Ofcom
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for everyone

The consumer mobile experience

Measuring consumer experience of using mobile services

16 June 2017

Contents

Executive summary

This report summarises the initial results from Ofcom's new mobile research, which is designed to measure the consumer experience of using mobile services. It provides information on data service availability, and the performance of mobile voice and data services.

The purpose of this first report is to present a high-level picture of the consumer experience of using mobile services, and it does not include data comparing the performance of mobile network operators. We will look to extend the scope of future reports to include comparisons of consumers' experience by mobile network operator and location.

We welcome feedback on this report at mobileresearchapp@ofcom.org.uk.

Key findings:

Data service availability

- More than nine in ten mobile data downloads are successful for both 4G (95.6%) and 3G-only (92.4%) users.
- Almost seven in ten users (69%) are happy with their overall service, with 4G users more satisfied than 3G-only users (71% vs 60%).
- When using apps, 4G consumers are connected to Wi-Fi 69% of the time. When 4G users are connected to a cellular network, 65% of time is spent on a 4G network, 30% on 3G and 5% on 2G.

Data performance

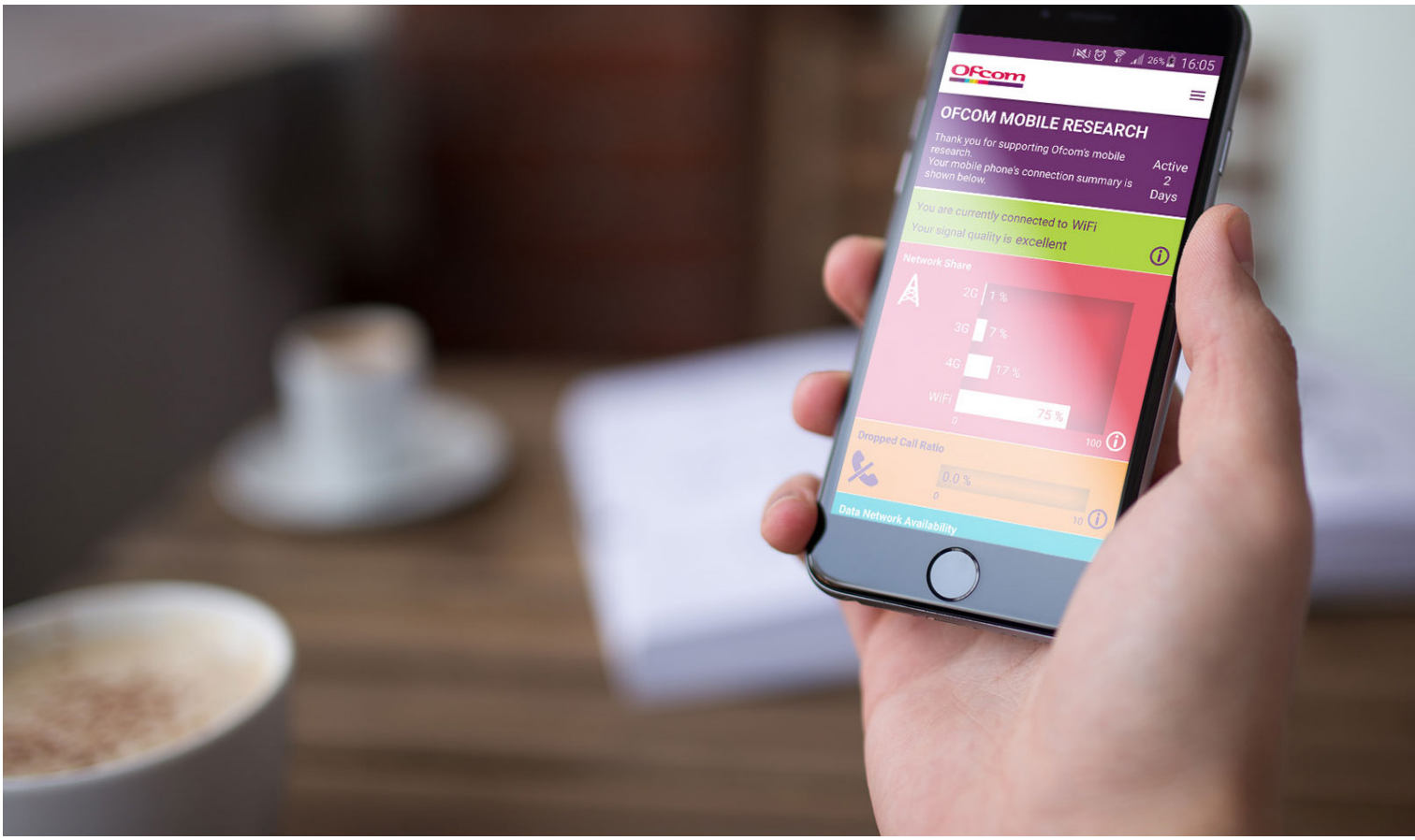
- Connection speeds when using YouTube and Chrome are faster over 4G than 3G, with Wi-Fi providing higher average speeds than both mobile technologies.
- 4G networks are more responsive than 3G (48ms vs 64ms response time). Wi-Fi is even more responsive at 27ms.

Voice performance

- Once initiated, less than 1% of all calls are dropped due to loss of service.
- Nine in ten (90%) panellists say they are happy with the performance of their network when making a call.

This research is part of a wider programme of work by Ofcom to research and provide information about mobile quality of service, which also includes our Smartphone Cities research and our broadband and mobile checker app.

Introduction



Introduction

Last year we piloted a new methodology for measuring the consumer experience of using mobile voice and data services, recruiting a panel of UK consumers who installed an Ofcom-branded research app on their Android smartphone. This new research complements our Smartphone Cities work, which has been running since 2014 and compares the performance of mobile network operators (MNOs) in selected UK cities.

About the Ofcom Mobile Research App

The app, which is provided by our technical partner P3, measures consumers' experience of using mobile services as the panellists use their smartphones. It does this by running a programme of 'passive' tests which are designed to measure network availability and performance, while minimising the impact on the user experience (for example, by minimising data use and battery drain). Additional satisfaction measurements are captured via pop-up style surveys, which allow us to compare consumer experience and perception.

More information about our testing methodology can be found in Annex 1: Technical methodology.

The app gives its users summary information about their connection and usage habits (most metrics are based on the past seven days):

- the current network technology the phone is using and the signal strength;
- the proportion of time spent on the different network types (Wi-Fi, 2G, 3G and 4G);
- the proportion of data connection tests that have been successful on Wi-Fi and mobile networks;
- the maximum download speed recorded over each wireless network type;
- the dropped call ratio;
- network latency (response time) recorded over each wireless network type.

The app can be downloaded from the Google Play Store.

The app collects information on a number of measures, including:

- Data service availability and accessibility
- Data throughput and responsiveness (latency)
- Voice call performance
- Usage information

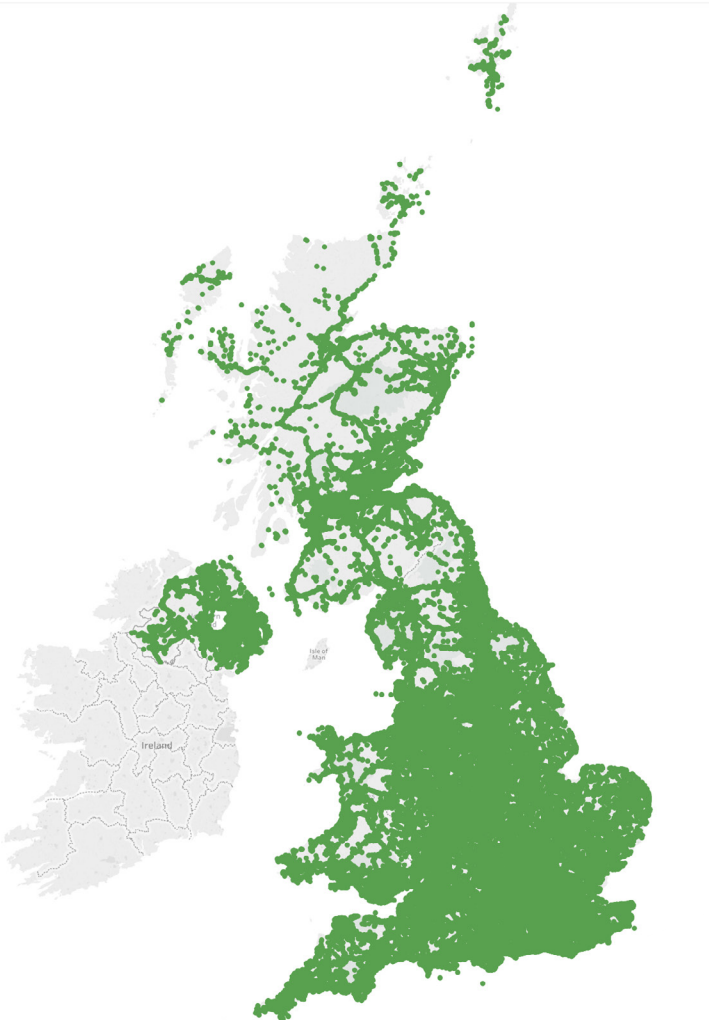
As the data are collected from a panel of consumers across the UK, the results provided below are a good reflection of the consumer experience. This experience is affected by a number of factors in addition to network performance, including handset settings and, potentially, the tariff that the consumer is on. As such, the findings are likely to be different from those published in Smartphone Cities and similar reports, which focus on measuring the performance of the mobile network.

The data used in this report were collected between 27 September 2016 and 23 December 2016. In total, 6,632 people downloaded the app; of those, 4,288 met our requirements in terms of spending at least a week on the panel by the end of the fieldwork, and having valid information regarding their:

- mobile provider;
- mobile service technology;
- home postcode;
- age; and
- gender.

The map shows the geographic spread of our overall panel (i.e. where the tests were attempted), although for the purposes of this report we used sub-panels of the data to ensure that our analysis is representative of the UK Android mobile population.

More information about our sub-panels and how we ensured that the data were representative can be found in Annex 2: Statistical methodology.



Overall satisfaction

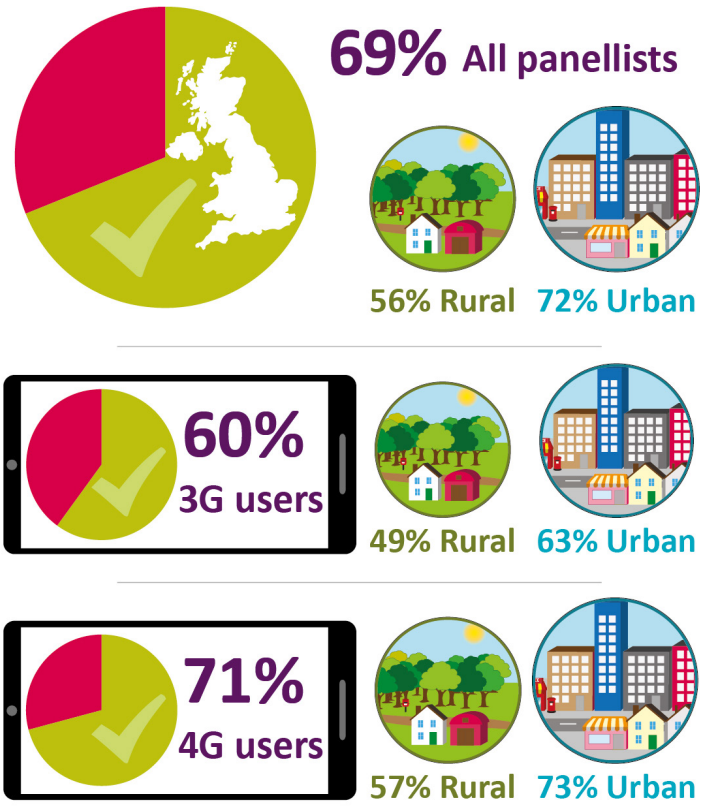
4G users reported higher levels of satisfaction than 3G-only users

Overall, 69% of our panellists said they were 'very' or 'fairly' satisfied with their overall mobile service.

Those with a tariff and handset which enabled them to use 4G services were more satisfied than 3G-only users (71% vs 60%).

People in urban areas were more likely than those in rural areas to say they were satisfied with their service (72% vs 56%). This was true both for 4G users (73% vs 57%) and for 3G-only users (63% vs 49%), and may reflect the better network coverage in urban areas.

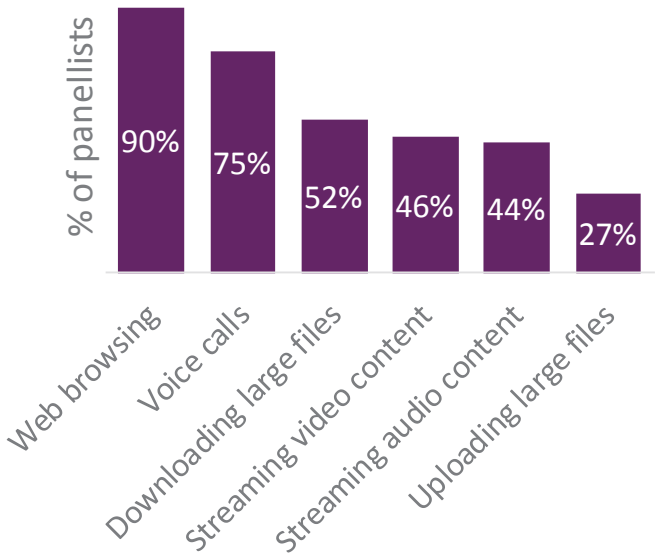
Satisfaction with overall mobile service



While the performance of a service is a key driver of consumer experience, it is important to note that many other factors also affect the consumer experience and therefore levels of satisfaction. These include price, handset type, quality of customer service, contract terms and the activities that the phone is used for.

In our panel, people said that web browsing (90%), voice calls (75%) and downloading large files (52%) were among the most important activities that they used their phones for.

Activities important to mobile users



Network share

4G consumers used apps over Wi-Fi more than two-thirds of the time

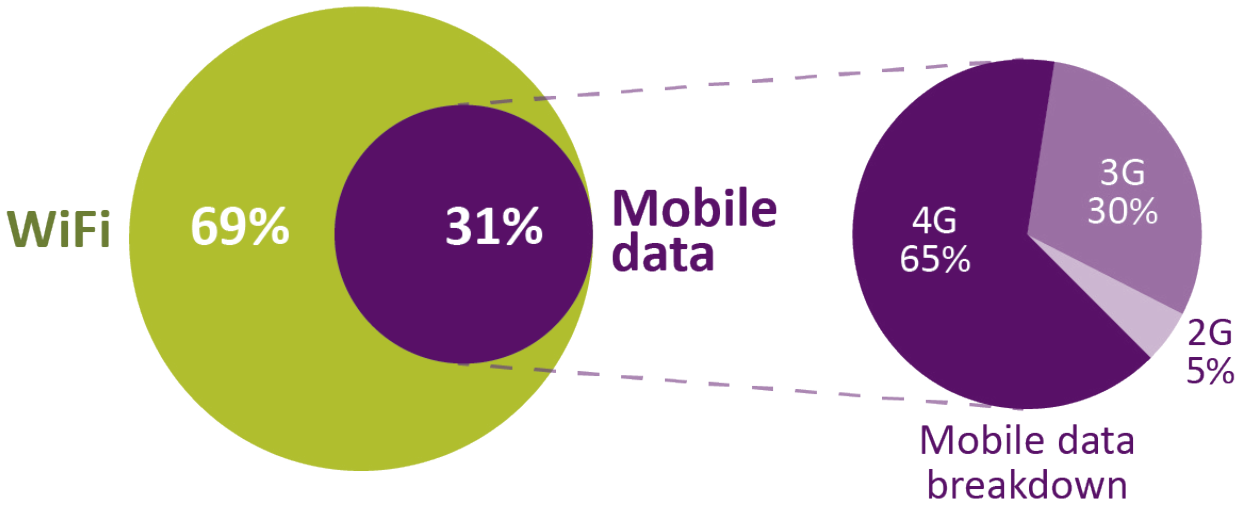
Our mobile research app records the type of network that users connect to when actively using apps and transferring data, and provides an overall picture of the type of network mobile users connect to most often.

Our findings show that Wi-Fi is a fundamental part of the experience of consumers using mobile phones. More than two-thirds of the time, 4G consumers connected to Wi-Fi rather than mobile networks when using apps.

This may be due to better experience over Wi-Fi or users trying to minimise their mobile data use, enabling them to save their data allowances for when they are outside the home or other Wi-Fi areas.

When transferring data over a mobile data network, 35% of the time 4G customers were connected to 3G or 2G networks. This reflects the fact that 4G networks currently have lower coverage than 3G or 2G networks, and even where 4G coverage is available, connections may sometimes be made to a 3G or 2G network as part of mobile providers' capacity management.

Type of network connected to while data is transferred during app session



Data service availability

What is data service availability?

Every 15 minutes, the research app runs a background test which attempts to download a small file and logs whether this can be completed successfully. This metric defines the percentage of cases when the user can both connect to the network and download data, however, it is not a direct measure of coverage.

More information on how this metric is derived can be found in Annex 1: Technical methodology.

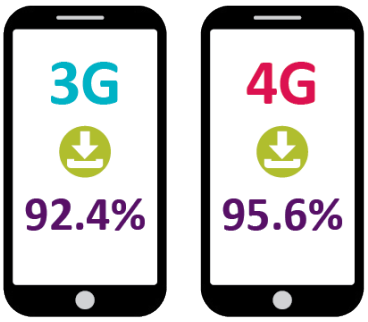
Data service availability

More than nine in ten mobile data downloads are successful

In most cases (95.6% of occasions), 4G users could access a mobile network (either 2G, 3G or 4G) and successfully download data. This was lower for 3G-only users (92.4%).

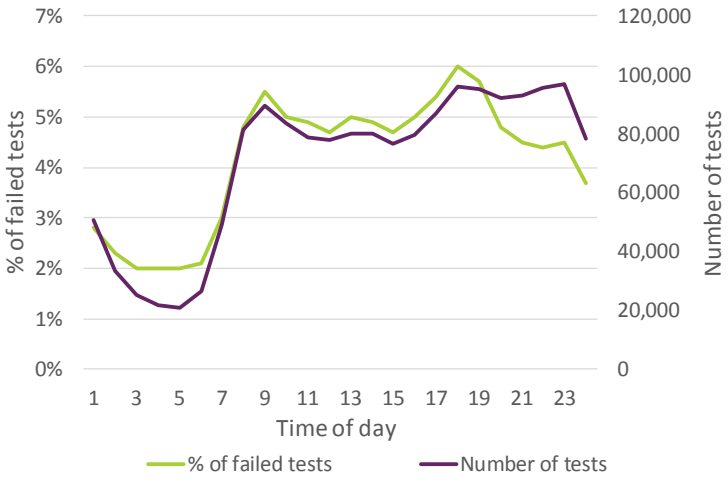
This analysis includes only those tests that were run when the phone's screen was on, i.e. when the panellist was trying to use it. It does not take into account connection tests run while the phone was not in use ('screen off').

Percentage of cases people could access a mobile network and successfully download data



Analysing the results by time of day, we see a strong positive correlation between the number of connection tests per hour and the percentage of tests that fail. This indicates that it is more likely that data download will not be successful at times when more people are using their phones and mobile networks are busy.

Correlation between the number of connection tests per hour and the percentage of failed tests



Data performance

Download speed

Download speed is the speed at which information is transferred from the internet to a device. In effect, it determines how quickly a file can be downloaded to a smartphone. The unit of measurement for download speeds is megabits per second (Mbit/s).

Response time

Response time (referred to technically as latency) is the delay between a consumer making a request to their mobile network for information and the network providing this information to the device. A connection with low latency will 'feel' more responsive.

More information on how this metric is derived can be found in Annex 1: Technical methodology.

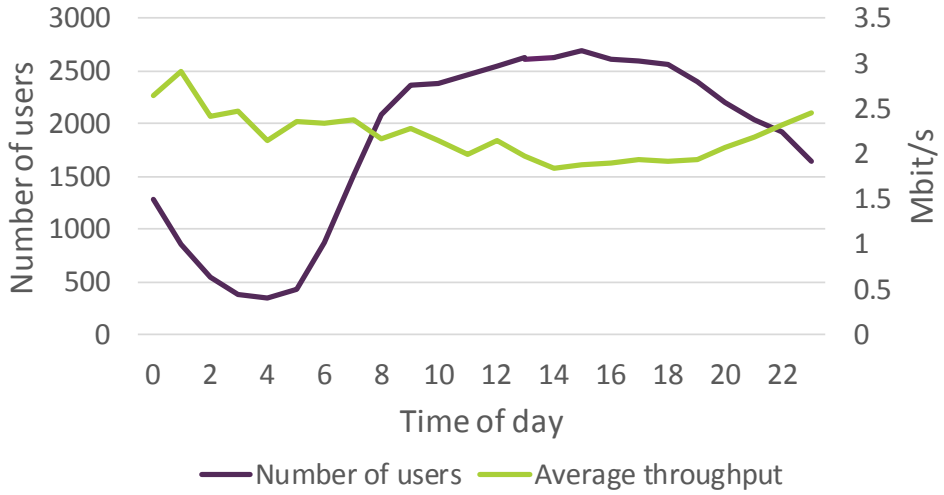
Data performance

People use their smartphones for a variety of purposes, and what the phone is used for affects the consumer experience: some applications require higher speeds in order to deliver a good consumer experience, while for others response time may have a bigger impact.

When using apps like the Google Play Store, the phone tries to download a file as quickly as possible and therefore needs speeds significantly higher than most other apps. Video streaming services such as YouTube also need higher speeds in order to deliver a good experience (over 2Mbit/s for standard-definition video streaming and over 5Mbit/s for high-definition); low speeds may lead to video buffering and failure to stream high-definition videos. In comparison, web browsing and video calling require speeds of over 1Mbit/s for a good experience (the indicative speeds are based on those used to determine the status of service for the Ofcom's broadband and mobile checker app).

Looking at variation throughout the day, we see that the highest levels of mobile use are between 10am and 8pm, and that during these times the recorded average data throughput is lowest. This indicates that network congestion results in lower speeds at busy times.

Correlation between the number of people using their phones and the average speed, by time of day

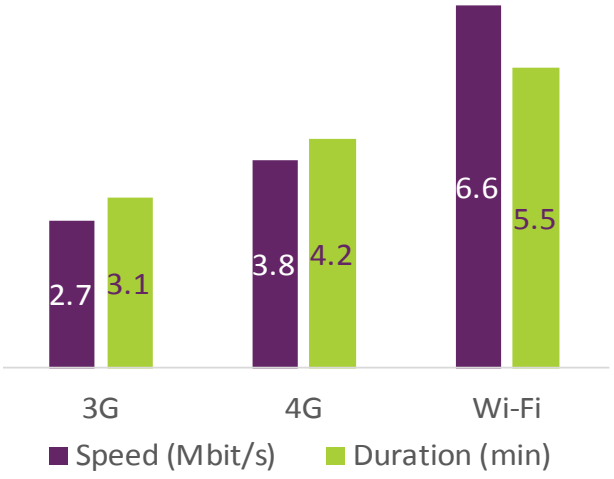


YouTube and Google Chrome performance

YouTube

The average speeds recorded when using YouTube vary by network technology.

On average, those using YouTube over 4G could receive speeds of 3.8Mbit/s, while the average speed over 3G was lower, at 2.7Mbit/s. People watching YouTube over Wi-Fi had the highest average speed, at 6.6Mbit/s.



The average duration of a YouTube session was longer over Wi-Fi (around five-and-a-half minutes) compared to 4G (just over four minutes) and 3G (around three minutes).

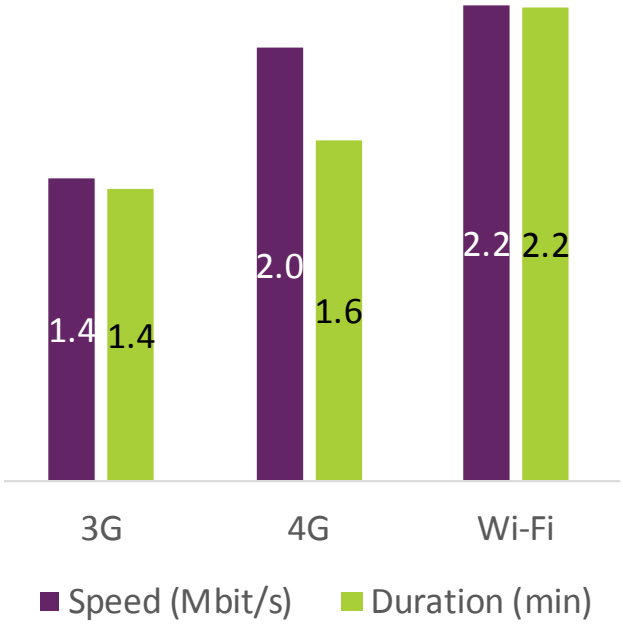
This may reflect a better user experience over higher speeds. But it is also likely to be due to consumers limiting their mobile data use to avoid exceeding their mobile data allowance.

Google Chrome

The Google Chrome web browser requires much lower speeds than YouTube in order to provide a satisfactory user experience.

At the UK level, 4G users on average received 2.0Mbit/s speeds, while when on 3G, the average speed was lower, at 1.4Mbit/s. On average, there was little difference between speeds on 4G and Wi-Fi (2.2Mbit/s) when using Chrome.

Consumers tended to spend more time using Chrome when on Wi-Fi (just over two minutes) compared to 4G and 3G (at slightly above and slightly below one-and-a-half minutes respectively).



It should also be noted that people may spend more time using apps when at home and likely using Wi-Fi than when they are out and probably using mobile data, thus explaining higher app use on Wi-Fi.

Response time

Download speeds are particularly important for video streaming and downloading larger files, such as films or apps, however it is not the only measure that determines consumer experience.

For activities that require information to be delivered with as little delay as possible, a quick response time (i.e. low latency) may be more important. A connection with low latency will also feel more responsive for simple tasks like web browsing and certain applications perform far better with lower latency, including video calling, VoIP (voice over internet protocol) and online gaming.

Our research indicates that 4G networks are more responsive than 3G ones; on average, response time (latency) on 3G was 64ms compared to 48ms on 4G. Response time on Wi-Fi was even lower at 27ms.

Most activities require a response time of less than 100ms to provide a good experience, although some online gaming apps require a response time of less than 50ms.

3G response time	4G response time	Wi-Fi response time
64ms	48ms	27ms

Voice performance

Measuring voice performance

As voice call performance is still a major driver of customer satisfaction, Ofcom's mobile research app measures whether people can successfully maintain voice calls by detecting cases where the call is interrupted due to a loss of service.

Due to limitations in passive testing methodology, we are not able to look into call set up success, so the results do not take into account times when people were not able to make a call.

More information on how this metric is derived can be found in Annex 1: Technical methodology.

Voice performance

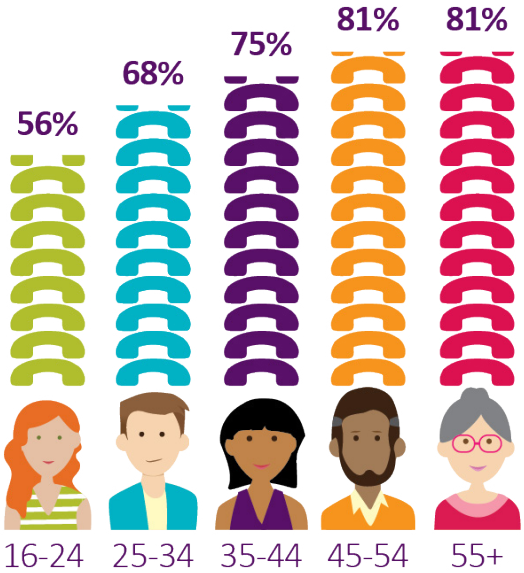
Voice call performance remains important for many people

Three in four respondents in our panel said that the ability to make voice calls on a daily basis was 'extremely' or 'very' important to them, while only 5% claimed that voice calls were not at all important.

There were differences based on age; a lower proportion (56%) of 18-24s in our panel said calls were important to them, compared to 81% of over-45s.

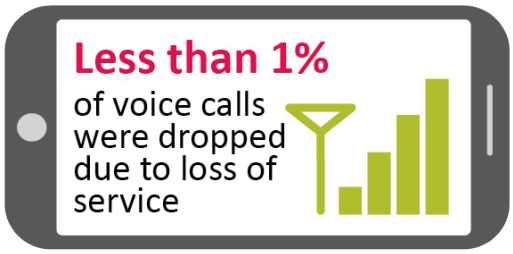
More than half of panellists said that making voice calls was extremely important

Age breakdown of panellists who said voice calls were extremely or very important



Calls dropped due to loss of service

Our research shows that once initiated, less than 1% of all calls were dropped due to loss of service during the research period.

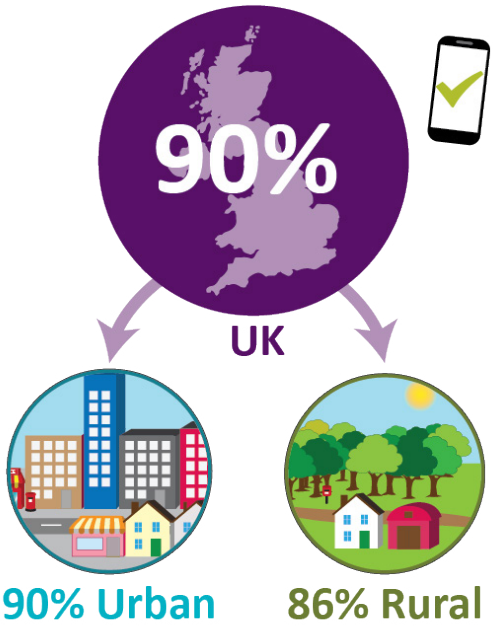


Satisfaction with voice call performance is high

At a UK level, 90% of panellists said that they were happy (either positive or neutral) with the performance of their network when making a phone call.

However, those in urban areas were more likely than those in rural areas to say that they were satisfied (90% vs 86%).

Percentage of panelists who claim they are happy with voice call performance



Next steps

- We will publish additional analysis of usage trend information captured by the research app in the ***UK Communications Market Report*** in August 2017.
- We aim to increase the size of our panel in the coming months. If you would like to take part in the research, please download the app from the Google Play Store.
- The second phase of fieldwork will run in Q4 2017.
- We will look to extend the scope of future reports to include comparisons of the experiences of consumers by mobile network operator and location.