

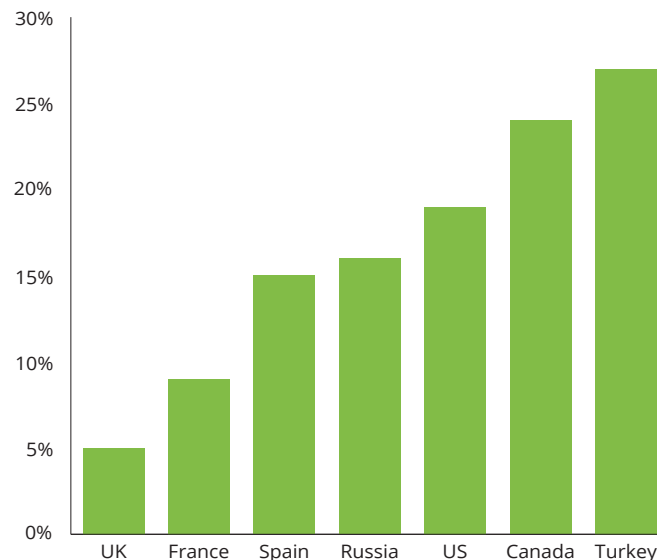
## Mobile-only: wireless home internet is bigger than you think

Deloitte Global predicts that 20 percent of North Americans with internet access will get all of their home data access via cellular mobile networks (mobile-only) in 2018. Deloitte Global further predicts that a mixture of cellular and fixed wireless access (FWA) technologies could lead to 30-40 percent of the population relying on wireless for data at home by 2022, an increase from only 10 percent in 2013.<sup>260</sup> These people will have no active wired data connection to their home – no coaxial cable, fiber-optic connection or DSL copper line. Instead, they rely solely on radio technology for their entire home internet usage. They are likely also to access the internet while at work, in school, in coffee shops and so on, but when they are at home, they have no other data-access technology.

Deloitte Global further predicts significant variation in the proportion of the population that use only cellular mobile for data access by country and by region (see Figure 24). According to our research, less than a tenth of people in France and the UK were mobile-only, but in Turkey the figure was more than three times higher. In Latin America, for example, Deloitte Brazil believes that over a third of all homes in Brazil were mobile data only. And in China, a fifth of the online user base (rather than households) were mobile-only as of 2016.<sup>261</sup> In Tokyo, where fiber-optic connections are widely available, hundreds of thousands of homes (or about five percent) are relying on only mobile in 2017.<sup>262</sup>

According to our research, less than a tenth of people in France and the UK were mobile-only, but in Turkey the figure was more than three times higher. In Latin America, for example, Deloitte Brazil believes that over a third of all homes in Brazil were mobile data only.

**Figure 24. Percentage of data mobile-only homes in selected countries in 2017**



Source: Deloitte Global survey of adults in seven countries – 1,096 in the US; 1,090 in Canada; 1,061 in Turkey; 1,118 in the UK; 1,097 in France; 1,082 in Spain; and 1,097 in Russia (survey conducted Aug.-Oct. 2017)

Why will so many homes be relying on mobile internet service alone in 2018? There will be many different reasons. Sometimes it is because mobile is the only form of data connection available, especially outside cities. Other factors – income, age, living alone, or using better and faster networks with bigger monthly data allowances – also seem to play a role. This tendency also follows a trend; many people have discontinued wired home phones, and the same shift is occurring in internet access.

260. All data comes from Deloitte Global surveys conducted with over 7,641 adults in seven markets in August and September of 2017 by Ipsos: 1,096 in the US, 1,090 in Canada, 1,061 in Turkey, 1,118 in the UK, 1,097 in France, 1,082 in Spain and 1,097 in Russia.

261. Why China Beats the US in Mobile Usage, Verto Analytics, 29 April 2016: <http://www.vertoanalytics.com/why-china-beats-the-u-s-in-mobile-usage-and-other-data-points-revealed-at-gmic-beijing/>.

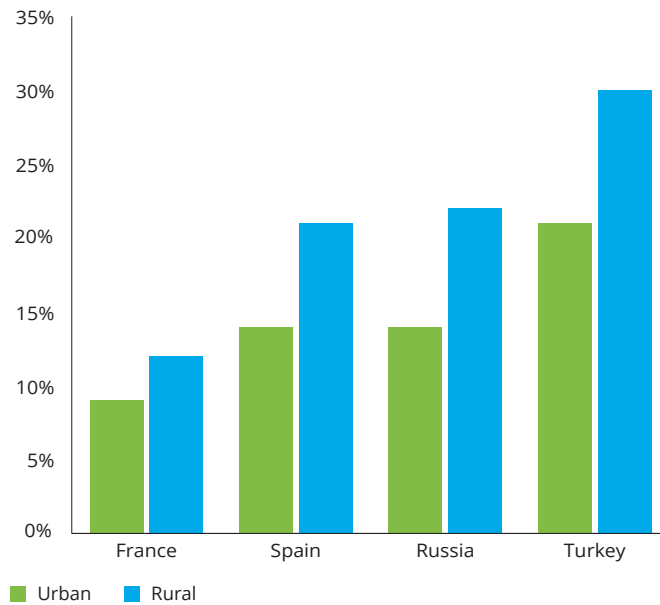
262. Hundreds of Thousands Go Wireless Only in Tokyo, Fastnet, accessed on 6 November 2017: <http://fastnet.news/index.php/97-fnn/592-hundreds-of-thousands-go-wireless-only-in-tokyo>.

**Part I: the past and present of mobile-only for data**

**Sometimes you have only one choice.** From the edge of cities to remote farms, there are hundreds of millions of people worldwide who live in areas with no fiber or cable connections. Although their homes have copper phone lines, they are too far from the local telephone exchange for DSL technologies to work well.<sup>263</sup> If their homes are more than a mile from a central office and less than four miles from a long-term evolution (LTE) cell phone tower, mobile may be the fastest internet service available. This may be quite rare in the UK and France (and probably many other Western European countries), but is more common in other places. As can be seen in Figure 25, in countries for which we have data, rural residents are far more likely than urban residents to have mobile-only service.

From the edge of cities to remote farms, there are hundreds of millions of people worldwide who live in areas with no fiber or cable connections.

**Figure 25. Data mobile-only population for urban and rural, 2017**



Source: Deloitte Global survey of mobile-only adults: Turkey (290), France (103), Spain (168), and Russia (171), Aug-Oct 2017.

263. At more than a mile from the central office, broadband speeds are difficult. How DSL Works. HowStuffWorks, accessed on 6 November 2016: <https://computer.howstuffworks.com/dsl1.htm>.

264. iGR: Average Monthly Broadband Usage Is 190 Gigabytes Monthly per Household, Telecompetitor, 26 September 2016: <http://www.telecompetitor.com/igr-average-monthly-broadband-usage-is-190-gigabytes-monthly-per-household/>; Table 5.3.6 Weighted-average upload and download usage (GBs) of residential high-speed Internet subscribers, Communications Monitoring Report 2016: Canada's Communication System: An Overview for Canadians, accessed 6 November 2017: <http://www.crtc.gc.ca/eng/publications/reports/policymonitoring/2016/cmr5.htm#a53ii>; Connected Nations 2016, Ofcom, accessed on 16 December 2016: [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0035/95876/CN-Report-2016.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0035/95876/CN-Report-2016.pdf).

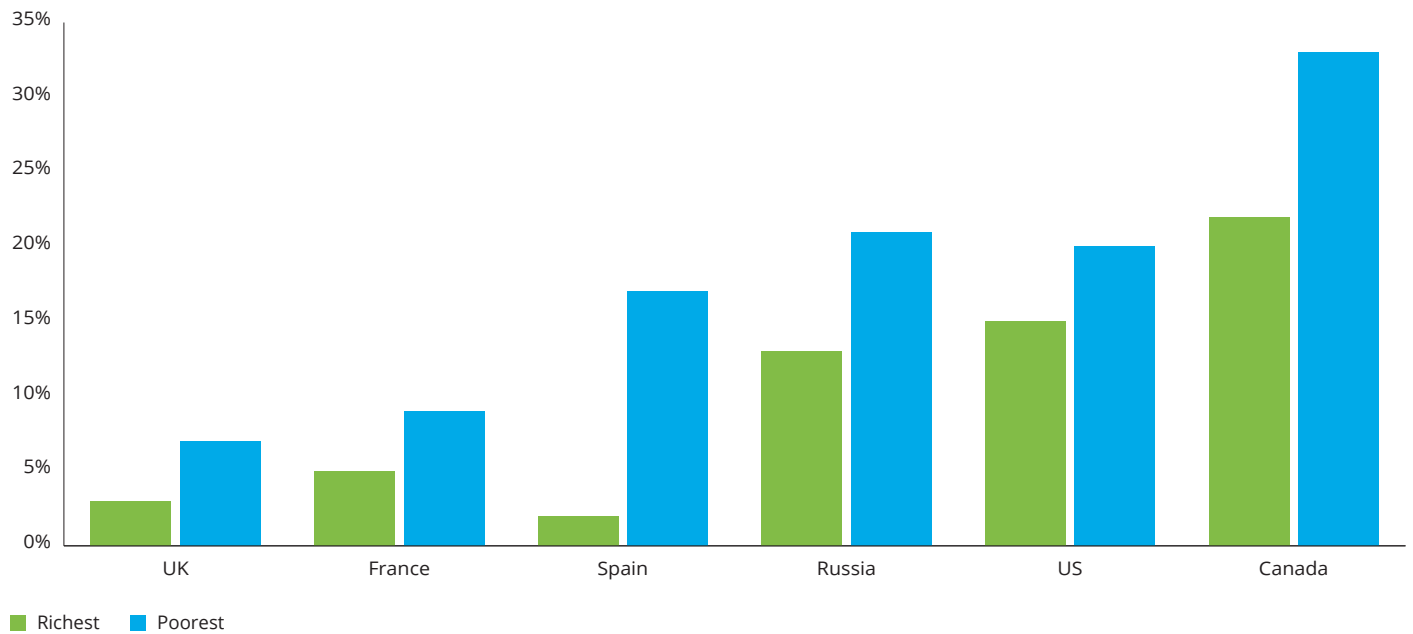
265. Most Comcast customers now have a 1TB home internet data cap, The Verge, 6 October 2016: <https://www.theverge.com/2016/10/6/13192832/comcast-xfinity-home-internet-data-caps-one-terabyte>.

**It's about income, but it isn't about only income.** In every country surveyed, homes in the lowest income bracket were more likely to be mobile-only than homes in the highest income bracket (the brackets vary from country to country). As Figure 26 shows, the income effect was lowest in the US, where those making less than \$25,000 annually were only a third more likely to be mobile-only than those making \$75,000 and over. In general, it seems clear that

having a low income makes being mobile-only well over 50 percent more likely. Deloitte Global predicts that in 2018 there will be a higher proportion of mobile-only homes among lower-income households, although it should be noted that in some of the countries surveyed, 13 to 23 percent of higher-income individuals are also mobile-only; wireless-only data isn't only for those who can't afford wired service.

266. 4G speeds declining as LTE matures globally, Mobile World Live, 1 November 2017: <https://www.mobileworldlive.com/featured-content/home-banner/4g-speeds-declining-as-lte-matures-globally/>.

**Figure 26. Data mobile-only population for highest and lowest income groups, 2017**



Source: Deloitte Global survey of mobile-only adults – 54 in UK, 103 in France, 168 in Spain, 171 in Russia, 203 in the US and 265 in Canada (survey conducted Aug.-Oct. 2017)

267. Average mobile wireless data usage per user in Canada and the United States in 2014 and 2019, Statista, accessed on 6 November 2017: <https://www.statista.com/statistics/489169/canada-united-states-average-data-usage-user-per-month/>.

268. What is 5G, and when do I get it? Wired, 23 February 2017: <https://www.wired.com/2017/02/what-is-5g-and-when-do-i-get-it/>.

269. FCC OKs sweeping Spectrum Frontiers rules to open up nearly 11 GHz of spectrum, Fierce Wireless, 14 July 2016: <http://www.fiercewireless.com/tech/fcc-oks-sweeping-spectrum-frontiers-rules-to-open-up-nearly-11-ghz-spectrum>.

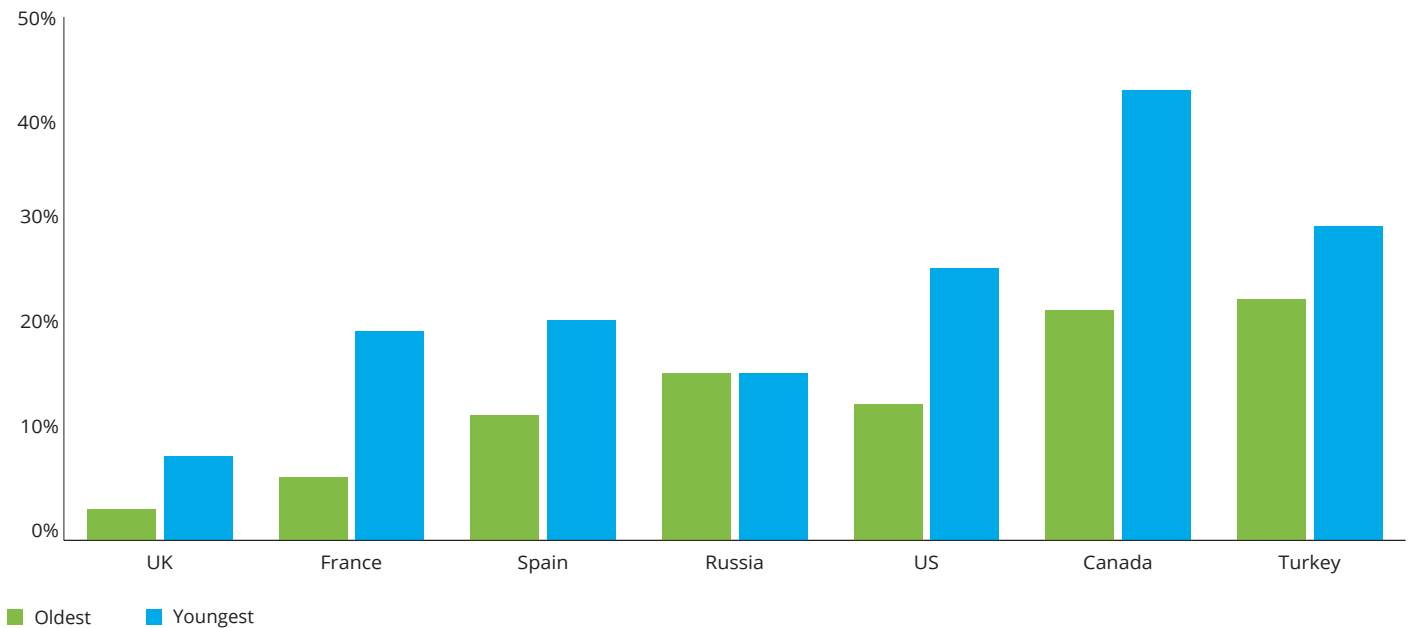
270. AT&T steps up 5G trials ahead of 2018 goal, Mobile World Live, 30 August 2017: <https://www.mobileworldlive.com/featured-content/home-banner/att-steps-up-5g-trials-ahead-of-2018-goal/?ID=003200000vA0LIAAK&BU;5G: Comcast, Liberty Most Serious>

**The age effect is pronounced.** Younger people are roughly twice as likely to rely on cellular for all of their at-home data. In fact, the single biggest demographic factor pointing to whether someone will be mobile-only is age. As can be seen in Figure 27, the youngest cohort surveyed (the exact ages varied from country to country,

but were around 18-24) was almost always more likely, and on average for the seven countries twice as likely, to be mobile-only than the oldest age group (varying by country, but around 55-65 years). The effect was largest in the US, Canada and France; the reasons are unclear.

About mmWave, Wireless One, 23 August 2017: <http://wirelessone.news/10-r/860-5g-comcast-liberty-darn-serious>; Verizon: "100s of mmWave Cells Installed," Wireless One, 5 October 2017: <http://wirelessone.news/mimo-2/879-verizon-100-s-of-mmwave-cells-installed>.

**Figure 27. Data mobile-only population for oldest and youngest groups, 2017**



Source and base: Deloitte Global survey of data mobile-only adults: UK (54), France (103), Spain (168), Russia (171), US (203), Canada (265), and Turkey (290), Aug-Oct 2017.

### Some people use little data when at home.

In 2016, monthly internet usage was 190 GB per household in the US, 145 GB in Canada and 132 GB in the UK.<sup>264</sup> By 2018, usage may be approaching 200 to 300 GB per month in these countries, which may make mobile-only unsuitable for many. These averages are lifted by a minority of households (one to two percent among cable customers in the US)<sup>265</sup> whose usage is approaching one terabyte (TB) per month. Homes with one or two residents who are older or who watch little online video consume much less. Homes where people watch little online video on a TV set would struggle

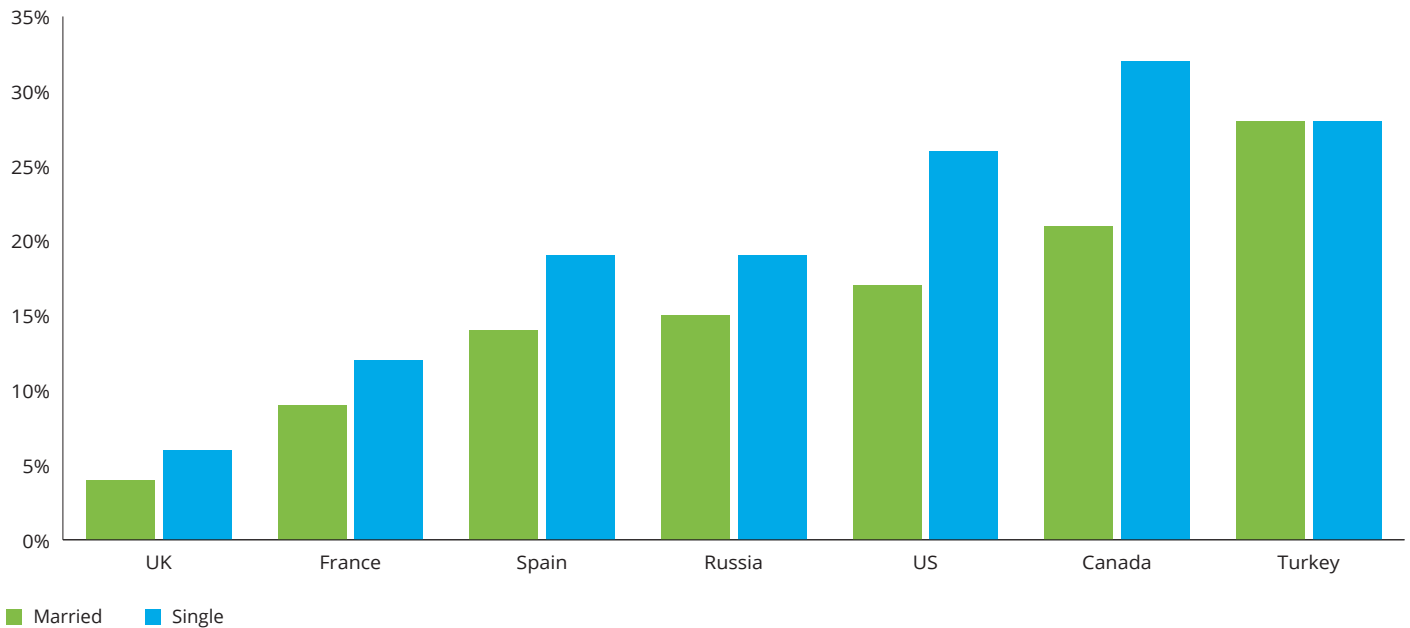
to use more than 50 GB per month. For these homes, the data packages offered by mobile operators may suffice. In markets where naked broadband (broadband only, without also having to subscribe to a landline) is not available, homes can save hundreds of dollars per year by giving up their landline connection. As can be seen in Figure 28, people who are single are more likely to be mobile-only than those who are married or living as married. Although the differences between marital statuses were not statistically significant in all countries, single people were on average over 40 percent more likely to be mobile-only.

271. AT&T Expanding Fixed Wireless 5G Trials to Additional Markets. AT&T website, 30 August 2017: [http://about.att.com/story/att\\_expanding\\_fixed\\_wireless\\_5g\\_trials\\_to\\_additional\\_markets.html](http://about.att.com/story/att_expanding_fixed_wireless_5g_trials_to_additional_markets.html).

272. McAdam of Verizon: mmWave Going Twice the Distance, Cutting Cost. Wireless One, 18 June 2017: <http://wirelessone.news/mimo-2/830-mcadam-of-verizon-400-meter-mmwave-without-line-of-sight>.

273. Teaching by Teleconference: A Model for Distance Medical Education across Two Continents, Open Journal of Obstetrics and Gynecology, May 2015, pages 754-761: <http://www.scirp.org/journal/PaperInformation.aspx?PaperID=61220>.

274. Maybe Americans don't need fast home Internet service, FCC suggests, Ars Technica, 9 August 2017: <https://arstechnica.com/information-technology/2017/08/maybe-americans-dont-need-fast-home-internet-service-fcc-suggests/>.

**Figure 28. Data mobile-only population for married/living as married and single people, 2017**

Source: Deloitte Global survey of data mobile-only adults – 54 in UK, 103 in France, 168 in Spain, 171 in Russia, 203 in the US, 265 in Canada and 290 in Turkey (survey conducted Aug.-Oct. 2017)

**Better cellular mobile networks means mobile only is enough for some.** Since 2013, fourth-generation (4G) LTE wireless networks have become more ubiquitous, and in the past two years, LTE Advanced technologies have been widely deployed in many countries. As a result, those with wireless connectivity regularly see speeds of 10 to 30 Mbps (in 2017, typical download speeds in the developed world were 16.6 Mbps, while 13 countries had speeds of at least 30 Mbps)<sup>266</sup>, and monthly data allowances are larger than in the past; in 2014, the US average monthly consumption of wireless data was only 1.9 GB, with 1.2 GB per month typical in Canada.<sup>267</sup>

Faster speeds and higher caps make wireless-only internet an option for more people. This will only increase as we move to next-generation technologies and networks.

### Part II: mobile-only turns into wireless-only, aka fixed wireless access

When using the term “mobile-only,” up until now we have been talking about a specific kind of usage. Some people accessed the internet at home solely via their phone’s cellular radio and viewed the content on the smartphone screen; others used their smartphone radio as a hotspot and viewed the internet on other devices like computers or tablets.

The data in either case flowed over a licensed spectrum in certain frequency bands between 700 MHz and 5 GHz and was provided by a short list of cellular operators, and the technology was mobile; the same device that allowed wireless internet in someone’s home could be easily picked up and moved somewhere else.

That kind of solution may be adequate for some part of the population in 2018 (depending on the country), but the limitations on speed and capacity mean that it is sufficient only for those who (relatively speaking) do not use much data. As an example, probably more than two-thirds of North Americans need more than 100 GB per month, and as time goes on, that requirement seems sure to climb. By 2020, assuming current annual growth is maintained, the average North American home may be using over 500 GB per month, meaning that only a small percentage of the population would be happy with any kind of mobile-only solution provided today.

Wireless networks are expected to improve dramatically as 5G, or fifth-generation, wireless networks are deployed, with gigabit speeds expected. These networks are predicted to launch in the US by 2020,<sup>268</sup> but exact launch dates will vary by country. 5G is made possible by many different technologies, but a critical one is the use of new radio wavelengths.

275. FCC faces backlash for saying Americans might not need fast home Internet, Ars Technica, 11 August 2017: <https://arstechnica.com/information-technology/2017/08/mobile-broadband-cant-replace-fast-home-internet-americans-tell-fcc/>.

276. A midyear roundup of the 2017 global FTTH broadband market, PPC, accessed 6 November 2017: <http://www.ppc-online.com/blog/a-mid-year-roundup-of-the-2017-global-ftth-broadband-market>.

### Millimeter wave (mmWave) fixed wireless access (FWA)

Historically, although frequencies that were much higher than traditional cellular frequencies theoretically had lots of room to carry data, they were not of much use practically. Technology to transmit and receive these frequencies was expensive and hard to develop, and the radio waves themselves propagated poorly. Although cellular frequency radio waves can travel for kilometers, go around buildings and penetrate windows, people believed that the much shorter radio waves at over 24 GHz – also known as millimeter wave, or mmWave – could travel only two hundred yards before being absorbed by the air, could not penetrate glass or even the leaves of a tree, and worked only in the line of sight.

But Deloitte Global predicts that in 2018 there will be significant further trials in the US of technologies using frequency bands around 28 GHz, 37-40 GHz and 64-71 GHz (11 GHz of spectrum) as laid out in the new rules proposed by the Federal Communications Commission (FCC).<sup>269</sup> These trials will not, at first, be focused on mobile devices (that will likely happen in 2019 and 2020) but will instead be for non-mobile home internet access. The technology uses small digital antennas mounted on the outside of homes, located about a few hundred meters from small microcell transmitters (usually on utility poles rather than on traditional much larger and more expensive cell towers but often connected to high-speed fiber-optic cables as part of ongoing network densification efforts) and with a direct line of sight between the home and the transmitter.

Speeds are potentially much higher than 4G, with 1 to 2 Gbps being the likely minimum and 10 Gbps possible, all with latency of less than 10 milliseconds. This is known as fixed wireless access, and major North American carriers, as well as potential non-carrier entrants in the wireless ISP market, are doing multiple trials in 2017 and 2018.<sup>270</sup> From what we know only from public announcements, this technology is being tried in over 15 US markets, with the first commercial launch from one carrier scheduled for late 2018.<sup>271</sup> Very importantly, the trials are revealing that mmWave technology may be working better than predicted; some trials have seen 1.4 Gbps speeds at distances of about a quarter of a mile and from behind a building.<sup>272</sup> If this proves the case in larger trials, it would make the technology significantly more useful.

It is early days, but Deloitte Global is predicting that this technology will be useful in at least some locations and for some customers and is likely to capture a small but growing portion of the home internet market by 2022. Further, due to the high speeds and small cell sizes, monthly capacity will be very high, and each home is likely to be able to use over a TB per month. Those who already have fiber-optic connections are unlikely to switch, and even those who have DOCSIS 3.1 cable connections and G.fast telco connections (both of which will probably offer 1 Gbps speeds or more by 2022) may not move to mmWave. But as we have seen in our mobile-only predictions for 2018, there are still many people who are not paying for wired access.

By 2022, wireless home internet solutions will continue to occupy the low end of the market (homes using relatively little data), but they are also likely to be competing at the high end of the market and sometimes displacing fiber-to-the-home solutions.



## The bottom line

The most obvious short-term implication of the prevalence of mobile-only access is for all firms doing business with consumers over the internet – which in 2018 is likely to be almost every consumer firm. Based on conversations with many large B2C worldwide companies in late 2017, we find most of these companies (depending on the country) did not know that significant parts of their audience lacked access to wired home internet and were mobile-only, often with lower speeds and lower monthly caps.

Any application that involves large images or even medium-quality video might not be feasible for mobile-only customers with low data caps. As mentioned above, consumers may be able to access data-rich services at a coffee shop, work or college, but they do not enjoy this access while at home.

For these situations, e-commerce retailers or online financial services firms will want to consider having low bandwidth versions that can reach the mobile-only audience. This can work well; low-resolution pictures of shoes or text-only versions of bank balances will likely suffice. But for media, it seems impractical to stream large amounts of video, even at lower resolutions, to those in the population who are mobile-only and face low monthly caps.

Some interesting challenges, given the fact that mobile-only is skewed toward lower-income and rural populations, are the public policy issues of distance medicine and education. Education of students online and conversations between patients and doctors both require significant bandwidth; mobile-only populations may be less able to access these services. For example, a distance medicine trial in Uganda was not able to use the hoped-for video conferencing solution due to bandwidth; instead, the connection had to be audio-only.<sup>273</sup>

Access to the internet, especially at higher speeds and with higher monthly caps, is of great interest to regulators worldwide. Often there are programs, initiatives and incentives that aim to provide better internet access to as much of the population as possible, with a focus on rural and lower-income households. Given the predictions above regarding mobile-only, regulators need to consider not only wired solutions but wireless too. The US regulator is already considering making mobile-only internet qualify as mandated minimum coverage by carriers,<sup>274</sup> although this is provoking some debate.<sup>275</sup>

Perhaps the most important question comes not from mobile-only in 2018 but from the choices for mobile data connections with mmWave technologies in 2019 and beyond. Network operators in countries including Singapore (95 percent) and South Korea (83 percent) already have extensive fiber-to-the-premises (FTTP) connections<sup>276</sup> and are likely to see little incentive for mmWave deployments. But in countries such as the US, where only about 10 percent of homes have FTTP, the question of how to deliver gigabit speeds will now have to include mmWave alongside DOCSIS 3.1 cable, G.fast telco and FTTP offerings.

There is unlikely to be a single magic-bullet technology; different markets have different weather, geography, density, digging costs and even extent of foliage. As an example, Phoenix has large numbers of single-family homes far enough apart that laying fiber to each home is not easy. But there are few trees to block mmWave signals, and it never snows – for snow, too, can interfere with radio at these frequencies. The same conditions do not apply in Boston or Paris. Equally, in Taipei, so many people live in 10-to-20-story buildings that running fiber to each building may be easier than using mmWave. In Istanbul, laying fiber is difficult in older parts of the city, since often when ground is broken, archeological finds are unearthed, so a wireless solution may be better.

Over the longer term, the most important market for mobile-only, LTE and mmWave and 5G will probably be the developing world. There, even in the cities, there is often no coaxial cable and few or no fiber-optic lines, and the telco infrastructure tends to be older and less useful for DSL internet services. Wireless data delivery is almost certain to be not just a choice but perhaps the only choice to move citizens into the gigabit age.



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