
3.5	The radio industry	72
<b>4</b>	<b>Internet and web-based content</b>	<b>73</b>
4.1	Internet take-up	73
4.2	Internet-enabled devices	73
4.3	Internet use	76
<b>5</b>	<b>Telecoms and networks</b>	<b>79</b>
5.1	Recent developments in Scotland	79
5.2	Availability of fixed broadband services	80
5.3	Mobile coverage	84
5.4	Service take-up	88
5.5	Satisfaction with telecoms services	92
<b>6</b>	<b>Post</b>	<b>95</b>
6.1	Recent developments	95
6.2	Sending post: residential customers	95
6.3	Receiving post: residential customers	99
6.4	Attitudes towards Royal Mail	100
6.5	Sending and receiving post: business customers	102

# Setting the scene

## Key facts about Scotland

Figure	Scotland	UK
Population	5.313m (mid-2012 estimate)	63.705m (mid-2012 estimate)
Age profile	Population aged <16: 17.2% Population aged 65+:17.4%	Population aged <16: 18.8% Population aged 65+: 17%
Population density	68 people per square kilometre	263 people per square kilometre
Language	87,000 people aged 3 and over (1.7% of the population) had some Gaelic language ability in 2011.	n/a
Unemployment	6.4% of the working age population	6.8% of the working age population
Income and expenditure	Weekly household income: £671 Weekly household expenditure: £437	Weekly household income: £711 Weekly household expenditure: £482

Source: Office for National Statistics: Region and Country Profiles, Key Statistics – December 2013; Office for National Statistics: Labour Market Statistics, May 2014; Office for National Statistics: Family Spending 2013 edition; National Records of Scotland, Statistical Bulletin – September 2013; 2011 Census, 2011 Census: Key Results

### A note on our survey research

We conducted a face-to-face survey of 3,750 respondents aged 16+ in the UK, with 501 interviews conducted in Scotland. Quotas were set and weighting applied to ensure that the sample was representative of the population of Scotland in terms of age, gender, socio-economic group and geographic location. Fieldwork took place in January and February 2014.

Respondents were defined as urban if they lived in a settlement with a population of 2000 or more and rural if they lived in areas with smaller populations. The survey sample in Scotland has error margins of approximately +/- 3-4% at the 95% confidence level. In urban and rural areas survey error margins are approximately +/-4-6%.

In addition to the survey data, this report refers to information from a range of other sources, including data provided to Ofcom by stakeholders. Tables summarising the data collected in our survey are published on Ofcom's website.





# 1 Scotland's communications market

## 1.1 Key findings for Scotland

### Introduction

This section sets out a selection of the key facts and figures relating to communications markets across Scotland in 2013, comparing and contrasting nations and highlighting changes that have taken place in the past year.

### Key findings for Scotland

#### SME telecoms research

- **A majority of SMEs in Scotland rate communications services as fundamental to their business, and many are making use of online applications.**
- **Most SMEs in Scotland are satisfied with communications at an overall level. Satisfaction levels were lowest among ADSL broadband services, with just under seven in ten (69%) say that they are satisfied with this service.**
- **Over three in ten Scottish SMEs do not feel confident in their ability to identify new communications products or services.**
- **A third of Scottish SMEs report having experienced poor mobile coverage, with almost 4 in 10 Scottish SMEs report having experienced poor reliability of their internet connection**

#### Mobile coverage in Scotland

- **Mobile users in Scotland have higher expectations of their network's performance than do users in the other nations.** Networks are expected to perform best in outdoor urban areas (94%) and indoors (89% and 80%). Expectations on network performance when travelling and in rural outdoor areas are lower (59%).
- **The majority of mobile phone users are satisfied with their network.** The majority of mobile phone users (82%) claim to be 'fairly' or 'very' satisfied with their current network, with those in urban areas being more satisfied than those in rural areas (85% vs. 68%).
- **A third of those who had switched mobile phone network in Scotland recalled their new supplier checking their network coverage for them.** Just over half (52%) said their coverage was not checked and the remaining 14% could not remember.

#### Availability of communications services in Glasgow and Inverness

- **Glasgow has markedly lower total next-generation access (NGA) coverage than the majority of the other cities assessed,** although this has increased by 4% since the last report.

- **Glasgow's NGA availability is likely to increase further as BT Openreach implements its upgrade plans.**
- **In Glasgow, the areas of greatest deprivation were those where NGA broadband was least available.** The most income- and education-deprived areas of the city also had the highest proportion of '<2Mbit/s' connections.
- **Glasgow's fixed broadband take-up has improved since the last report but is still lower than the UK average**
- **Inverness has significantly lower NGA availability than the other ten cities assessed, although this has increased slightly since the last report.**
- **NGA availability in Inverness is likely to increase in the future due to the £146m scheme to invest in broadband across the Scottish Highlands and Islands.** This is a public-sector intervention led by Highlands and Islands Enterprise (HIE).

### Digital Day

- **Consumers in Scotland spent the most time per day on media and communications.** Respondents in Scotland recorded the highest volume of media use, at 11 hours 41 minutes per day (squeezed into 9 hours and 6 minutes, because people carried out some media activities concurrently). The average across the UK was 11 hours 7 minutes of media consumption, compressed into 8 hours 41 minutes.
- **Television remains resilient in Scotland, where four in ten media minutes are spent watching TV on a TV set.** People in Scotland spent 39% of their daily media and communications time watching TV on a TV set – marginally higher than the UK average of 37%. Ten per cent of media time was spent using a radio set, with use of this device being most popular in the morning period.

### TV and audio-visual content

- **Satellite, cable and internet television platform take-up grew at the expense of digital terrestrial television (DTT).** Both satellite and cable increased their share of TV households by 3pp; to 40% and 19% respectively. Digital television via broadband jumped from 2% to 6%, possibly as a result of both BT and TalkTalk adding YouView boxes to their bundle offerings in late 2012.
- **Scotland has fewer online catch-up TV service users than the UK average.** The proportion of people who claimed to use online catch-up services for television viewing was lower in Scotland than in the UK as a whole (29% vs. 32%).
- **Of the three devolved nations, Scotland has the highest proportion of adults using the television to keep up with national news.** In 2013, 80% of respondents cited television as their main source of national news, compared with 60% and 61% in Wales and Northern Ireland respectively. National news in this context refers to each devolved nation and not the UK.
- **BBC and STV spend on first-run originated content for viewers in Scotland remained stable in 2013.** In nominal terms, spend on first-run originated programming shown on BBC One, BBC Two and STV for viewers in Scotland has remained steady, at around £52m per year over the last four years.

- **Total spend by the BBC/ STV on nations' programming in Scotland was up 1% year on year.** The BBC and STV spend on Scottish current affairs programming increased by 6% in 2013, a 17% rise on five years earlier.

#### Radio and audio content

- **Scotland has five new community radio stations on air.** This brings the total number of community radio stations available in Scotland to 23, with eight more preparing to launch since the recent licence awards.
- **Local commercial stations are more popular in Scotland than in other nations.** These accounted for a 36% share of listening hours in Scotland in 2013, which is seven percentage points above the UK average.
- **One third of all listening in Scotland was through a digital platform.** Digital listening grew 4.3 percentage points year on year, with 33% of listening hours now via a digital platform. Although lower than the UK average (36%), the share of digital listening in Scotland is higher than that for Wales and Northern Ireland (29% and 23%).
- **More than four in ten households in Scotland now have a DAB digital radio set.** There has been an increase of 14 percentage points since 2013, with 43% of households now owning a DAB digital radio set. This represents the second largest increase of all the nations, after Wales, and brings Scotland into line with the UK average of 44%.

#### Internet and web-based content

- **Eight in ten households in Scotland have internet access.** Access increased by five percentage points year on year, to come into line with the UK average (81%).
- **Four in ten households in Scotland have a tablet computer.** In Q1 2014, 42% of households in Scotland claimed to own a tablet computer such as an iPad or Kindle Fire, an 18 percentage point annual increase.
- **The laptop is no longer the most important device for getting online for most internet users in Scotland.** No single device was thought to be most important by a majority of internet users in Scotland in Q1 2014. This is in contrast to Q1 2013, when 54% of internet users in Scotland claimed their laptop was most important.
- **Internet users in Scotland spend the most time online of the devolved nations.** Internet users in Scotland claim to spend 16.5 hours on the internet per week, slightly less than the UK average of 16.9 hours. Furthermore, internet users in Scotland claim to spend a significantly greater amount of time using the internet outside the home, workplace, or place of education than users in Wales or Northern Ireland.

#### Telecoms and networks

- **By June 2014 64% of premises in Scotland were served by the NGA networks that are used to provide superfast broadband services.** This was below the UK average of 78% and was the second lowest proportion among the UK nations after Wales (58%).
- **Over three-quarters of homes in Scotland had a broadband connection in Q1 2014.** While broadband take-up stood at 76% across all households in Scotland in

Q1 2014, it was lower among people aged over 65, the C2DE socio-economic group and low-income households.

- **Eighty-eight per cent of fixed broadband users in Scotland were satisfied with their service in Q1 2014.** There was no difference in satisfaction levels between urban and rural areas of Scotland.
- **Two-thirds of mobile phone users (69%) in Scotland had a smartphone in Q1 2014.** This was an increase of 20 percentage points compared to Q1 2013, the largest increase across the nations. Smartphone take-up was higher in urban areas of Scotland (71%) than in rural areas (61%).

## Post

- **Almost six in ten adults in Scotland say they only use post if there is no alternative.** When asked about their attitudes to various statements concerning sending and receiving post, 57% of adults in Scotland say they only use this method of communication if there is no alternative, compared to just 40% across the UK as a whole.
- **Adults in Scotland are more likely than those in other nations to use a Post Office counter to send parcels.** When asked about the various services, adults in Scotland said they were more likely than those in the other nations to go to the Post Office counter to send a parcel (71% vs. 58% across the UK).
- **Those living in Scotland claim to receive the most items of post each week (10.5) compared to the rest of the UK (8.7).** This is largely driven by the finding that almost a third of respondents in Scotland (32%) claim to have received more than ten items in the past week, compared to just 24% across the UK as a whole.
- **Adults living in Scotland are more satisfied than those in the rest of the UK with the cost of postage.** Eighty nine per cent of people in Scotland are satisfied with Royal Mail overall. This satisfaction is seen across all aspects of Royal Mail's service, in particular the cost of postage: 68% of adults in Scotland express satisfaction with this, compared to just 55% across the whole of the UK.

Figure 1.1 Fast facts for Scotland

	UK	England	Scotland	Wales	Northern Ireland	UK urban	UK rural	Scotland urban	Scotland rural
TV take-up	97	97	95 <sup>-</sup>	98 <sup>+</sup>	97	96	99 <sup>+</sup> ↑+1	95 <sup>-</sup>	98 <sup>+</sup>
Smart TV take-up among TV homes	12 ↑+5	12 ↑+4	8 <sup>-</sup> ↑+4	9 <sup>-</sup> ↑+3	7	12 ↑+5	11 ↑+4	7	11
DAB ownership among radio listeners <sup>1</sup>	44	44	43 ↑+14	42 ↑+15	30 <sup>-</sup> ↑+6	43	47 ↑+8	43 ↑+14	42 ↑+11
Online TV / video viewing (on mobile or computer)	49 ↑+7	50 ↑+8	42	48 ↑+10	48	50 ↑+8	41 <sup>-</sup>	41	46
Broadband take-up	77	77	76 ↑+6	71 <sup>-</sup> ↑+5	73 <sup>-</sup>	76	78	76 ↑+7	76
Mobile broadband take-up	8 ↑+3	9 ↑+4	6 <sup>-</sup>	7	5 <sup>-</sup>	8 ↑+2	11 <sup>+</sup> ↑+7	6 <sup>-</sup>	7
Use mobile to access internet	57 ↑+8	57 ↑+8	56 ↑+12	52 <sup>-</sup> ↑+5	51 <sup>-</sup> ↑+6	58 ↑+9	51 <sup>-</sup> ↑+3	58 ↑+14	49 <sup>-</sup> ↑+7
Mobile phone take-up	93	94 ↑+2	90 <sup>-</sup>	92	94	93	93	90 <sup>-</sup>	89 <sup>-</sup>
Smartphone take-up	61 ↑+10	61 ↑+9	62 ↑+17	57 <sup>-</sup> ↑+8	55 <sup>-</sup> ↑+10	62 ↑+11	56 <sup>-</sup> ↑+5	64 <sup>+</sup> ↑+19	54 <sup>-</sup> ↑+9
Fixed landline take-up	84	84	83	78 <sup>-</sup>	83	83	87 <sup>+</sup>	82	89 <sup>+</sup>
Tablet computer take-up	44 ↑+20	44 ↑+20	42 ↑+18	45 ↑+24	45 ↑+16	43 ↑+20	47 ↑+18	41 <sup>-</sup> ↑+16	48 <sup>+</sup> ↑+26
E-reader take-up (personal use)	17	17	16	18 ↑+3	20 <sup>+</sup> ↑+8	16	21 <sup>+</sup>	16	20 <sup>+</sup>
Households taking bundles	63 ↑+3	64 ↑+4	64 ↑+4	59 <sup>-</sup> ↑+9	54 <sup>-</sup> ↑+3	63 ↑+4	63	64	65 ↑+8
Fixed telephony availability	100	100	100	100	100				
Fixed broadband availability <sup>2</sup>	99.99	100	99.87	100	100				
LLU ADSL broadband availability <sup>3</sup>	95	96	88	93	87				
Virgin Media cable broadband availability <sup>4</sup>	44	47	35	21	26				
BT Openreach / Kcom fibre broadband availability <sup>5</sup>	69	71	48	55	92				
NGA broadband availability <sup>6</sup>	78	80	64	58	95				
2G mobile availability <sup>7</sup>	99.7	99.9	99.5	99.0	98.9				
3G mobile availability <sup>8</sup>	99.5	99.8	97.3	98.3	99.0				
4G mobile availability <sup>9</sup>	73.0	76.3	56.8	44.9	79.2				
DTT availability <sup>10</sup>	98.5	98.6	98.7	97.8	97.4				
TV consumption (hours per day)	3.9	3.8	4.1	4.4	4.0				
Radio consumption (hours per day)	3.1	3.1	2.9	3.1	2.8				

Key: †Figure is significantly higher than UK average; †Figure is significantly lower than UK average;  
↑+xx Figures has risen significantly by xx percentage points since Q1 2013

Source: Ofcom research Q1 2014, BARB, RAJAR, industry data

Base: All adults aged 16+ (n = 3740 UK, 491 Wales, 2249 England, 501 Scotland, 499 Northern Ireland, 1965 England urban, 284 England rural, 261 Scotland urban, 240 Scotland rural, 252 Wales urban, 239 Wales rural, 247 Northern Ireland urban, 252 Northern Ireland rural)

1. DAB ownership in the nations and UK as reported here is sourced from Ofcom research. The UK CMR uses RAJAR data for DAB ownership.
2. Proportion of premises able to receive ADSL broadband services based on data reported by BT, December 2013
3. Proportion of premises connected to an LLU-enabled BT local exchange area, December 2013
4. Proportion of premises able to receive Virgin Media cable broadband services, June 2014
5. Proportion of premises able to receive BT Openreach/ KCom fibre broadband services, June 2014; under regulatory rules other providers can provide retail fibre broadband services to consumers using these networks.
6. Proportion of premises able to receive NGA broadband services, June 2014
7. Proportion of premises that have outdoor 2G mobile coverage from at least one operator, June 2014
8. Proportion of premises that have outdoor 3G mobile coverage from at least one operator, June 2014
9. Proportion of premises that have outdoor 4G mobile coverage from at least one operator, June 2014
10. Estimated proportion of homes that can receive the PSB channels via DTT (3PSB Mux coverage). Joint TV planning project (Arqiva, BBC, Ofcom).

## 1.2 SME telecoms research 2014

### A majority of SMEs in Scotland rate communications services as fundamental to their business

Eighty-two per cent of Small and Medium Enterprises (SMEs) in Scotland agree that communications services are fundamental to their business – this on a par with the average response from SMEs across the UK (83%). There are no significant differences by size or location.

When asked to rate the importance of different types of communications services on a scale of 1-10, fixed phone (8.9) and fixed internet (8.8) were both rated as almost 9 out of 10 on average. Mobile phone services were rated slightly lower (at 8.2). Mobile internet services (e.g. using a USB dongle) appear to be less important.

**Figure 1.2 Importance of communications services to SMEs in Scotland**

	All UK	Scotland	Scotland					
			Location		No. of employees			
			Urban	Rural	1-4	1-9	10-49	50-249
% who agree that “Communications services are fundamental to our business without them we could not achieve our goals”	83	82	81	84	80	82	88	88
Mean scores: “How important are XXX services on a scale of 1-10”								
Fixed phone lines	8.9	8.8	8.9	8.6	8.6	8.7	9.4	9.1
Leased Lines	8.4	Sample of users too small to report						
Mobile phone services	8.2	8.1	8.2	8.0	8.0	8.1	8.6	7.7
Fixed internet services	8.8	8.8	8.7	8.9	8.7	8.7	9.2	8.9
Mobile internet services	6.4	6.0	Sample of users too small to report					

Source: Ofcom SME research

Base: All SMEs (n=1508 in the UK, 349 in Scotland).

Note: Base sizes for rural (114), 10-49 employees (75) and 50-249 (51) employees are low and should be treated as indicative only. Importance scores based on all SMEs that use the service

### The majority of SMEs in Scotland have broadband internet

The majority (80%) of SMEs in Scotland are online and this is true across urban and rural areas and businesses of different sizes. Nearly seven in ten (69%) SMEs in Scotland use mobile phones. Use of internet and mobile phones is more common among larger businesses in Scotland.

**Figure 1.3 Communications services used by SMEs in Scotland (% use)**

	All UK	Scotland	Scotland					
			Location		No. of employees			
			Urban	Rural	1-4	1-9	10-49	50-249
Standard PSTN landline telephones	95	95	94	96	94	94	97	92
ADSL Broadband	66	72	70	76	69	71	83	80
Smartphones	44	48	49	47	46	48	49	73
Standard (non-smart) mobile phones	36	38	34	45	35	36	53	71
VoIP	13	12	13	10	11	11	19	39
Mobile broadband (e.g. USB dongle)	10	12	12	12	11	11	16	35
Cable broadband <sup>1</sup>	11	11	15	5	12	11	12	20
Fibre broadband	7	7	9	3	6	6	5	31
ISDN 2/ 2e	7	6	8	4	3	4	21	31
Video Conferencing	4	6	5	7	6	6	5	22
VPNs	4	4	6	2	2	2	16	53
Ethernet	7	5	5	5	3	4	13	33
Leased Lines/ Private Circuits	3	2	3	1	1	1	4	33
ISDN 30	2	1	2	0	1	1	1	39
NET: Landline	96	95	95	96	94	95	99	100
NET: Internet	78	80	81	79	76	79	92	94
NET: Mobile services	66	69	65	75	67	68	71	82

Source: Ofcom SME research

Base: All SMEs (n=1508 in the UK, 342 in Scotland).

Note: Base sizes for rural (114), 10-49 employees (75) and 50-249 (51) employees are low and should be treated as indicative only. "NET: Internet" figure excludes leased lines which can be used solely for voice service so the actual proportion connected to the internet may be marginally higher.

### Most SMEs in Scotland using online applications

The majority of SMEs are making functional use of the internet to order goods and services (86%) and to make payments (68%). Almost seven in ten have a company website (69%).

A minority of SMEs are using the internet for marketing and sales, with 38% using online marketing, 45% taking orders online and 39% taking payments online. A smaller minority of SMEs say they are using online services to manage or access their data; one in five (23%) are using cloud services.

<sup>1</sup> Likely to include an over-claim



**Figure 1.4 Selected internet applications/ software used by SMEs in Scotland (% use)**

	All UK	Scotland	Scotland					
			Location		No. of employees			
			Urban	Rural	1-4	1-9	10-49	50-249
Ordering goods and services online	83	86	87	85	85	86	93	88
Making payments by BACS	62	68	68	67	64	65	84	85
Company website	69	69	70	67	66	67	80	96
Taking orders for goods and services	42	45	48	39	45	45	43	54
Online marketing (e.g. email, Facebook, Twitter)	39	38	39	37	38	37	45	52
Taking payment for goods and services	35	39	39	39	38	38	39	56
Online data storage or back-up	28	29	27	32	26	27	38	48
Cloud services	23	23	24	21	21	22	32	31
Remote log-in to your work PC or laptop	20	16	18	12	12	14	29	48
Remote log-in to work server	17	16	17	14	12	13	30	58

Source: Ofcom SME research

Base: All SMEs with fixed internet (n=1267 in the UK, 293 in Scotland).

Note: Base for SMEs with fixed internet in rural areas (94) and those with 10-49 (69) and 50-249 (48) employees are low so treat as indicative only.

### **Over a third of Scottish SMEs do not feel confident in their ability to identify new communications products or services**

The survey results suggest that there is a confidence gap among SMEs in Scotland in identifying new communications products and services to benefit their business. More than a third (35%) say they do not feel confident in their ability to do this, although 65% say they feel very well informed about how communications services can help businesses survive.

A lack of information does not seem to explain low confidence – Scotland's SMEs are almost universal (91%) in their agreement that information is widely available. However, almost four in ten (38%) SMEs indicate that they have security concerns related to communications services, which may, in part at least, explain the lack of confidence.

**Figure 1.5 Confidence in use of communications services by SMEs in Scotland (%)**

	All UK	Scotland	Scotland					
			Location		No. of employees			
			Urban	Rural	1-4	1-9	10-49	50-249
% agree - I don't have confidence in my ability to identify which new communications products or services would be valuable for the organisation	34	35	30	42	37	36	27	20
% agree - I feel very well informed about how communications services can help the organisation survive	67	65	67	63	64	65	67	71

Source: Ofcom SME research

Base: All SMEs (n=1508 in the UK, 342 in Scotland)

**Most SMEs in Scotland are satisfied with communications at an overall level...**

Eighty-seven per cent are satisfied with standard PSTN lines, 91% are satisfied with smartphones and 87% with standard mobile phones.

**...but satisfaction is lower with ADSL broadband**

Just under seven in ten (69%) say that they are satisfied with their ADSL broadband service.

When SMEs were asked about particular aspects of mobile and internet services (for example, speed and coverage) satisfaction levels tended sit at around seven in ten (See Figure 1.6 for details).

**Figure 1.6 Satisfaction with elements of communications services: SMEs in Scotland (%)**

% Satisfied with...	All UK	Scotland	Scotland					
			Location		No. of employees			
			Urban	Rural	1-4	1-9	10-49	50-249
Standard PSTN landline telephone services	88	87	91	80	87	87	86	81
Smartphones (eg. iPhones/Blackberries/Samsung Galaxy/Other Android)	90	91	95	84	90	91	92	89
Standard mobile phone	85	87	87	86	87	87	85	92
ADSL Broadband (internet via fixed line)	78	69	79	54	69	68	74	80
Mobile phones / smartphones - the reliability of the service in terms of the quality of the signal or connection?	73	71	72	69	73	71	66	74
Mobile phones / smartphones- the geographic availability of the service (i.e. the breadth of coverage)	75	70	73	67	71	71	66	71
Mobile phones / smartphones- the value for money of the service provided	81	83	86	81	83	85	70	77
Mobile phones / smartphones – the reliability of the service in terms of being able to send and receive emails or access the internet	78	70	77	59	69	70	68	84
Internet service - the reliability of the service in terms of the quality of the connection	80	74	87	53	75	75	68	88
Internet service - the ability to access the speed that has been paid for	66	61	72	44	63	62	54	77
Internet service - the geographic availability of the service (i.e. The ability to obtain the service where your company is based)	80	73	80	63	74	73	75	77
Internet service- the speed of the connection	71	66	78	45	67	66	64	75
Internet service - the geographic availability of symmetrical services where the upload and download speeds is the same	57	46 <sup>2</sup>	55	31	44	45	55	58

Source: Ofcom SME research

Base: All SMEs (variable base).

Note: Base sizes for rural areas, 10-49 employees and 50-249 employees are low and so should be treated as indicative only.

### A third of Scottish SMEs report having experienced poor mobile coverage

Despite the relatively high levels of satisfaction reported, one in three (31%) SMEs with mobile telephony in Scotland report having experienced poor mobile coverage in the past 12 months.

<sup>2</sup> There were a high number of neutral and ‘don’t know’ responses to this question. 22% were dissatisfied.

**Figure 1.7 Problems experienced with mobile phone service in the past 12 months**

	All UK	Scotland	Scotland					
			Location		No. of employees			
			Urban	Rural	1-4	1-9	10-49	50-249
Poor mobile coverage	26	31	28	37	31	31	34	-
Poor mobile internet coverage	5	6	5	8	7	7	4	-
Calls dropping out	6	6	6	5	6	6	4	-
Slow speeds when connecting to internet	2	4	4	3	3	4	2	-
Delays in receiving text messages	2	3	2	4	3	3	0	-
Poor customer service	4	2	4	1	2	2	4	-
No problems experienced	61	57	61	50	56	56	58	-

Source: Ofcom SME research

Base: All SMEs with mobile/smartphone (n=1048 in the UK, 245 in Scotland).

Note: Base size for 10-49 employees (53) is low and so should be treated as indicative only.

Note: Problems mentioned by less than 2% in both the UK and Scotland samples are not included

On fixed-line telephone services, the most commonly-reported problem was poor service reliability, with 18% of SMEs in Scotland reporting having experienced such a problem in the past 12 months.

**Figure 1.8 Problems experienced with fixed-line service in the past 12 months**

	All UK	Scotland	Scotland					
			Location		No. of employees			
			Urban	Rural	1-4	1-9	10-49	50-249
Poor service reliability (loss of service/ technical fault)	15	18	16	22	19	18	19	18
Poor customer service	3	4	3	6	4	4	4	4
Unsolicited nuisance or silent calls	3	3	3	1	3	3	0	0
Additional charges (unexpected)	2	2	2	1	1	2	3	0
Poor voice quality	1	2	0	5	2	2	0	2
No problems experienced	75	73	76	68	72	73	74	76

Source: Ofcom SME research

Base: All SMEs with landline services, (n=1467 in the UK, 331 in Scotland). Base sizes for rural areas (48), 10-49 employees (74) and 50-249 (51) are low and so should be treated as indicative only.

Note: Problems mentioned by less than 2% in both the UK and Scotland samples are not included

### **Almost 4 in 10 Scottish SMEs report having experienced poor reliability of their internet connection**

Almost four in ten (37%) internet-connected SMEs in Scotland reported that they had experienced poor service reliability from their internet connection in the past 12 months. This figure was higher in Scotland than the UK average figure.

**Figure 1.9 Problems experienced by Scotland SMEs with internet service in the past 12 months**

	All UK	Scotland	Scotland					
			Location		No. of employees			
			Urban	Rural	1-4	1-9	10-49	50-249
Poor service reliability (e.g. Temporary loss of service/connection)	29	37	32	45	37	37	35	-
Slow download speeds	16	21	14	31	19	20	28	-
Slow upload speeds	13	17	12	27	16	17	23	-
Poor customer service	4	3	1	7	3	3	4	-
No problems experienced	58	51	58	40	52	51	49	-

Source: Ofcom SME research

Base: All SMEs with fixed internet (n=1267 in the UK, 293 in Scotland).

Base: All SMEs with fixed internet in rural areas (94) and those with 10-49 (69) and 50-249 (48) employees are low so treat as indicative only.

Note: Problems mentioned by less than 2% in both the UK and Scotland samples are not included

### Most SMEs in Scotland say the needs of their business are well catered for by the communications industry

Most (80%) SMEs agree that the needs of their business are well catered for by the communications market. However, a minority (15%) report that the ability of their business to grow has been impacted by a lack of service availability.

One per cent of SMEs say that they have been unable to move premises due to a lack of service availability.

**Figure 1.10 Communications services in the context of business needs**

	All UK	Scotland	Scotland					
			Location		No. of employees			
			Urban	Rural	1-4	1-9	10-49	50-249
% Agree - the needs of my business are well catered for in the communications market	85	80	86	71	81	80	77	86
% Agree - The ability of my business to grow has been impacted by the lack of suitable communications products and services available to me	15	15	14	16	14	15	12	14
Has your organisation ever been prevented from moving location due to the communications services you require to be able to function as a business not being available in the area or location you wanted to move to? (% Yes)	1	1	1	0	1	1	0	8

Source: Ofcom SME research

Base: All SMEs (n=1508 in the UK, 342 in Scotland)

Note: Base sizes for rural (114), 10-49 employees (75) and 50-249 (51) employees are low and should be treated as indicative only.

## 1.3 Mobile coverage

### Mobile users in Scotland have higher expectations of their network's performance than do users in the other nations

Networks are expected to perform best in outdoor urban areas (94%) and indoors (89% in-home and 80% in other indoor locations). Expectations when travelling (71%), and in rural outdoor areas are lower (59%).

**Figure 1.11 Network expectations for voice calls in various locations**

Percentage of respondents

	Outdoors Urban		In own Home		Other indoor locations		Travelling by train or road		Outdoors rural	
	Very/ fairly good	Very/ fairly poor	Very/ fairly good	Very/ fairly poor	Very/ fairly good	Very/ fairly poor	Very/ fairly good	Very/ fairly poor	Very/ fairly good	Very/ fairly poor
UK	88	3	80	14	74	11	60	11	53	19
England	87	3	79	15	74	11	59	12	52	19
Scotland	94	2	89	6	80	9	71	4	59	13
Wales	86	3	81	12	72	7	54	5	48	19
Northern Ireland	89	3	80	14	78	12	66	4	62	14

Source: Ofcom mobile network coverage research March 2014

Base: All mobile phone users: UK 1,509, England: 877, Scotland: 216, Wales: 222, Northern Ireland: 194

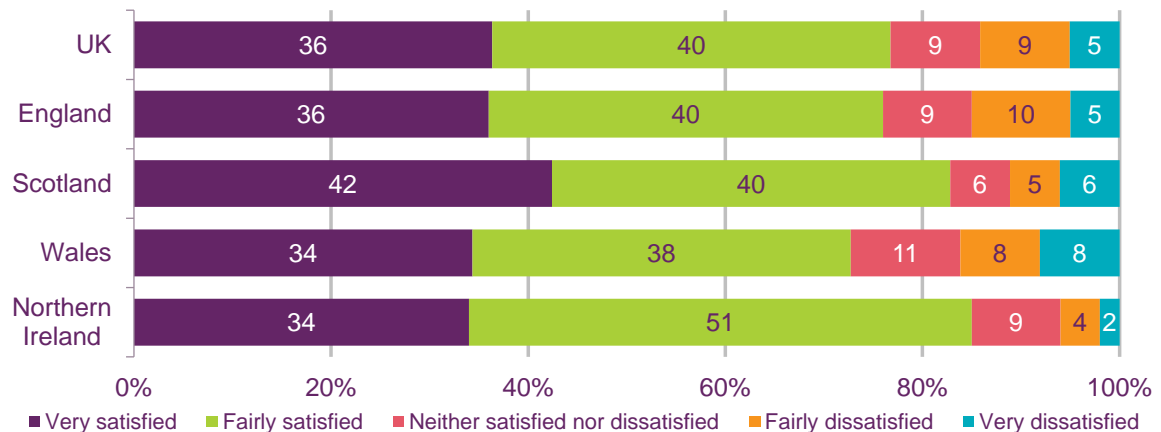
Q20b: Please can you tell me how you would expect your network to perform when making and receiving clear voice calls and without them dropping out unexpectedly in each of the following locations?

### Overall satisfaction with mobile networks is highest in Scotland

The majority of mobile phone users in Scotland (82%) claim to be either fairly or very satisfied with their current network, with 42% claiming to be very satisfied.

**Figure 1.12 Overall satisfaction with network**

Percentage of respondents



Source: Ofcom mobile network coverage research March 2014

Base: All mobile phone users: UK 1,509, England: 877, Scotland: 216, Wales: 222, Northern Ireland: 194

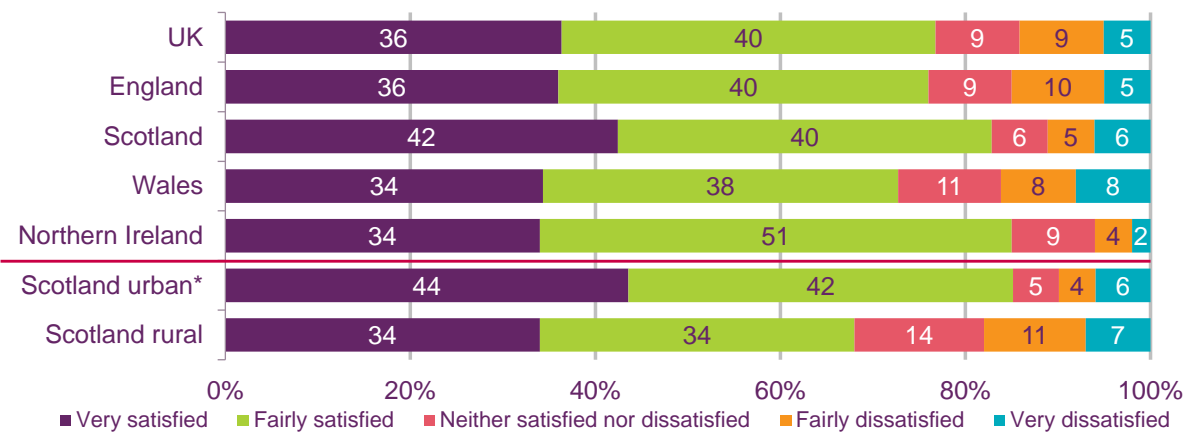
Q21: Overall, how satisfied or dissatisfied are you with [name of network currently used]?

**Overall satisfaction with mobile networks is higher in urban than in rural areas**

Overall satisfaction with mobile networks is higher in urban areas than in rural areas (86% vs. 68%); those in urban Scotland are most likely to be ‘very satisfied’ (44%).

**Figure 1.13 Overall satisfaction with network: urban vs. rural**

Percentage of respondents



Source: Ofcom mobile network coverage research March 2014

Base: All mobile phone users: UK total: 1,509, UK urban: 1,033, UK rural: 476, England urban: 741, England rural: 136, Scotland: urban 96, Scotland rural: 120, Wales urban: 99, Wales rural: 123, Northern Ireland urban: 97, Northern Ireland rural: 97

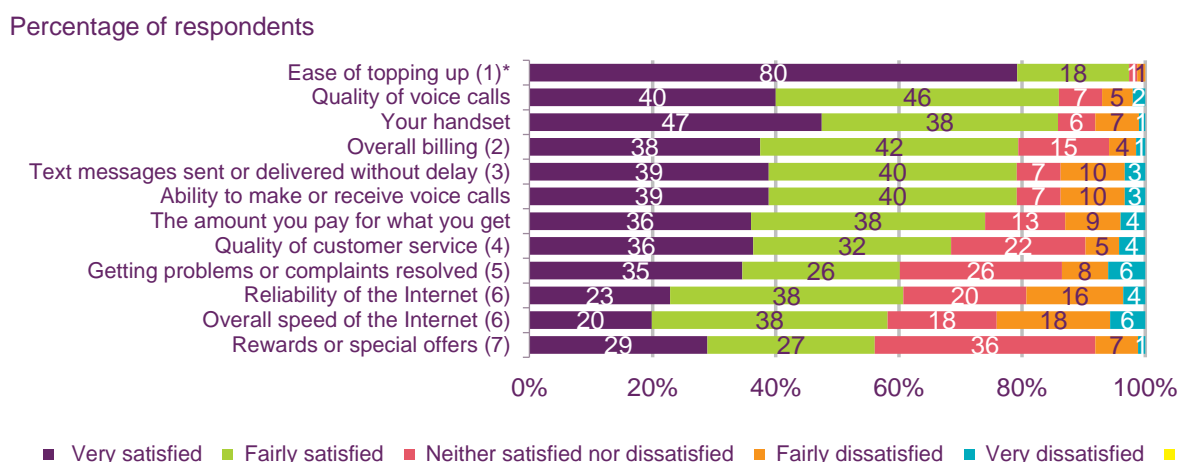
Q21: Overall, how satisfied or dissatisfied are you with [name of network currently used]?

\*Caution: Low base size

## Among mobile phone users in Scotland, mobile internet speed causes the greatest levels of dissatisfaction

Levels of satisfaction vary with specific aspects of services; the highest ratings are given for ease of topping up (98% of those who top up) and the lowest for the overall speed of the internet (24% of those who use the internet on their mobile phone).

**Figure 1.14 Satisfaction with aspects of service among mobile phone users in Scotland**



Source: Ofcom mobile network coverage research March 2014

Base: All mobile phone users, Scotland 216, (1) those who top up: 76, (2) those who pay monthly: 136 (3) those with experience of customer services: 165, (4) those who send/receive texts: 211, (5) those who have experienced a problem and/or made a complaint: 133 (6) those who use their mobile phone to browse the internet: 141, (7) those with knowledge of rewards/special offers: 173. Don't know and Not applicable excluded from bases

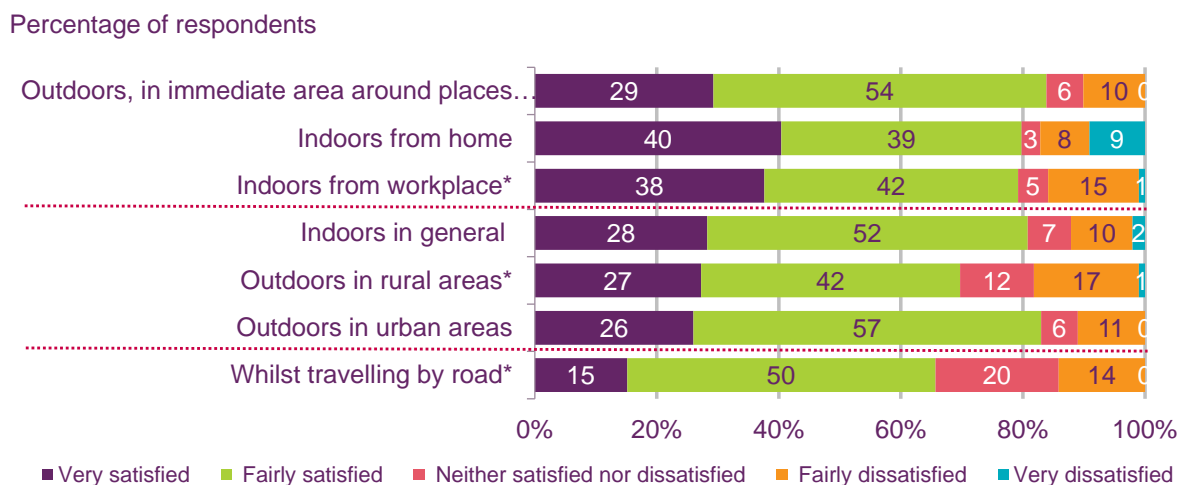
Q22: For each aspect of service, I would like you to tell me how satisfied or dissatisfied you are with it.  
\*Caution small base

## Satisfaction with making calls in various locations in Scotland is generally high

Over three quarters of mobile phone users in Scotland who use each service are fairly or very satisfied with the service they receive in each of the types of locations listed, with the exception of travelling by road and outdoors in rural areas. The greatest levels of dissatisfaction are experienced in outdoor rural locations, where 18% of users are dissatisfied, and indoors at home, where 17% are dissatisfied.



**Figure 1.15 Satisfaction levels among mobile phone users in Scotland with making calls in various locations**



Source: Ofcom mobile network coverage research, March 2014

Base: All mobile phone users in Scotland who make calls in each location at least a few times a month: Indoors from home: 186, indoors from workplace 94\*, outdoors in immediate area 176, indoors in general 170, outdoors in rural areas 97\*, outdoors in urban areas 175, while travelling by road 90\*.

Q46: How satisfied are you with the ability to make/receive calls on your main personal phone in each of the following locations?

\*Caution: Low base size

### In Scotland, use of the internet on mobile phones is most likely in users' own homes

Almost three-quarters (71%) of those who use the internet on their mobile phone do so in their own home at least a few times a month. Two-thirds (66%) use the mobile internet in other indoor locations, and almost as many (58%) use it outdoors in urban locations a few times a month or more. This compares to 29% who access the mobile internet outdoors in rural locations over the same period.

### Problems with mobile internet access and speed each affect around half of those who use the internet on their mobile phone

With the exception of 'slow internet / web pages taking a long time to load' and 'being unable to use the mobile internet', less than half of mobile phone users in Scotland who use each function on their mobile phone said they experienced any difficulties on a regular basis (a few times a month or more).

Mobile phone users in Scotland (21%) are less likely than users in Wales (39%) and in England (31%) to be unable to connect to their network even when their handset shows that they have a signal.

**Figure 1.16 Problems experienced on mobile phones a few times a month or more**

	UK	Eng-land	Scot-land	Wales	NI
Web pages slow loading/slow internet	59%	58%	62%	65%	50%
Unable to use mobile internet*	48%	47%	49%	59%	47%
Having no signal/reception	44%	44%	39%	47%	46%
Unable to send/receive emails**	36%	35%	41%	48%	40%
Poor sound quality/calls breaking up	36%	36%	31%	42%	35%
Calls ending unexpectedly	34%	35%	28%	39%	27%
Unable to connect when phone shows signal	30%	31%	21%	39%	30%
Unable to send/receive texts	28%	28%	28%	33%	27%
Text messaged not arriving / being delayed	28%	27%	31%	36%	28%

Source: Ofcom mobile network coverage research March 2014

Base: All mobile phone users, UK: 1.509, \*those who use internet on their mobile phone 980, \*\*those who use their mobile phone for email 712. England: 877 those who use internet on their mobile phone 568 \*\*those who use their mobile phone for email 413. Scotland: \*those who use internet on their mobile phone 144, \*\*those who use their mobile phone for email 111. Wales: 216, \*those who use internet on their mobile phone 144, \*\*those who use their mobile phone for email 111. NI: 194, \*\*those who use internet on their mobile phone 118, \*those who use their mobile phone for email 72. Q43: How often, if at all, have you experienced any of the following when using your main mobile phone?

### **Two-thirds of those who have experienced problems with making calls or using the internet on their phone did not take any action to try and solve them**

Among mobile phone users in Scotland who claimed to ‘sometimes’ or ‘always’ experience problems when using their phone for one or more functions (54% of the sample overall), a minority (4%) had looked for information about the problem, tried to resolve it (11%) or done both (14%). Those who had looked for information were most likely to have looked on their supplier’s website. This level of proactive searching for information and/or solutions is in line with England and Wales and higher than in Northern Ireland

The majority of mobile phone users (81%) said they had never received any information or communication from their operator about problems with network coverage in their area. Fifteen per cent had received a text from their provider, 2% a phone call and 1% an email. The proportion in Scotland who had received any information was in line with England and Wales and significantly higher than in Northern Ireland.

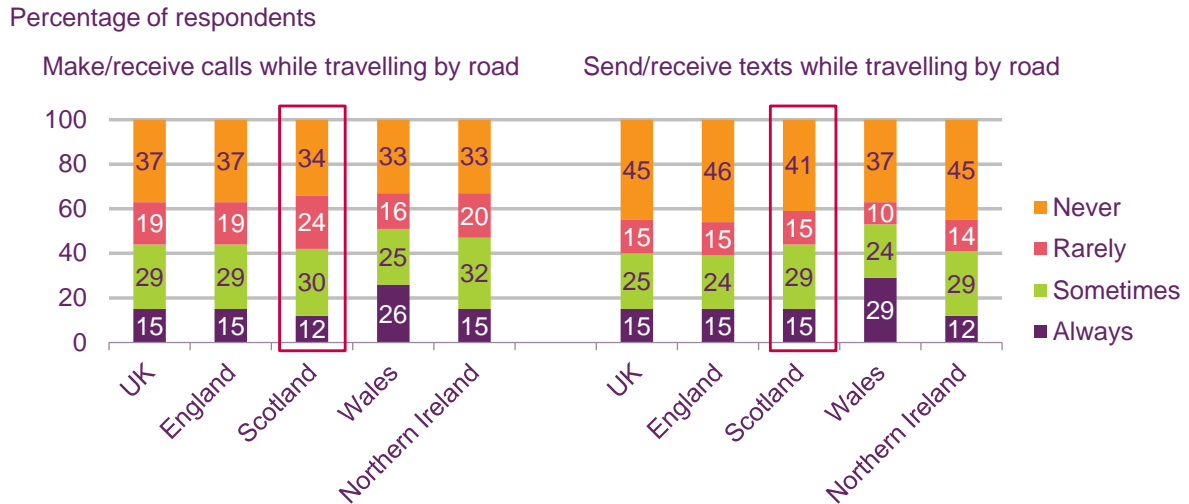
### **Around half of mobile phone users in Scotland who use their phone for sending texts or for voice calls do so while travelling<sup>3</sup>**

Just over four in ten (44%) of those who travel by road at least once a week and send texts regularly do so while travelling by road, with a similar number (42%) of those who travel by road either ‘always’ or ‘sometimes’ use their phone to make calls while travelling.

<sup>3</sup> Making or receiving calls / texts can be by anyone in the car. Also the question did not ask if the car was in motion

Use of mobile phones in Scotland for making calls (12%) and sending texts (15%) while travelling is in line with England and Northern Ireland and lower than in Wales (26% and 29% respectively).

**Figure 1.17 Frequency of making/receiving voice calls and texts while travelling by road**



Source: Ofcom mobile network coverage research March 2014

Base: All respondents UK: 1248, England: 722, Scotland: 173, Wales: 184, Northern Ireland 169  
 Q41: How often do you use your main mobile phone for each of the following activities?

**‘Lack of need’ is the main reason for not using a mobile phone when travelling by road**

The main reason given for not using the phone while travelling by road, by those in Scotland who do not do so, was ‘having no need to’ (61%) which is significantly higher than in Wales (39%). This was followed by ‘not having a hands-free kit’ (18%). Ten per cent said they ‘did not want to disturb other passengers’ and 5% don’t use their mobile while travelling because they don’t think they will get a signal.

**Figure 1.18 Reasons for not using mobile phone while travelling by road**



Source: Ofcom mobile network coverage research, March 2014

Base: All those who say "never" to at least one activity on their phone when travelling by car or bus  
 UK: 771, England: 442, Scotland: 123, Wales: 107, Northern Ireland 111

Q42: you say you never [functions mobile phone is used for at least once a week but not used when travelling by car or bus] when you travel by car or bus. Why is that?

**Just over one in ten of those using their mobile phone while travelling by road in Scotland are dissatisfied with their ability to make and receive calls**

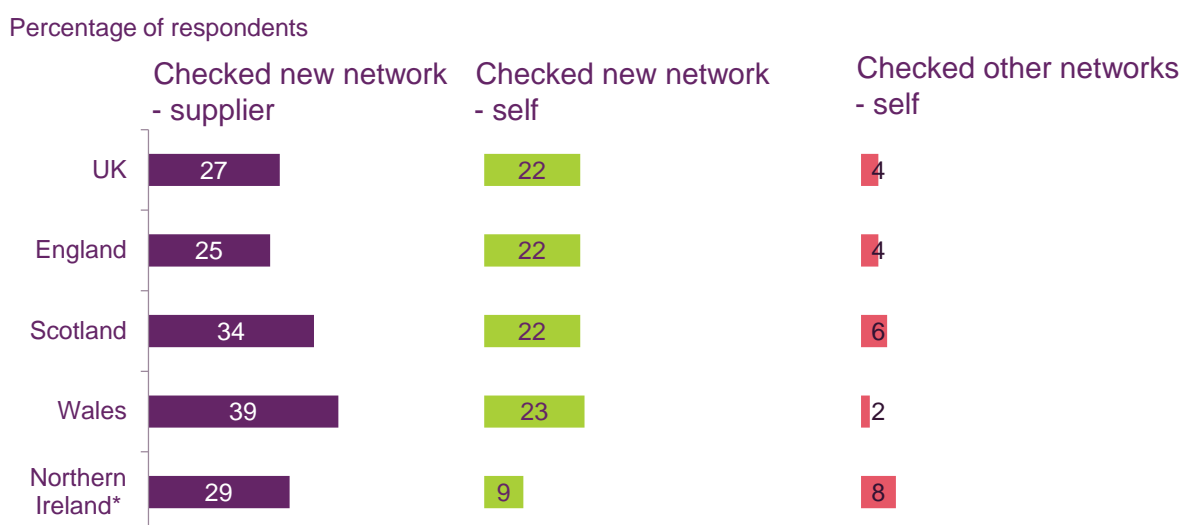
Almost two-fifths (38%) of road travellers who use their phone to make calls when on the road claim to experience difficulties; either ‘always’ or ‘sometimes’. However, only 14% are dissatisfied with their ability to make and receive calls while travelling by road.

**A third of those who had switched mobile phone network in Scotland recalled their new supplier checking the network coverage for them**

A third (34%) said their new network supplier had checked the coverage in their area when they switched. Just over half (52%) said their coverage was not checked, and the remaining 14% could not remember. Those who had signed up in-store were just as likely to say their supplier had checked their coverage as were those who had signed up elsewhere. Among those who said their coverage was checked, 73% said the new supplier had checked their coverage in only one location.

A fifth (22%) of those who had switched network in the last five years had checked the coverage of their new provider themselves, and 6% had checked the coverage of one or more other networks. Supplier websites were the most likely place to have been used to check coverage.

**Figure 1.19 Checking of network coverage**



Source: Ofcom mobile network coverage research, March 2014

Base: All mobile phone users who have switched their network operator within the last five years: UK 742, England: 453, Scotland: 110, Wales: 106, Northern Ireland: 73\*

Question: Q63: Thinking back to when you signed up to [network currently with], did they check coverage in your area for you?

Q65: Did you personally do anything to check the coverage of your new provider and/or any other providers in your area before signing up with [network currently with]?

\*Caution: Low base size

## 1.4 Availability of communications services in Glasgow and Inverness

### Introduction

Ofcom's 2013/14 Annual Plan identified the importance of understanding infrastructure availability with respect to geography:

*In 2013/14 we will undertake further research into the effect of communications infrastructure availability on geographic areas. This research will be used together with the conclusions of our work on the availability of communications services in the nations (Economic Geography) which we will publish shortly. This existing research focused on rural and lower-density geographies; our follow-up work will complement this by focusing on higher-density areas, including cities and towns*

In May 2013, Ofcom published a report on the availability of communications services in the UK<sup>4</sup>, which examined how and why the availability of communications services varies across the UK, and how it could be improved. This work focused on the UK as a whole and the variations between urban and rural areas.

To build on this report Ofcom commissioned 11 case studies of UK cities. These would explore the availability of communications services in each city and attempt to identify some of the factors driving this. The 11 cities we chose to study are listed below. They were chosen to represent a range of urban populations across the UK, cover different business profiles and include all the UK nations.

<sup>4</sup> <http://stakeholders.ofcom.org.uk/market-data-research/market-data/economic-geography/>

- **Scotland:** Glasgow, Inverness
- **Northern Ireland:** Belfast, Derry-Londonderry.
- **England:** London, Birmingham, Manchester, Cambridge, Exeter
- **Wales:** Cardiff, Bangor

The key findings of this research were published in Ofcom's *Communications Market Report* on 1 August 2013 alongside the full report, which can be found on Ofcom's website.<sup>5</sup>

Ofcom has decided to update key elements of this research for the current report in order to present the latest available data and to assess how availability has changed since we published the 2013 CMR.

This section focuses on the availability of fixed broadband networks in the cities of Glasgow and Inverness, drawing on the key findings of our 2013 *Infrastructure Report*.<sup>6</sup>

## Methodology

The percentage of city premises that have access to NGA provided by BT Openreach<sup>7</sup> and/or Virgin Media was estimated by combining a postcode-level dataset for current and future BT Openreach NGA with a postcode-level dataset for premises serviceable by Virgin Media's cable network, as provided by Virgin Media. These data only show premises that have access to NGA services; it does not reflect how many households have actually taken up the service.

The proportion of broadband connections with speeds less than 2Mbit/s was calculated using data from Ofcom's *Infrastructure Reports* published in 2012 and 2013. These data show the proportion of premises receiving broadband over their telephone line at speeds of less than 2Mbit/s.

**For the city of Glasgow only, we also include a summary of analysis that compares availability of NGA and sub-2Mbit/s lines with the socio-economic factor of income deprivation. This analysis was carried out for Ofcom by Analysys Mason and the full report is available on the Ofcom website.**<sup>8</sup>

The results for Glasgow are broken down by quartile. Analysys Mason applied two alternative quartile analysis methods, which are summarised in Figure 1.20 .

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<sup>5</sup> <http://stakeholders.ofcom.org.uk/market-data-research/market-data/communications-market-reports/cmr13/uk/>

<sup>6</sup> [http://stakeholders.ofcom.org.uk/binaries/research/telecoms-research/infrastructure-report/IRU\\_2013.pdf](http://stakeholders.ofcom.org.uk/binaries/research/telecoms-research/infrastructure-report/IRU_2013.pdf)

<sup>7</sup> including retail services provided by BT or other providers using BT Openreach's NGA network. BT Openreach has regulatory obligations to give other providers wholesale access to its NGA network. Those other providers can then make retail services available to consumers.

<sup>8</sup> [http://stakeholders.ofcom.org.uk/binaries/research/infrastructure/Analysys\\_Mason\\_final\\_report.pdf](http://stakeholders.ofcom.org.uk/binaries/research/infrastructure/Analysys_Mason_final_report.pdf)

**Figure 1.20 Description of quartile analysis methods used**

Method	Description	Example
Equal domain range	This method defines each quartile as the difference between maximum and minimum values of scores in the IMD domain divided by four. The upper and lower scores of each quartile will be different for each city depending on its range of scores for the given IMD domain. Therefore, the number of premises in each quartile will be different. This method highlights acute deprivation relative to the rest of the nation.	This method highlights the NGA broadband availability for areas of the city that fall into the 25% most deprived areas.
Equal premises count	This method defines each quartile as the total number of premises in a city divided by four. Therefore, the number of premises in each quartile will be the same. This method highlights the relative differences in deprivation within a city.	This method highlights the NGA broadband availability for areas that represent the 25% most deprived premises in the city.

Source: Analysys Mason 2014

In its report, Analysys Mason presented findings from both quartile analysis methods. However, for the purpose of making comparisons and observing trends between the six cities, Analysys Mason has used findings based on the *equal domain range* method in order better to highlight those areas with the most acute deprivation. In most cities, there is a large gap between the maximum and minimum values of scores in the IMD domain, with most households clustered around the average values. This means that the number of premises in the lowest quartile (the households whose deprivation level is within the range covered by the lowest 25% of IMD domain values) can often be very low. In Glasgow, for example, only 1.3% of premises fell into the most income-deprived quartile. In our analysis, we have chosen to use findings based on the *equal premises count* as, by including an equal number of premises in each quartile, it is easier to compare how availability differs within a city.

## Glasgow

### Summary of key findings

- Glasgow has markedly lower total next-generation access (NGA) coverage than the majority of the other cities assessed, although this has increased by 4% since the last report.
- Glasgow's NGA availability is likely to increase further as BT Openreach implements its upgrade plans, but may still remain behind the other large cities examined in the study.
- In Glasgow, the areas of greatest deprivation were those where NGA broadband was least available. The most income- and education-deprived areas of the city also had the highest proportion of '<2Mbit/s' connections.
- Glasgow's low fixed broadband take-up continues, but has risen since the last report.

### **Glasgow has a population of about 0.59 million, with residential premises accounting for 95% of all premises**

Figure 1.21 shows the size of the city in terms of population and number of residential and non-residential premises. The population is based on the 2011 census and the number of premises is based on postcodes within the local authority boundary.



Glasgow has undergone a significant amount of urban regeneration over the past 20 years. The city's industry is now dominated by services in finance/business, distribution and hospitality (such as hotel services)<sup>9</sup>.

**Figure 1.21 City population and premises data**

City	Population	Total premises	Business premises	Residential premises
Glasgow	c.0.59 million	c.316,000	c.16,000	c.300,000

Source: Analysys Mason

For this study the city boundary is defined by Glasgow City Council, and is shown in detail in the following figure:

**Figure 1.22 Map of area local to Glasgow, highlighting city boundary**



Source: Analysys Mason

### **Next generation access (NGA) is available to 67% of premises in Glasgow**

Figure 1.23 identifies NGA network infrastructure (FTTx<sup>10</sup> and DOCSIS v3.0 cable technologies<sup>11</sup>) for the two main network operators, BT Openreach and Virgin Media.

We estimate that NGA availability in Glasgow has increased by 4% since 2012, which is still significantly lower than the other ten cities we assessed. It also remains behind the UK average, which incorporates both rural and urban areas.

Although the availability of first-generation broadband is 100%, 5.5% of premises experience broadband speeds of less than 2Mbit/s, which is considered below the minimum requirement for a basic broadband service.

<sup>9</sup> Source: Analysys Mason

<sup>10</sup> Fibre-to-the-exchange (FTTx) is a generic term used to describe any broadband network using optical fibre to replace all or part of the usual metal local loop used for last-mile telecommunications.

<sup>11</sup> DOCSIS v3.0 is the next generation of DOCSIS, which allows users to experience significantly faster speeds.



**Figure 1.23 NGA availability in Glasgow, by premises passed, compared to 11-city average and UK average**



Source: Analysys Mason, Ofcom Infrastructure Report 2013

Figure 1.24 shows the proportion of connections with a speed of less than 2Mbit/s. The proportion of Glasgow connections that have a speed less than 2Mbit/s is 5.5%, which is a decrease of 2% from last year. This is likely to be due to increased take-up of NGA broadband services, which offer higher speeds.

**Figure 1.24 Percentage of connections that have a speed less than 2Mbit/s, and relative positioning**



Source: Analysys Mason, Ofcom Infrastructure Report 2013

**Glasgow has 33 exchanges, 17 of which have been upgraded to NGA**

Figure 1.25 shows the number of exchanges serving the city postcodes, the percentage of lines that support both ADSL and ADSL Max<sup>12</sup>, and the average number of lines per

<sup>12</sup> ADSL Max is a 'rate-adaptive' variant of ADSL, where the transmitted bit rate varies depending on the physical conditions of the twisted-pair copper line, which may change over time. In contrast, the bit rate for ADSL is fixed and does not change.

exchange.<sup>13</sup> Not all of these exchanges are physically located within the city boundary. All of the copper lines support basic broadband (both ADSL and ADSL Max).

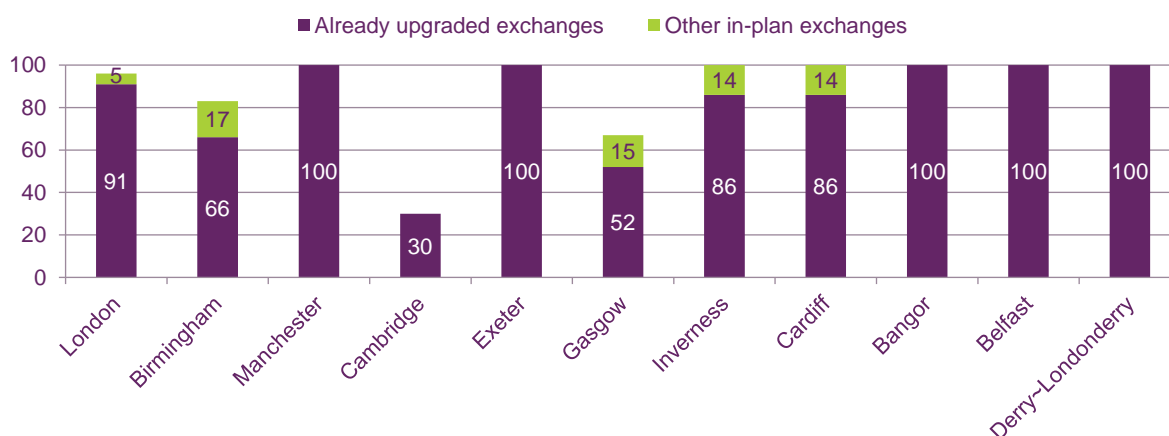
**Figure 1.25 Number of exchanges and % of lines with access to basic broadband**

No. of exchanges serving city postcodes	% of lines that have access to both ADSL & ADSL Max	Average number of lines per exchange
33	100%	9,600

Source: Analysys Mason

The BT Openreach fibre network comprises fibre-to-the-cabinet (FTTC) and fibre-to-the-home (FTTH) infrastructure. Figure 1.26 shows the FTTC status of the city exchanges according to BT Openreach’s current roll-out plans, compared to the other cities assessed.

**Figure 1.26 FTTC status of exchanges serving city postcodes, according to BT Openreach’s roll-out plans**



Source: Analysys Mason, Ofcom Infrastructure Report 2013

To date, 17 of the serving exchanges (51.5% of total serving exchanges) have been upgraded to FTTC<sup>14</sup>.

### Summary of public interventions

Step Change 2015, part of the Scottish Government’s Infrastructure Action Plan, combined with existing commercial roll-out plans, will deliver access to fibre broadband to at least 96% of premises by the end of 2017. It is claimed to be the highest-value telecommunications infrastructure investment in Europe, and will bring fibre broadband to over 600,000 premises in 130,000 postcodes. Through this investment, Digital Glasgow believes that at least 85% of Glasgow premises will have access to fibre broadband by 2015 and at least 95.7% will have it by 2017.<sup>15</sup>

<sup>13</sup> Source: Analysys Mason

<sup>14</sup> Note that only a proportion of the cabinets which connect to the upgraded exchanges have been upgraded. Although data are not available on the actual number of cabinets upgraded across the city, BT Openreach has stated that for the national FTTC roll-out, on average 85% of premises are passed with NGA, which equates to an average 70% of cabinets per exchange area.

<sup>15</sup> Digital Glasgow Roadmap 2014

Glasgow has also become the first Scottish city to offer council-led free public WiFi. A network of 50 WiFi spots will cover the city centre and parts of the east end. The service is provided by BT, which has an eight-year contract, potentially extendable to ten years.

In January 2013 Glasgow City Council won £24m from the UK Government's innovation agency, the Technology Strategy Board, for its Future Cities Demonstrator project, after bidding in competition with 30 other UK cities. The project aims to show that the local authority can integrate transport, communications and other infrastructure to improve the city's economy and quality of life, and to reduce its environmental impact.

Later this year the Technology and Innovation Centre, part of the University of Strathclyde, will officially open in Glasgow city centre. Here, academics, researchers and industry will collaborate to find solutions to challenges in the energy, renewables, engineering and manufacturing sectors.

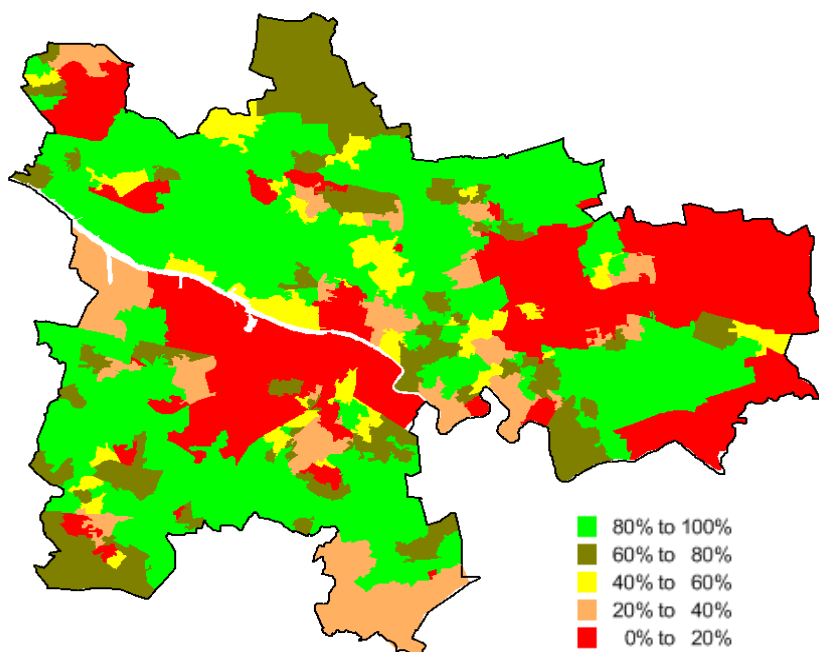
Glasgow's Digital Strategy is supporting social and digital inclusion locally; its goal is that all citizens of Glasgow become confident internet users, able fully to participate online, both as consumers and as citizens.

#### Analysis of availability against income deprivation

#### **In Glasgow, the areas of greatest deprivation are those where NGA broadband is least available**

Low levels of NGA broadband availability, shown in red in Figure 1.27, are scattered throughout Glasgow, but the north and south-west regions are generally well-served with NGA broadband.

**Figure 1.27 NGA broadband availability in Glasgow**



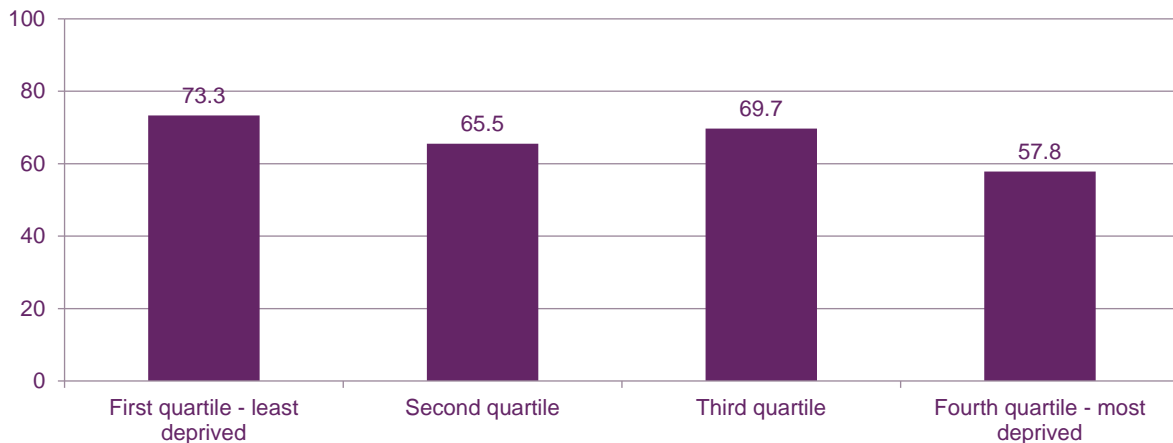
Source: Analysys Mason, Ofcom Infrastructure Report 2013

The greatest difference between the availability of NGA in the most, and least, income-deprived areas was 15.5 percentage points in Glasgow, while it was at most 6.2 percentage

points among the remaining cities. This is likely to be a reflection of the limited roll-out of NGA across Glasgow at the time of measurement.

Lower NGA availability in income-deprived areas could be explained by the weaker incentive for telecoms companies to invest in areas where average revenue per user is likely to be low. Alternatively, since roll-out was not yet complete at the time of measurement, this correlation might be explained by telecoms companies having a preference for upgrading infrastructure in less-income-deprived areas first, where take-up is initially likely to be higher.

**Figure 1.28 NGA availability in Glasgow, by income deprivation**

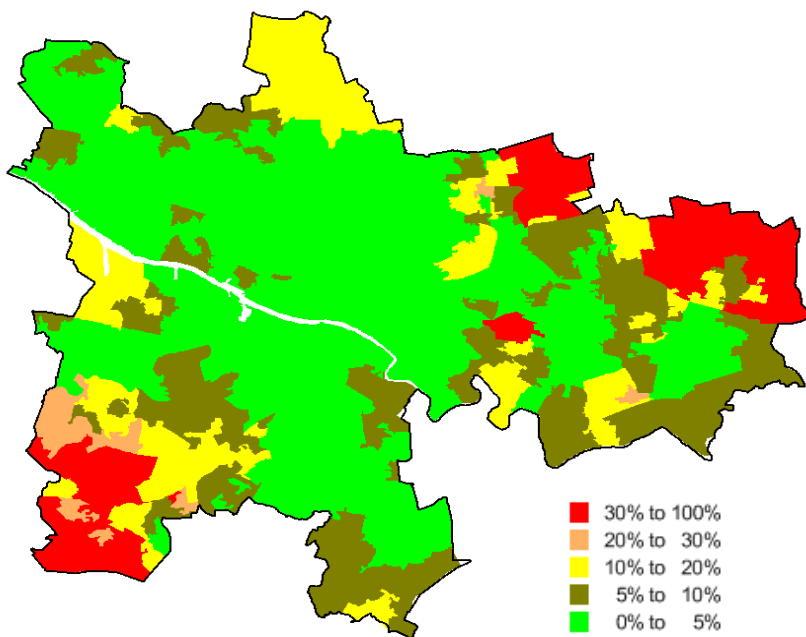


Source: Analysys Mason, IMD, Ofcom June 2013  
Notes: Equal premises count method

### **In Glasgow, the most income-deprived areas had the highest proportion of '<2Mbit/s' connections**

Areas with the highest percentage of '<2Mbit/s' connections, shown in red in Figure 1.29, are mostly in the north-east and south-west of the city; most of the city has a low percentage of <2Mbit/s connections (between 0% and 5%).

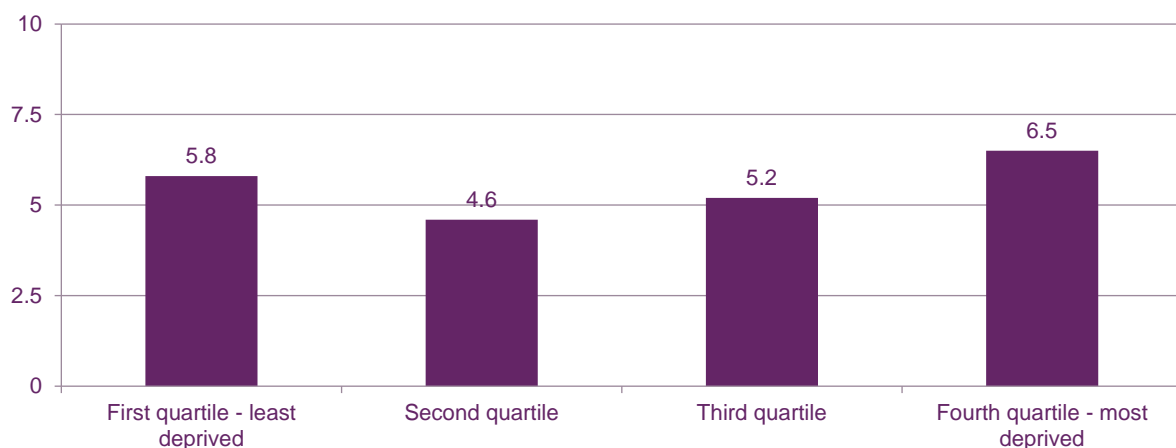
**Figure 1.29 <2Mbit/s connections in Glasgow**



Source: Analysys Mason, Ofcom Infrastructure Report 2013

Although the highest proportion of <2Mbit/s connections fall in the most income-deprived areas of Glasgow, there is no consistent trend across the quartiles, which may be explained by the fact that other factors (such as existing take-up and premises density) have an overriding effect in some areas.

**Figure 1.30 Broadband connections with speeds of less than 2Mbit/s in Glasgow, by income deprivation**



Source: Analysys Mason, IMD, Ofcom June 2013  
Notes: Equal premises count method

Analysis of fixed broadband take-up in Glasgow

**Glasgow’s low fixed broadband take-up continues, but has improved**

As the *Communications Market Report* highlighted in 2010, 2011, 2012 and 2013, broadband take-up is, and has remained, relatively low in Glasgow. For this report, we obtained data from the BPS for respondents within Glasgow only, and it is therefore not

possible to compare Glasgow to the UK as a whole, or other cities. However, Ofcom's Technology Tracker records that the percentage of the UK population with broadband (excluding mobile devices) is 77%, rising to 82% if mobile devices are included.

In contrast, the percentage of Glaswegians living in households with broadband (excluding mobile devices) is 63%; and 66% if mobile devices are included. This compares to 50% and 54% respectively in the 2013 CMR report.

**Is this a genuine increase? Yes, but changes in respondent profile explains some of the increase.**

The British Population Survey is designed to monitor the UK population at a regional level but not designed to look at relatively small areas such as Glasgow City. Therefore, the respondents' profile may shift from year to year. From analysis of the Technology Tracker, it is known that a respondent's age, socio-economic status and gender has an impact on how likely they are to have broadband in the home. Therefore, it was important to compare the 2012/2013 and 2013/2014 samples.

There were differences between the two profiles, in particular with regard to socio-economic status. Some of this may be explained by the fact that weights now reflect the 2011 rather than the 2001 census, but it may also be a factor of the areas to which interviewers were sent.

The key differences between the 2012/2013 and 2013/2014 Glasgow profiles are shown below.

**Figure 1.31 Differences between 2012/2013 and 2013/2014 Glasgow sample**

Glasgow Profile	2012/2013	2013/2014	Difference
Male	51%	50%	0%
Female	49%	50%	0%
15-24	21%	13%	-7%
25-34	18%	19%	1%
35-44	15%	15%	1%
45-54	18%	18%	0%
55-64	12%	15%	3%
65+	17%	19%	3%
AB	8%	16%	8%
C1	22%	23%	1%
C2	20%	17%	-3%
D	19%	24%	5%
E	32%	21%	-11%

Source: British Population Survey Base: All adults 15+ (April 2012 to March 2013; 15-24 187 25-34 231; 35-44 181; 45-64 487, 65+ 319; Male 695, Female 710, AB 153, C1 335, C2 227, D 314 and E 376) Q: Is your access to the internet at home cable broadband, ADSL broadband, broadband but you don't know type, or non-broadband?

The table above shows that the main change in 2013/2014 is that the sample contains more ABC1 respondents, and fewer aged 15-24, or in social class E, than in 2012/13. This is important: the lower the socio-economic status, the less likely the adult is to have broadband at home. So part of the increase in broadband take-up may be due to this.

Several companies provide geo-demographic data that merges demographic data with income-related variables such as the value of houses, number of cars or type of housing, to classify UK postcodes into segments. Ofcom currently licenses the ACORN dataset from CACI; this segments postcodes into 56 types, plus five for non-residential, and postcodes with communal dwellings such as care homes. The segments are then aggregated into six broad classifications.

These classifications give a simple method of checking whether the increase in broadband take-up is driven only by a change in respondent profile.

**Figure 1.32 Differences between 2012/2013 and 2013/2014 Glasgow sample**

Glasgow Profile	2012/2013		2013/2014	
	% in segment	% segment with broadband	% in segment	% segment with broadband
Affluent achievers	1%	59%	10%	86%
Rising prosperity	5%	74%	10%	90%
Comfortable Communities	6%	81%	9%	76%
Financially stretched	24%	55%	22%	61%
Urban Adversity	63%	44%	49%	51%

Source: British Population Survey Base: All adults 15+ (April 2012 to March 2013; Affluent achievers 118, Rising Prosperity 120, Comfortable communities 99, Financially stretched 306 and Urban adversity 761

Q: Is your access to the internet at home cable broadband, ADSL broadband, broadband but you don't know type, or non-broadband?

The chart above shows that the percentages of people who are in the two most affluent bands have increased from 6% to 20% while the percentage in the least affluent band has fallen from 63% to 49%. Within all bands except 'comfortable communities', broadband take-up has increased in the past year.

If we adjust the 2013/2014 profile to match exactly that of 2012/2013 in terms of CACI category representation, broadband take-up is 57%. This is still higher than in the previous year, but lower than the 63% if changes of profile are included. Therefore we can conclude that the change in take-up is real, but some of it is due to a change in respondent profile.

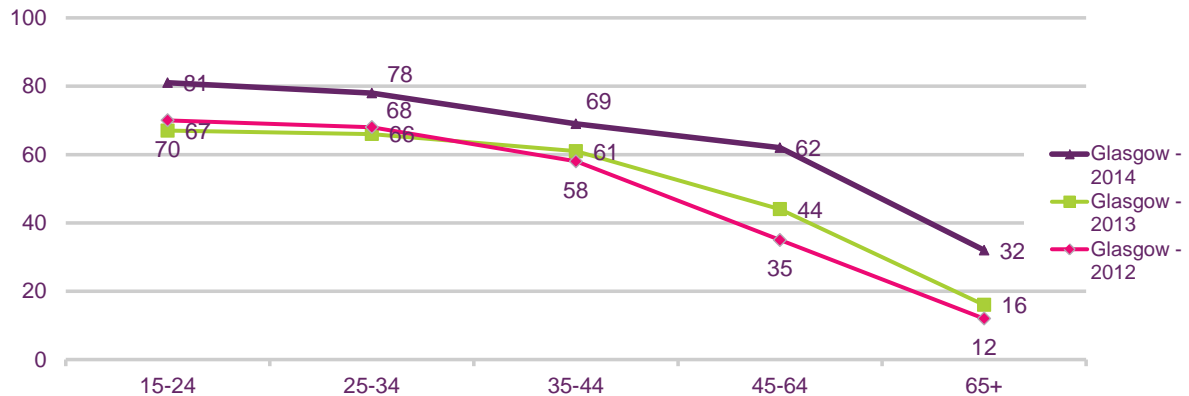
### **Demographic differences go some way to explaining Glasgow's low fixed-broadband take-up.**

Similarly, the 2013/2014 Glasgow CACI profile can be adjusted to match that of the whole of the UK. If we do this, removing the demographic difference within Glasgow would give a broadband take-up of 68%, compared to the Technology Tracker UK figure of 77%. This suggests that something other than demographics explains the remaining 9% difference.

**The increase in broadband take-up has been driven mainly by increases in take-up among people under 35 and over 45.**

Between 2013 and 2014, there was a significant increase in the numbers of people aged 45-64 and 65+ with access to the internet. Although the increase among people aged 15-24 and 25-34 is not significant on its own, combining these two groups gives a significant increase in broadband take-up for people aged under 35.

**Figure 1.33 Changes in take-up, by age group: 2012, 2013 and 2014**



Source: British Population Survey

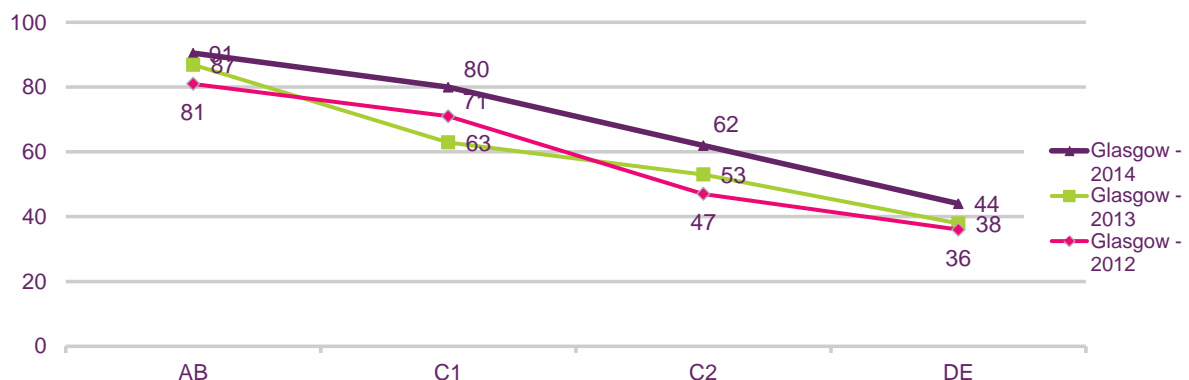
Base: All adults 15+ (April 2012 to March 2013; Glasgow - 2014 1405 Glasgow - 2013 1398, Glasgow - 2011/2012 597)

Q: Is your access to the internet at home cable broadband, ADSL broadband, broadband but you don't know type, or non-broadband?

**The increase in broadband take-up has been driven by increases in take-up among people in social class C.**

Although no individual socio-economic group's broadband take-up has increased significantly, the combined increase in broadband take-up in socio-economic groups C1 and C2 is significant. These groups are associated with clerical and skilled manufacturing roles.

**Figure 1.34 Broadband take-up in Glasgow, by socio-economic group: 2012, 2013 and 2014**



Source: British Population Survey

Base: All adults 15+ (April 2012 to March 2013; Glasgow - 2014 1405 Glasgow - 2013 1398, Glasgow - 2011/2012 597)

Q: Is your access to the internet at home cable broadband, ADSL broadband, broadband but you don't know type, or non-broadband?



## Inverness

### Summary of key findings

- Inverness has significantly lower NGA availability than the other ten cities assessed, although this has increased slightly since the previous report.
- NGA availability in Inverness is likely to increase in the future due to the £146m scheme to invest in broadband across the Scottish Highlands and Islands, which is a public-sector intervention led by the Highlands and Islands Enterprise (HIE). Since the research was conducted for this report, data supplied by Highlands and Islands Enterprise shows coverage of fibre broadband in Inverness has now reached 70%. This is as a result of the programme referred to above plus BT's own commercial roll-out.

### **Inverness has a population of 37,000, with residential premises accounting for 93% of all premises**

Figure 1.35 shows the size of the city in terms of population and number of residential and non-residential premises. The population is based on the 2011 census and the number of premises is based on postcodes within the local authority boundary.

Inverness acts as a hub for high-technology industries, namely life sciences, renewable energy, digital media, and electronics. Other industries include tourism and leisure/sports. The city acts as the major centre for the surrounding Highland and Islands area<sup>16</sup>.

**Figure 1.35 City population and premises data**

City	Population	Total premises	Business premises	Residential premises
Inverness	c.37,000	c.20,400	c.1600	c.18,800

Source: Analysys Mason

For this study the city boundary is defined by the combination of appropriate Data Zones, published by Scottish Neighbourhood statistics, for areas of contiguous urban density, which are shown in detail in the following figure:

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<sup>16</sup> Source: Analysys Mason

**Figure 1.36 Map of area local to Inverness, highlighting city boundary**



Source: Analysys Mason

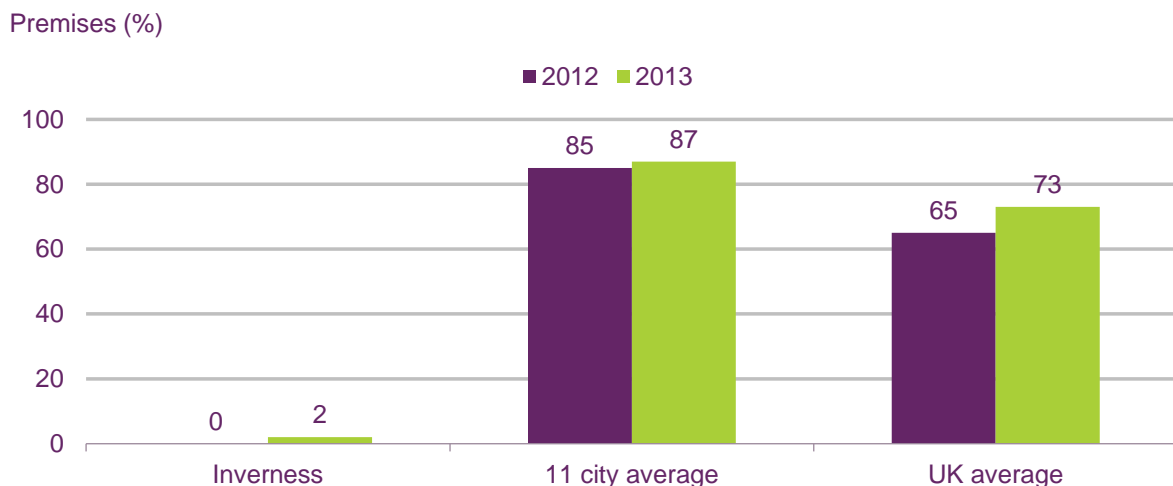
**Next generation access is available to 2% of premises in Inverness<sup>17</sup>**

Figure 1.37 identifies NGA network infrastructure (FTTx and DOCSIS v3.0 cable technologies) for BT Openreach.<sup>18</sup>

The BT Openreach NGA network is currently available to 2% city premises. Virgin Media does not currently offer NGA services in the city.

Although the availability of first-generation broadband is 100%, some premises experience broadband speeds of less than 2Mbit/s, which is considered below the minimum requirement for a basic broadband service.

**Figure 1.37 NGA availability in Inverness by premises passed, compared to 11 cities' and UK averages**



Source: Analysys Mason, Ofcom Infrastructure Report 2012

<sup>17</sup> Please see update from Highlands and Islands Enterprise on the previous page.

<sup>18</sup> BT Openreach has regulatory obligations to give other providers wholesale access to its NGA network. Other providers make retail services available to consumers using that network.

Figure 1.38 shows the proportion of connections with a speed of less than 2 Mbit/s. The proportion of Inverness lines in this category is 7.6%, compared to 9.6% in 2012, which is likely to be due to increased take-up of NGA broadband services.

**Figure 1.38 Percentage of lines with speed less than 2Mbit/s, and relative positioning**



Source: Analysys Mason, Ofcom Infrastructure Report 2012

### **Inverness has three copper exchanges, one of which has been upgraded to NGA**

Figure 1.39 shows the number of exchanges serving the city postcodes, the percentage of lines that support both ADSL and ADSL Max<sup>19</sup>, and the average number lines per exchange.<sup>20</sup> Not all of these exchanges are physically located within the city boundary. All of the copper lines support basic broadband (both ADSL and ADSL Max).

**Figure 1.39 Number of exchanges and % of lines with access to basic broadband**

No. of exchanges serving city postcodes	% of lines that have access to both ADSL & ADSL Max	Average number of lines per exchange
3	100%	6,800

Source: Analysys Mason

### **Summary of public interventions**

Highlands and Islands Enterprise (HIE) is leading a £146 million investment in broadband infrastructure across the Highlands and Islands. The project is to be delivered by BT, and on completion around 84% of Highlands and Islands homes and businesses will have access to fibre broadband. The public-sector investment in the contract is £126.4m, which is being delivered through the Scottish Government broadband fund, incorporates funding from Broadband Delivery UK, and includes up to £12m from the HIE budget. BT is investing an additional £19.4m in the project, in addition to investment in its wider commercial roll-out for the region.

<sup>19</sup> ADSL Max is a 'rate-adaptive' variant of ADSL, where the transmitted bit rate varies depending on the physical conditions of the twisted-pair copper line, which may change over time. In contrast, the bit rate for ADSL is fixed and does not change.

<sup>20</sup> Source: Analysys Mason.

In October 2013, over 16,000 premises on the outskirts of Inverness and along the coast into Moray were announced as the first areas that will be able to access fibre broadband services as part of the scheme. These premises were earmarked to receive fibre connectivity from early 2014<sup>21</sup>. Since the research was conducted for this report, data supplied by Highlands and Islands Enterprise shows coverage of fibre broadband in Inverness has now reached 70%.

## 1.5 Digital Day 2014 Scotland

### Introduction

People have more flexibility and choice than ever before when it comes to what, how and when they access media content and use communications services. This is due in part to the expansion in the range of devices that are capable of supporting a wide variety of media content and service types, and the speed of their adoption.

In Q1 2014, Ofcom conducted an in-depth study of UK adults' total media and communications activities to provide an overview of the role of media and communications in people's lives. The study was designed as a follow-up to Ofcom's Digital Day study conducted in 2010<sup>22</sup>, and was undertaken to support Ofcom's regulatory goal to research markets constantly and to remain at the forefront of technological understanding.

The research provides a snapshot of people's media and communications behaviour over a seven-day period. It was designed to explore how people use media and communications devices throughout the day, covering both personal and business use, in- and out-of-home use. Note that in this analysis 'media consumption' refers not only to viewing and listening but also to all text and voice communications, and the consumption of print media.

A nationally representative sample of 1,644 adults aged 16+ participated in the study across the UK in March-April 2014, including 253 in Scotland. Respondents recorded all their media behaviour in a diary for seven days, and these data were captured on a daily basis online or by telephone. Figure 1.40 shows all the activities and devices recorded.

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<sup>21</sup> <http://www.digitalscotland.org/news/scotland%E2%80%99s-first-publicly-funded-fibre-broadband-services-to-be-in-inverness-shire-and-moray/>

<sup>22</sup> See <http://stakeholders.ofcom.org.uk/market-data-research/market-data/digital-day/>

**Figure 1.40 Media consumption activities**

Activity Types	Grouped activities	Activities	Devices
Watching	TV or films on a TV set	Live TV, Recorded TV, On-demand / catch-up TV or films (free), Downloaded or streamed TV or films (paid-for) , TV or films on DVD, Blu-ray, VHS video	A TV set (including TV set top box or DVD/Blu-ray player, but excluding games console)
	TV or films on another device	Live TV, Recorded TV, On-demand / catch-up TV or films (free), Downloaded or streamed TV or films (paid-for) , TV or films on DVD, Blu-ray, VHS video	Any capable device except for TV set
	Other video (short clips)	Short online video clips	Any capable device
Listening	Radio on radio set	Radio (at the time of broadcast), On-demand/'Listen again' radio programmes or podcasts	A Traditional analogue (FM/MW/AM) radio set, a Digital (DAB) radio set, or an Internet/WiFi radio set
	Radio on another device	Radio (at the time of broadcast), On-demand/'Listen again' radio programmes or podcasts	Any capable device except for radio set types
	Other audio	Personal digital music or audio collection , Streamed online music, Personal music collection on CD, Vinyl record or cassette tapes, Music videos (background listening)	Any capable device
Communicating	Voice communications	By phone call, By video calls	Any capable device
	Text communications	Through a Social Networking site (excluding checking updates), Instant Messaging, email (reading/ writing), Text message, Photo or video messages (viewing/ sending) or Snapchat	Any capable device
Playing	Games	Games (on an electronic device)	Any capable device
Read/ browsed/ used	Print media	A newspaper/article (printed or online/digital including apps), A magazine /article (printed or online/digital including apps), A book (printed or eBook)	A Printed copy (Newspaper/book/magazine)
	Other Internet media	A newspaper/article (printed or online/digital inc. apps), A magazine /article (printed or online/digital inc. apps), Other online news (not through a newspaper site), Sports news /updates (not through a newspaper site), Online shopping or ticketing site/ app, Other websites or apps	Any capable device
	Other non-internet media	A book (printed or eBook), Other activities such as creating office documents/spreadsheets, creating or editing videos/music/audio, etc.....	Any capable device

In this section we provide an overview of the key findings for consumers in Scotland, while a detailed analysis of the findings among the UK population can be found in the *UK Communications Market Report*<sup>23</sup>.

## Key findings

### Television on a TV set dominates peak-time media consumption, while text communications are popular during the daytime

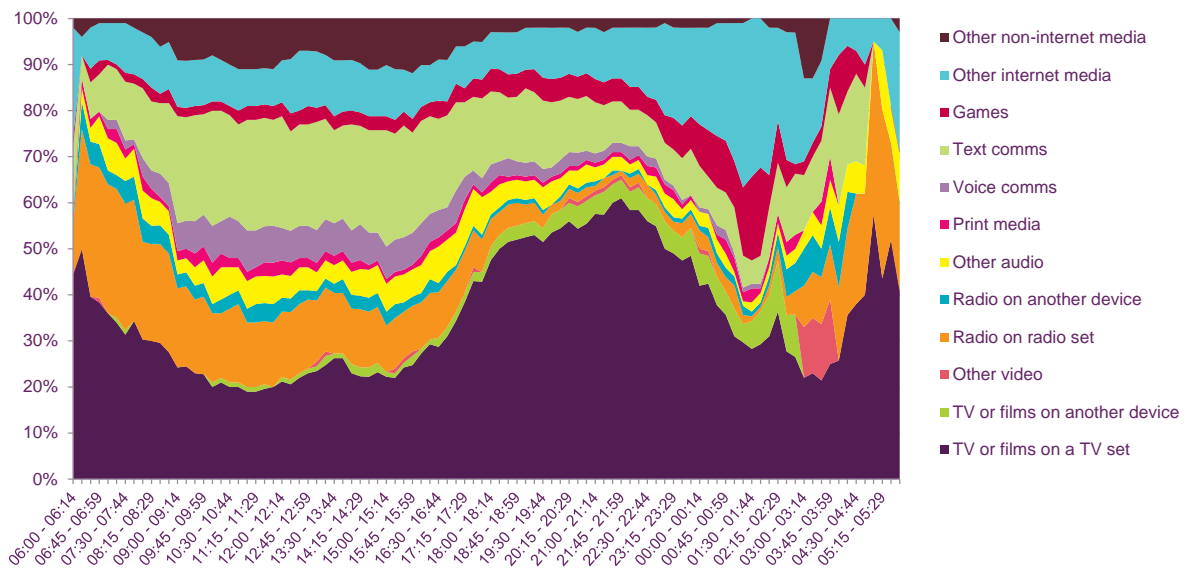
Figure 1.41 focuses on the proportion of media and communications activity undertaken throughout the day by respondents in Scotland. The data illustrate the popularity of television in the evening, as between 6.15pm and 11.29pm over half of all media activities undertaken involved watching television or films on a TV set. This peaked at 61% during the 9.45pm to 9.59pm timeslot. In comparison, despite the rise in consumption of tablets and smartphones, watching TV or films on a different device accounted for approximately 5% of peak-time media consumption. In the morning, listening to the radio on a radio set or another device was popular, accounting for 34% of all media activities between 6.30am-6.44am.

Text communications including email, instant messaging, and communicating via a social networking site, made up a fair proportion of media activity throughout the day but particularly during the daytime (9-5pm). This activity peaked at 3pm-3.14pm, when it accounted for a quarter of all media activity (25%). Voice communications accounted for a significantly smaller proportion of media consumption, peaking at 9% between 10.30am-

<sup>23</sup> <http://stakeholders.ofcom.org.uk/market-data-research/market-data/communications-market-reports/cmr14/>

11.14am, while use of print media including books, magazines and newspapers made up an average of 2% of all media activity throughout the day.

**Figure 1.41 Proportion of media activities across the day: Scotland**



Source: Digital Day 7-day diary

Base: All activity records (17356) for adults aged 16+ in Scotland (253) - data aggregated to 15-min slots

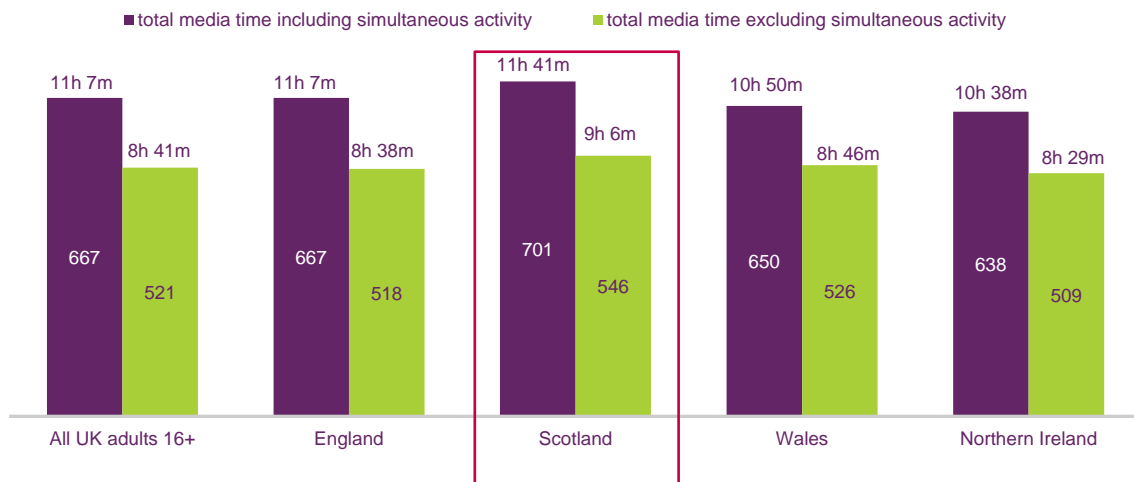
Note: The base of media activities changes every 15-min slot, so is much lower during sleeping hours

### Consumers in Scotland spend the most time consuming media across an average day

Figure 1.42 shows the number of minutes of media and communication activity undertaken across a typical day, split by nation. Our research found that the time spent by people in Scotland using media would take 701 minutes (11 hours 41 minutes) in total if each activity were done separately. However, because people carried out some media activities concurrently, this simultaneous media consumption allowed them to fit these 701 minutes into 546 minutes, or 9 hours 6 minutes per day.

The chart shows that consumers in Scotland spend more time than consumers in other nations consuming media and communications in a typical day, and 34 minutes more than people in England, which has the next-highest level of media consumption. The average across the UK was 11 hours 7 minutes of media consumption, compressed into 8 hours 41 minutes.

**Figure 1.42 Average total media and communications time, by nation**



*For this analysis the calculations are made by generating mean times spent for all adults for each of the activities (including zeros). These mean times are then summed for each group of activities, and in total across all activities*

*Source: Digital Day 7-day diary*

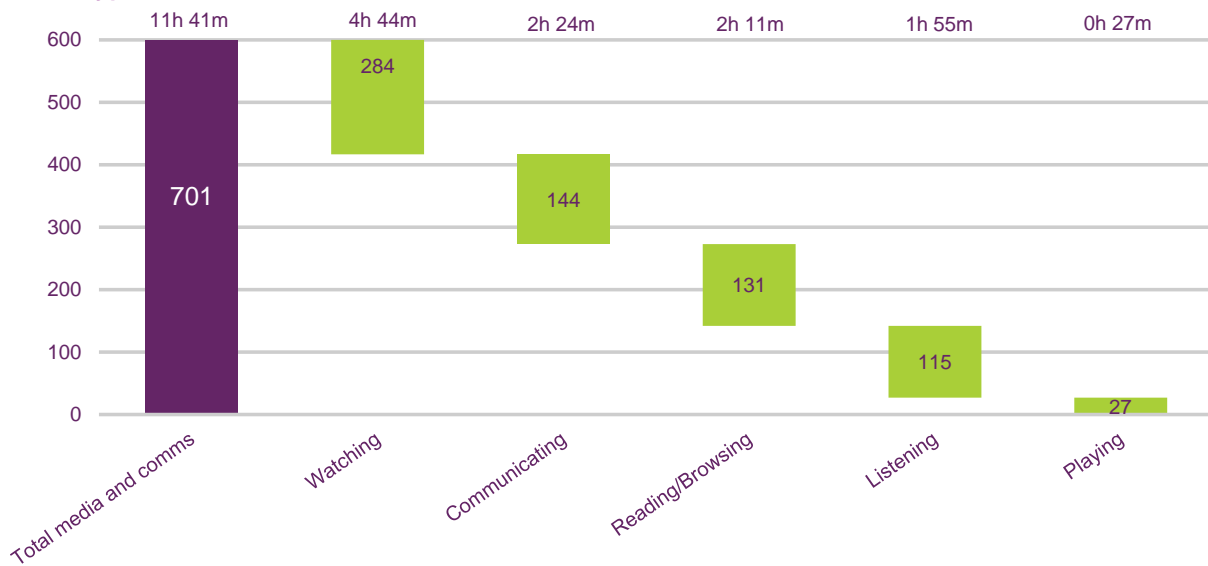
*Base = all media and comms activity records for adults aged 16+ (UK=108782, England=62289, Scotland=17356, Wales=14316, N Ireland=14821)*

### **Consumers in Scotland spend nearly two and a half hours a day communicating via media**

'Watching' activities dominated people's total media consumption time in Scotland, as they did across the UK nations. In total, respondents in Scotland recorded an average of four hours 44 minutes of viewing per day, largely through watching live TV, but this category also includes watching recorded TV, video on demand and catch-up services, and short video clips.

However, consumers also spent the equivalent of 2 hours 24 minutes communicating – by email, text, social networks, instant messaging and voice calls. This amounts to over a fifth of all their media and communications time throughout the day. Almost two hours a day were spent 'listening' (to radio or other audio), while 2 hours 11 minutes were spent reading/ browsing – greater than the UK average of 2 hours 1 minute.

**Figure 1.43 Average total media and communications time (including simultaneous activity), in Scotland**



*For this analysis the calculations are made by generating mean times spent for all adults for each of the activities (including zeros). These mean times are then summed for each group of activities, and in total across all activities*

*Source: Digital Day 7-day diary*

*Base: All activity records (17356) for adults aged 16+ in Scotland (253)*

**Television remains resilient in Scotland, where four in ten media minutes are spent watching TV on a TV set**

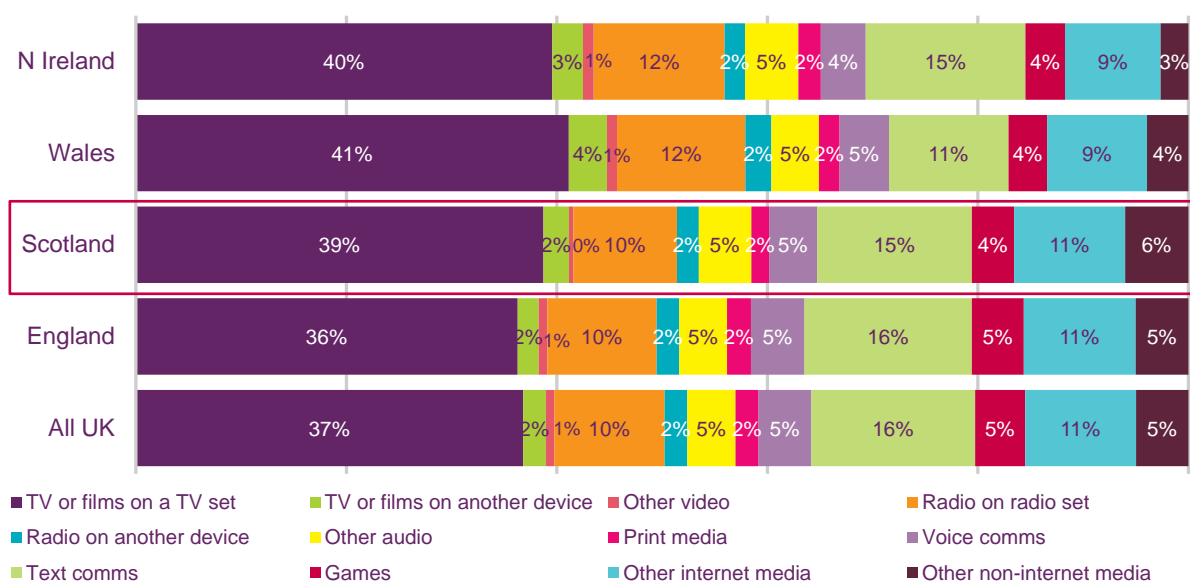
Consumers in Scotland spent 39% of their daily media and communications time watching TV on a TV set – marginally higher than the UK average of 37%. In comparison, just 2% of their media time was spent watching TV or films on another device, such as a tablet, laptop or smartphone, in line with the UK average.

In Scotland, 12% of total media time was spent listening to the radio (10% via a radio set and 2% on another device), while a further 5% of time was spent listening to other audio, such as personal digital music collections or streaming services. Almost a fifth of media time was therefore spent listening to audio.

Text communication, including emailing and texting, took up three times as much media time as voice communications (15% vs. 5%), a pattern which was repeated across the nations.



**Figure 1.44 Proportion of all media and communications time, split by activity**



Source: Digital Day 7-day diary

Base: all media and comms activity records for adults aged 16+ (UK=108782, England=62289, Scotland=17356, Wales=14316, N Ireland=14821)

\*Average time spent is the total average daily time spent doing media and comms activities, including simultaneous activity

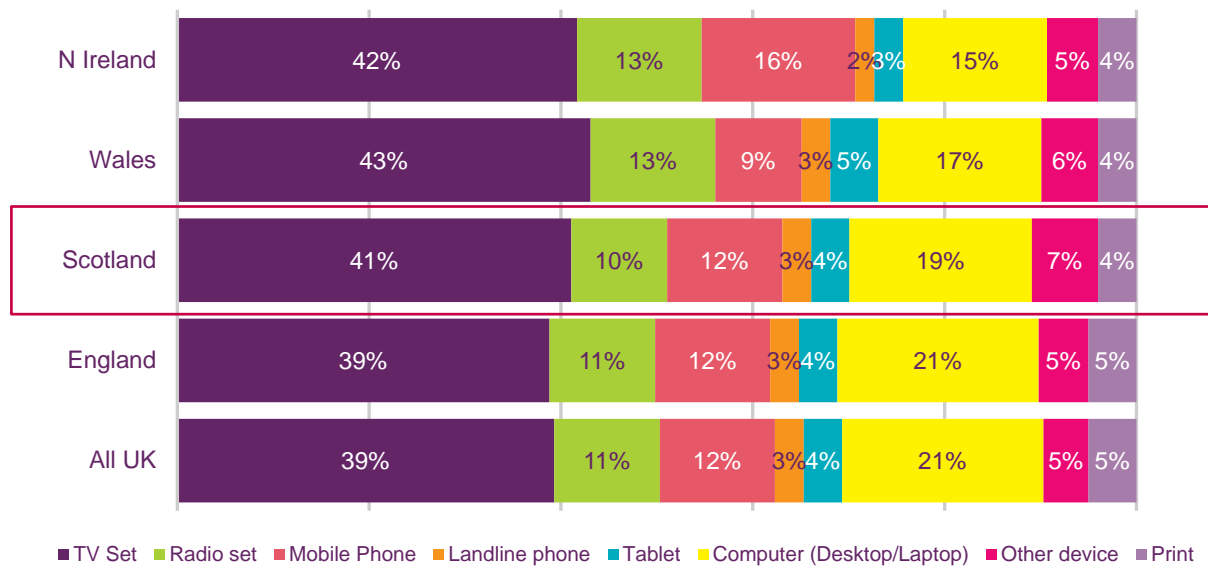
### Despite the rise in ownership of tablets, traditional media devices still account for a majority of media consumption

Figure 1.45 shows the proportion of media time spent on different devices. In line with the charts above, media time is dominated by the TV set, with over four in ten media minutes in Scotland spent on this device. Ten per cent of media time was spent using a radio set, with use of this device being most popular in the morning.

Scotland's media consumption pattern by device is broadly in line with the UK average, and despite the rise in take-up of tablet computers in the past two years (42% of households in Scotland have one of these devices), 19% of media consumption time is spent using a desktop or laptop computer, compared to 4% on a tablet.

However, with smartphone penetration now at 62% in Scotland, for many consumers phone functions extend far beyond calling and texting, and as a result mobile phones accounted for 12% of all media consumption time – equivalent to 1 hour 25 minutes per day.

**Figure 1.45 Proportion of all media and comms use through each device, by nation**



Source: Digital Day 7-day diary

Base: all media and comms activity records for adults aged 16+ (UK=108782, England=62289, Scotland=17356, Wales=14316, N Ireland=14821)

\*Average time spent is the total average daily time spent doing media and comms activities, including simultaneous activity

\*\*Other device includes games console, stereo system, e-reader and any other devices not listed (each one represents 1%-2% of use)