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Smartphone & tablet usage trends & insights

4G LTE and Wi-Fi powering data consumption

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Executive Summary

In brief

With mobile phone penetration at or above 100% in many markets worldwide, growth in the mobile industry relies now more than ever on existing subscribers upgrading to new devices and technologies and using new applications and services. This has become nothing less than the core value proposition of the global mobile industry, and this research is designed to shed light on the current status of that value proposition by examining how much wireless data customers are using every month, how that usage is changing over time, and how it varies by country, access technology (cellular and Wi-Fi), device generation (3G and 4G), device type (smartphones and tablets), and data-plan size.

Key findings

- **4G LTE has become the fastest-growing mobile technology in history.** It will reach the milestone of half a billion subscribers globally this year, just six years after commercial launch. Its closest competitor is 3G WCDMA which took nine years to reach the same milestone.
- **Smartphone and tablet users globally passed the landmark of 10GB of data consumption per user in December 2014.** This includes Wi-Fi and cellular usage, and is up 51% from 6.9GB per user in January 2014.
- **iOS tablets had significantly higher data consumption than Android tablets.** iOS tablet users globally had data consumption of 12.1GB/user in December, 36% higher than Android tablet users with 9GB/user in the same month, likely due to iOS devices being relatively high-end.
- **iOS and Android smartphone users also broke through the 10GB/user/month barrier last year, and had similar usage profiles.** iOS smartphone users consumed an average of 10.9GB of data in December, just ahead of Android smartphone users with 10.3GB.
- **4G Android smartphone users globally passed the 10GB/user/month milestone in January 2014.** By December, 4G Android smartphone users consumed 13.1GB/user/month, dramatically higher than the 5GB/user/month of 3G Android smartphone users that month.
- **Wi-Fi accounted for 80% of data consumption on smartphones and tablets, compared to cellular with 20%.** Wi-Fi has cemented its position as the dominant wireless access technology, with cellular playing a vital yet supporting role.
- **The transition from 3G to 4G is driving huge increases in cellular data consumption.** Android 4G smartphone users consumed an average of 2.4GB of cellular data in December 2014, more than double the 1.1GB used by those with Android 3G smartphones in the same month. This is a powerful confirmation of the 4G business case in that it speaks to the success of 4G in delivering better devices and networks that improve usability and usage, which in turn drives growth in revenue per user. This is key in today's maturing mobile markets where subscription growth is limited.
- **Many smartphone users globally are buying larger monthly data plans than they need.** On average, 53% of 3G smartphone subscribers and 48% of 4G smartphone subscribers used half or less of their data plan in December. T-Mobile US attacked this as an "infuriating wireless industry practice" that it solved by letting unused data carry forward, and AT&T quickly followed. Other markets will see similar moves.
- **A sizable minority of smartphone customers are going over their monthly data limits.** 16% of 4G smartphone users and 14% of 3G smartphone users went over their monthly data limit in December, which can result in overage charges and churn, but also clearly creates opportunities for users migrating to larger plans.

Foreword

This discussion paper is the latest in a series on smartphone user trends published by Ovum in partnership with Mobidia. The aim of this paper, in keeping with the six previous papers published starting in February 2012, is to combine Mobidia's mega-panel and extensive global data set with Ovum's market expertise to create groundbreaking new research on smartphone user behavior, particularly in light of the transition from 3G to 4G LTE (identified as 4G in this paper) that is under way in many of the world's leading mobile markets, and the parallel explosion in Wi-Fi coverage globally. The aim is to select the most telling data from Mobidia's vast data set to detail and interpret this key technology inflection point for the mobile industry, one that has service providers and vendors looking for answers as to how smartphone users are evolving, and what that means for everything from 4G and Wi-Fi deployment plans, to existing and new mobile revenue streams.

As with previous papers in this series, readers should be aware that the source of the primary usage data cited throughout is the Mobidia My Data Manager application, specifically end users who have agreed to share their usage data with Mobidia on a strictly anonymous basis. The application now has millions of active users across hundreds of countries, and the vast majority of Mobidia's users have agreed to share their usage data. That has led to a sample size of over a million end users globally, and hundreds of thousands across the 15 leading 4G markets covered in this paper – South Korea, Japan, China, US, Canada, UK, Germany, Russia, Romania, Brazil, Mexico, Colombia, Saudi Arabia, Kuwait, and South Africa.

I would like to extend my sincere thanks to the team at Mobidia for their vision and dedication to producing this thought leadership and making it freely available to the industry. In particular this project would not be possible without the support and expertise of Chris Hill and Eric Eden at Mobidia. In addition, I would like to thank Lucy Powell, Jim Eagan, and Felicity Agyemang at Informa for all of their hard work to create and deliver the final product.

Finally, we welcome feedback on this paper whether in the form of questions, comments, or suggestions for future topics and trends to explore. The evolution to 4G and parallel expansion of Wi-Fi is a huge transition that is reshaping the mobile industry, and our aim is to contribute to the industry's ability to understand and capitalize on this transition.

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Introduction

With mobile phone penetration at or above 100% in many markets worldwide, growth in the mobile industry relies now more than ever on existing subscribers upgrading to new devices and technologies and using new applications and services. Consumers get more value from faster and more powerful devices and network technologies, and operators are rewarded with increasing data usage per customer, which in turn translates into higher data revenues.

That has become nothing less than the core value proposition of the global mobile industry, and this research is designed to shed light on the current status of that value proposition by examining how much wireless data customers are using every month, how that usage is changing over time, and how it varies by country, access technology (cellular and Wi-Fi), device generation (3G and 4G), device type (smartphones and tablets), and data-plan size.

As this research details, the transition from 3G to 4G provides a huge boost in the mobile value proposition by, quite simply, providing much better mobile services via better devices and networks, which in turn drives huge increases in subscriber data usage. The importance of this trend has helped to define the geographic scope of this research which is global at times to provide a comprehensive overview, but then moves to the country level to provide more specific insights. The countries covered are 15 of the top LTE markets globally, selected both for their size and representation of each major region worldwide, namely Asia-Pacific, Western Europe, Eastern Europe, Middle East, Africa, North America, and Latin America. These countries include the ten covered in the last report – US, Japan, South Korea, UK, Germany, Russia, Canada, Brazil, Saudi Arabia, and South Africa – along with another five countries that became significant LTE markets in 2014, namely China, Colombia, Kuwait, Romania, and Mexico.

The current status of LTE subscriptions and penetration in these markets is detailed below, ordered by number of LTE subscriptions in December 2014 (see Table 1). The top five markets alone represented 76% of global LTE subscriptions in December 2014, and all 15 markets took that share to 84%, which makes the selected countries a reasonable representation of the global LTE market. As befitting the world's largest mobile market, China went straight from launching LTE in late 2013 to being the third-largest LTE market globally by end-2014, when it had 56.1 million LTE subscriptions, behind only the long-established LTE markets of the US and Japan.

Table 1: LTE subscriptions, major markets, December 2013 and December 2014 (million)

Country	LTE subs, Dec-13 (million)	LTE to mobile subs penetration, Dec-13 (%)	LTE subs, Dec-14 (million)	LTE to mobile subs penetration, Dec-14 (%)	Share of global LTE subs, Dec-14 (%)
US	96.4	27.1%	157.8	41.9%	35.5%
Japan	39.0	27.7%	70.6	47.2%	15.9%
China	0.8	0.1%	56.1	4.3%	12.6%
South Korea	28.4	51.7%	36.0	62.5%	8.1%
UK	2.9	3.6%	16.4	20.3%	3.7%
Germany	3.6	3.3%	9.0	7.8%	2.0%
Russia	1.5	0.6%	5.6	2.3%	1.3%
Canada	3.2	11.7%	5.6	19.8%	1.3%
Brazil	1.4	0.5%	5.3	1.9%	1.2%
Saudi Arabia	1.0	2.0%	2.3	4.3%	0.5%
South Africa	0.9	1.2%	1.8	2.2%	0.4%
Colombia	0.2	0.4%	1.7	3.4%	0.4%
Kuwait	0.6	9.0%	1.0	13.3%	0.4%
Romania	0.3	1.0%	0.8	2.9%	0.2%
Mexico	0.2	0.2%	0.6	0.6%	0.1%
Total	**180.4**	**6.4%**	**370.6**	**12.4%**	**83.5%**
Global LTE subs (million) and global LTE/mobile penetration (%)	206.1	3.0%	444.5	6.2%	

Note: Global mobile subs were 6.77 billion in December 2013 and 7.1 billion in December 2014.

Source: Ovum

The LTE market continues to grow strongly when measured by subscriptions, with the global market increasing to 444.5 million LTE subscriptions in December 2014, more than double the 206.1 million subscriptions in December 2013. That puts LTE penetration of total global mobile subscriptions at 6.2% in December 2014, up from 3.0% in December 2013.

LTE is on track to reach the milestone of half a billion subscriptions in 2015, just six years after its first commercial launch in Scandinavia in December 2009, and only five years after the first major commercial launches in the US and Japan in December 2010. In comparison, the two major 3G technologies (WCDMA and CDMA) together took seven years to reach the same milestone, while 3G WCDMA on its own took nine years and 2G took even longer. That means LTE has earned the distinction of being the fastest-growing technology by subscriptions in the history of the mobile industry.

While the record pace of adoption of LTE is certainly good news for the mobile industry on one level, it does bear further scrutiny given the maturity of the industry, which in turn means that growth in LTE subscriptions is driven primarily by migration from 3G to LTE. That raises the question of the impact of this migration, and this research tackles some of the key elements of that, namely how the migration from 3G to LTE is impacting data usage. Given the widespread adoption by operators and subscribers of data plans with higher costs for higher levels of data usage, this analysis goes to the heart of the LTE business case, in that it reveals whether and how LTE is driving increases in data usage, which in turn drives increases in data revenues.

Of course there are many other aspects of the mobile industry in general and LTE in particular that are not covered in this research, including the relative cost of LTE devices and networks, and the impact of those factors on both adoption and operator profitability.

However, another key aspect that is covered in detail is the leading role that Wi-Fi plays as the dominant bearer of data traffic on cellular devices, whether smartphones or tablets, and whether enabled by 3G or LTE. While many operators are aware of the vital importance of Wi-Fi to the smartphone and tablet user experience, others may not be, judging by their strategies. This research leaves little room for doubt on that point, and provides ample evidence that operators need to take a holistic view of cellular and Wi-Fi access, and by extension fixed access, to provide the best possible service for smartphone and tablet customers.

Methodology

Several aspects of the methodology of the research should be highlighted to avoid confusion. First, although coverage of newer LTE markets provides a fuller picture of smartphone usage trends worldwide, analysis of these markets is limited by their relatively small LTE user base, which can translate into a relatively small sample size of end users with Mobidia's My Data Manager application installed on their devices. This means that for a number of markets – particularly China, Russia, Romania, Brazil, Colombia, Saudi Arabia, and Kuwait – the usage data covered here should be taken as illustrative rather than representative, as it may change significantly as the sample size increases.

Second, much of the data that follows is for Android smartphone users. Although one section of the research highlights differences in usage between devices running Android and iOS, respectively, it also shows that these differences are not major. In addition, the larger market share of Android devices compared to iOS devices translates into a much larger sample size for Android device users, and the more open nature of Android means that more granular usage data can be recorded on Android versus iOS devices. For those reasons, the majority of data that follows is for Android device users.

Third, while 4G is a high-level term that can include multiple technologies, in this research it is used as a synonym for LTE. In other words, for the purposes of this research, "4G" only refers to LTE, and does not refer to other technologies such as HSPA+.

Fourth, one of the primary segmentations in this research is to split smartphones and tablets by the most advanced mobile technology supported, namely 3G or 4G LTE (4G). It is important to note that the 3G/4G segmentations provided here are by device, rather than by network access technology. In other words, on 3G devices, cellular usage could be a mixture of 3G and 2G network access, depending on network coverage and congestion in a given area. Likewise, cellular usage on 4G devices could be a mix of 4G, 3G, and 2G network usage for the same reasons.

Fifth, only devices with cellular connectivity are covered in this analysis, so devices with Wi-Fi access but no cellular connectivity are not covered.

Finally, Mobidia's My Data Manager application tracks data usage whether a subscriber is in their home market or roaming; all the data cited herein,

with one exception, is for domestic usage. The exception is Figure 8, which compares domestic and roaming usage at a global level.

Smartphone and tablet global usage trends

Our initial focus is on smartphone and tablet usage trends at a global level, drawing on a sample that stretches across hundreds of countries and topped one million users by December 2014, to answer questions that are fundamental to the entire mobile value chain stretching from component and device vendors through to application and service providers. Namely, how much data are end users consuming each month, and how is that total changing over time?

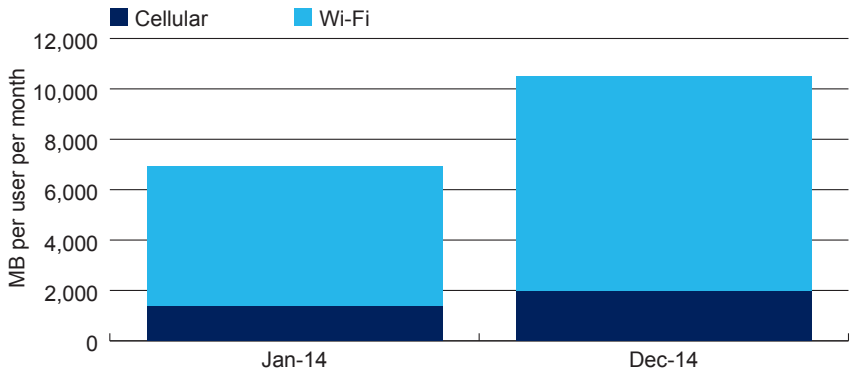
The answer is that across countries, device types (smartphones and tablets), and operating systems (Android and iOS), average monthly data usage globally broke through the 10GB milestone in December 2014 to reach 10.5GB per user per month, up 51% from 6.9GB per user per month in January 2014 (see Figure 1).

The global average of 10.5GB per user per month in December 2014 is made up of 8.5GB per user per month Wi-Fi usage and 2GB per user per month in cellular usage, up from 5.5GB/user/month in Wi-Fi usage and 1.3GB/user/month in cellular usage in January 2014.

This confirms strong growth in average data usage across both cellular and Wi-Fi networks in 2014, with average monthly cellular use up 45% from January to December, and average monthly Wi-Fi usage up 53%.

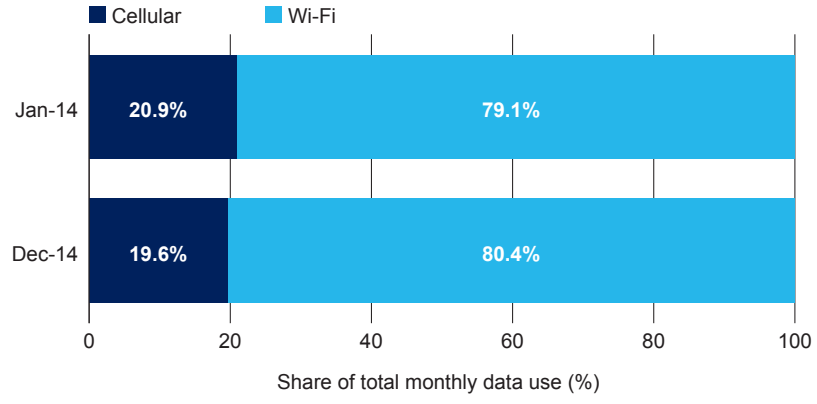
Of course the data also highlights the leading and even dominant role Wi-Fi now plays as an access network for cellular devices, supporting the vast majority of data usage across both smartphones and tablets.

Figure 1: Global, cellular device users, average monthly data use, cellular and Wi-Fi, January 2014 and December 2014



Source: Mobidia

Figure 2: Global, cellular device users, cellular and Wi-Fi share of total monthly data use, January 2014 and December 2014



Source: Mobidia

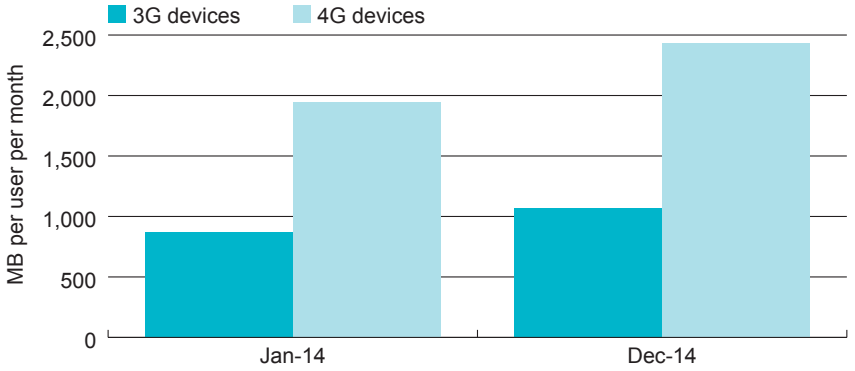
Looking at the share of total monthly data use accounted for by the different access technologies, Wi-Fi carried 79.1% of data traffic on devices in the global sample in January 2014, compared to 20.9% for cellular (see Figure 2). Wi-Fi nudged its share up to 80.4% in December, when cellular dipped to 19.6%, but this is a relatively small swing compared to previous years when Wi-Fi gained 5–10% or more of total monthly traffic compared to cellular over the year. This suggests that at the global level Wi-Fi and cellular could be settling into an 80/20% split of traffic on cellular devices, at least based on trends over the last year. This could simply reflect the reality that the places where we spend most of our time – notably our homes and offices – tend to have good Wi-Fi coverage at low or no perceived cost, so devices are set to default to Wi-Fi whenever it's available, leaving cellular usage mainly for those times when we're on the move.

4G device cellular usage double that of 3G devices

Robust demand for data access from end users and favorable economics may have cemented the place of Wi-Fi

as the dominant bearer of data traffic on smartphones and tablets, but cellular data usage is growing strongly in its own right, particularly with the migration from 3G to 4G devices. In fact, one of the most striking findings of the research is the success of 4G devices in driving huge increases in cellular data usage compared to 3G devices. Looking across all Mobidia end users globally, those with Android 4G smartphones used an average of 1.9GB of cellular data per user per month in January 2014, more than double the 873MB/user/month of cellular data use of those with Android 3G smartphones. By December 2014, Android 4G smartphone users were averaging 2.4GB/user/month of cellular usage, more than double the 1.1GB/user/month for those with Android 3G smartphones (see Figure 3).

Figure 3: Global, Android 3G and 4G smartphone users, average monthly cellular use, January 2014 and December 2014



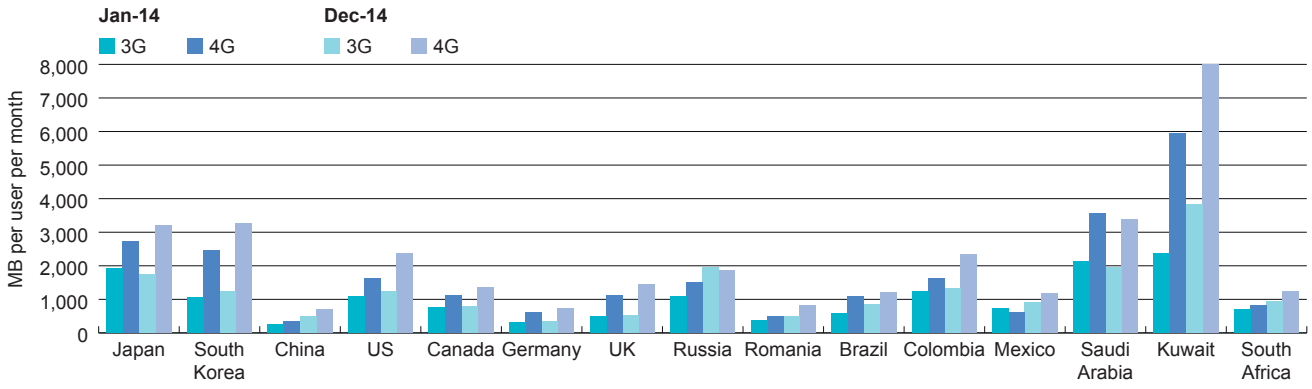
Source: Mobidia

While no single global data set can make the business case for 4G, this data certainly provides significant and robust support, in that it confirms that 4G drives huge increases in data consumption per user. That creates opportunities for growth even as subscription growth slows, which is the fundamental challenge that most mobile operators are facing in the majority of markets worldwide.

Exploring the same segmentation at the country level reveals similar trends but with significant variation by market, as you would expect across such a diverse group of countries, with huge differences ranging from overall levels of development to 4G penetration rates (see Figure 4). This diversity helps to explain the wide variation in levels of cellular usage across the 15 markets, with factors such as network coverage, network quality, and service affordability helping to generate relatively low usage in markets such as China, Germany, Romania, Mexico, and South Africa, but relatively high usage in Japan, South Korea, Saudi Arabia, and Kuwait.

However, what is common across virtually all the countries in both January and December 2014 is that cellular usage is significantly higher on 4G devices than 3G devices, with cellular usage on 4G devices an average of 63% higher than on 3G devices in January, and an average of 77% higher in December. There are exceptions of course, with cellular usage on 4G devices lower than on 3G devices in Mexico in January and in Russia in December, but both could be explained by relatively small sample sizes and/or limited 4G coverage.

Figure 4: Android 3G and 4G smartphone users, average monthly cellular data use, by country, January 2014 and December 2014



Note: 4G user base is limited in China, Russia, Romania, Brazil, Colombia, Saudi Arabia, and Kuwait.
Source: Mobidia

Usage by device type and operating system

With the strong variation in usage via 3G and 4G devices well established, we move on to segment Mobidia's global data set by device operating system – Android and iOS – and then further by major device type, namely smartphones and tablets. In this case each segment includes both 3G and 4G devices of that type – in other words, the smartphone segment includes both 3G and 4G smartphones, and likewise for tablets.

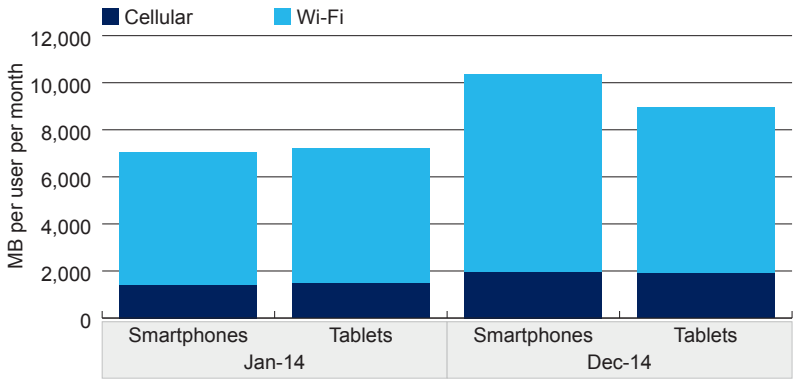
Turning first to Android cellular devices, overall monthly data consumption per user across both cellular and Wi-Fi was relatively close in January 2014 at 7GB on Android smartphones and 7.2GB on Android tablets, with similar levels of cellular and Wi-Fi usage on both device types (see Figure 5). However, by December 2014, average data consumption per user per month on smartphones had jumped 47% to 10.3GB, largely due to a 49% jump in Wi-Fi usage over the period, to 8.4GB per user per month. Tablets saw a 25% increase in data usage over the period to reach 9GB per user per month in December, made up of 7.1GB/user/month via Wi-Fi and 1.9GB/user/month on cellular.

While it is difficult to establish causes for the uneven growth in monthly data use on Android smartphones and tablets, particularly at a global level, some industry trends are likely factors. One is the rise of Android phablets, notably the popular Samsung Galaxy Note series, with screen sizes of 5–7 inches and strong support for data-hungry video services. A related factor is ongoing major improvements in smartphone usability that minimize the limitations of their smaller screen size, ranging from smart keyboards to quality voice-recognition systems. Also, Android tablets are increasingly available at relatively low specification levels and price points, which could result in relatively low monthly data usage compared to high-spec models.

iOS devices naturally have somewhat different usage profiles, with iOS smartphone users having average consumption of 6.3GB/user/month in January, behind iOS tablets with 9GB/user/month in the same period (see Figure 6). iOS smartphones saw average consumption increase 74% to 10.9GB/user/month in December, while tablets saw a more modest increase of 35% over the same period, to 12.1GB/user/month. The difference versus Android smartphones and tablets could be partly due to the high-end nature of iOS devices, which limits the downward migration in average consumption rates, along with the relatively late entry of Apple into the phablet category, marked by the launch of the iPhone 6 Plus in September 2014.

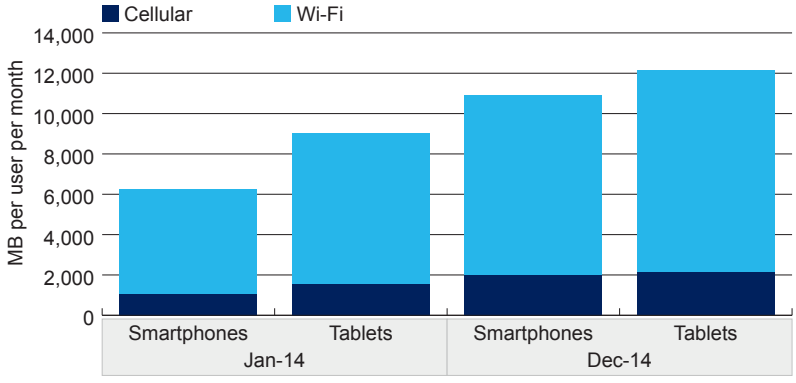
Rounding out our segmentation by device type and operating system, we narrow the focus to tablets but add segmentation by device access technology (see Figure 7). This reveals that tablets with the same access technology (3G or 4G) have similar cellular data usage patterns regardless of operating system, but iOS tablets have significantly higher

Figure 5: Global, Android cellular device users, average monthly data use, January 2014 and December 2014



Source: Mobidia

Figure 6: Global, iOS cellular device users, average monthly data use, January 2014 and December 2014



Source: Mobidia

Wi-Fi usage patterns in both the 3G and 4G device categories in January and December. The main conclusion is that device capability (3G or 4G) is a more powerful driver of data consumption than operating system.

Data roaming increases but remains low

Roaming in general and data roaming in particular remains one of the most conservative segments of the mobile industry, with many carriers wedded to the traditional approach of sky-high prices which generate attractive returns but discourage usage. While there is some innovation in the segment, whether driven by regulation or more progressive carriers, data usage while roaming remains a fraction of domestic data usage, whether on 3G or 4G devices (see Figure 8).

That is not to say that roaming usage is completely moribund, given that it increased from near 60MB/user/month in January, on both 3G and 4G devices, to near 100MB/user/month in December, again on both 3G and 4G devices. While that represents a significant increase of near 66% over the period, roaming usage remains a fraction of domestic usage levels on 3G and particularly 4G devices. It also illustrates that the dramatic increases in usage seen domestically with the migration from 3G to 4G devices are not seen in roaming usage, which is still constrained by high prices and consumer fears of bill shock.

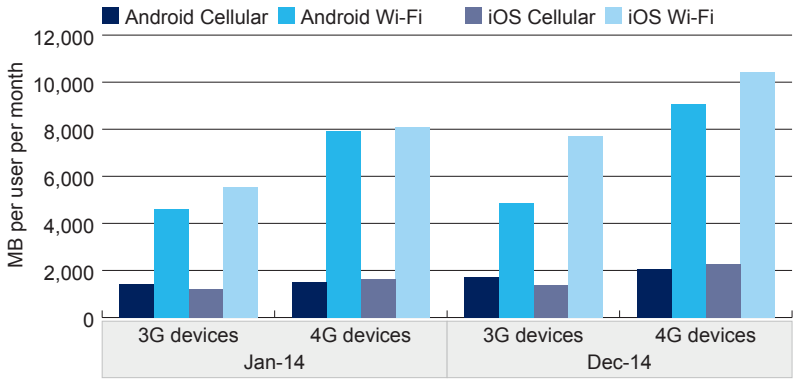
The role of Wi-Fi in the transition to 4G

We now focus on the role that Wi-Fi is playing in the transition to 4G, in particular whether the transition to more advanced 4G devices and networks reduces the importance of Wi-Fi access in relation to cellular access. This point of view has certainly been promoted by certain operators which launched 4G and then noted that it was leading their subscribers to reduce their Wi-Fi usage.

While that could be the case in certain markets at certain times, at a global level it is clearly not the case. In fact, global data for Android smartphone users highlights a more complementary relationship between cellular and Wi-Fi data usage, with both dramatically higher on 4G devices compared to 3G devices in the same period (see Figure 9). For example, in January 2014, cellular usage on 4G devices was 123% higher than on 3G devices, and Wi-Fi usage on 4G devices was 163% higher than on 3G devices. A similar picture emerges in December 2014, when cellular usage on 4G devices was 128% higher than on 3G devices, and Wi-Fi usage on 4G devices was 172% higher than on 3G devices.

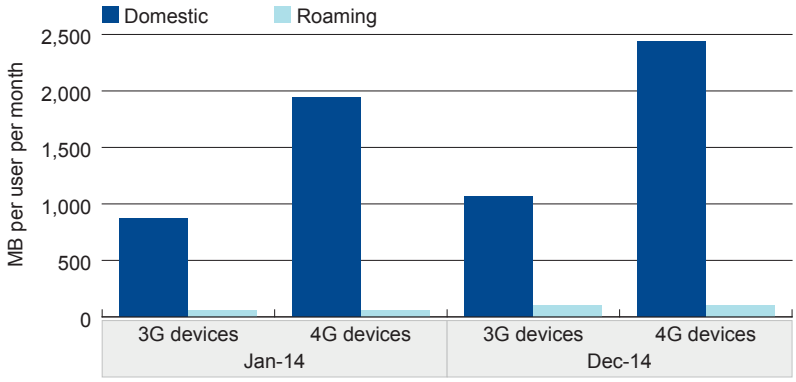
The segmentation by device capability also highlights that 4G device users have dramatically higher overall data consumption than 3G device users, with usage on 4G devices increasing from 10GB/user/month in January 2014 to 13.1GB/user/month in December 2014. That compares to data usage on 3G devices increasing from 4GB/user/month to 5GB/user/month over the same period.

Figure 7: Global, tablet users, average monthly data use, cellular and Wi-Fi, Android and iOS, January 2014 and December 2014



Source: Mobidia

Figure 8: Global, Android 3G and 4G smartphone users, average monthly cellular data use, domestic and roaming, January 2014 and December 2014



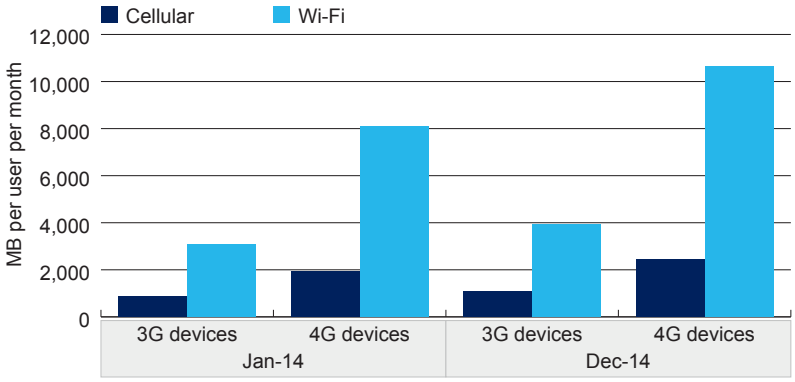
Source: Mobidia

Given the impressive levels of usage on 4G devices, we narrow the focus to Android 4G smartphone usage on both cellular and Wi-Fi networks, but move to the country level to identify trends across the 15 major LTE markets under study. In common with the global view, common themes across the countries include increases in both cellular and Wi-Fi data use over time, and dramatically higher Wi-Fi use when compared to cellular (see Figure 10).

Naturally there are also significant variations by country, with South Korea standing out with Wi-Fi usage at a whopping 16.7GB/user/month in December, up from 11.8GB/user/month in January, thanks in large part to the widespread availability of fiber-based broadband services at competitive prices. A different picture emerges in Kuwait, where Wi-Fi use was relatively low in January at 4.8GB/user/month, which was below cellular usage in the same month of 6GB/user/month. That can be explained partly by the lack of advanced fixed broadband services in Kuwait, which reduces the relevance of Wi-Fi and makes LTE the best available broadband network for many end users. Wi-Fi usage did overtake that of cellular in the country by December, but the gap between them remained smaller than in many other markets, with Wi-Fi at 10GB/user/month compared to cellular at 8GB/user/month.

Next we take the same segmentation to the operator level in Japan and South Korea, two of the world's leading LTE markets. The data highlights the strong reliance on cellular access in Japan, where the gap between cellular and Wi-Fi usage is much smaller than in many other markets, particularly South Korea. In that market, Android 4G smartphone users on the LGU+ network registered Wi-Fi use of 18.2GB/user/month in December, along with 3.7GB/user/month of cellular access, pushing combined usage to an impressive 21.9GB/user/month (see Figure 11).

Figure 9: Global, Android 3G and 4G smartphone users, average monthly cellular and Wi-Fi use, January 2014 and December 2014

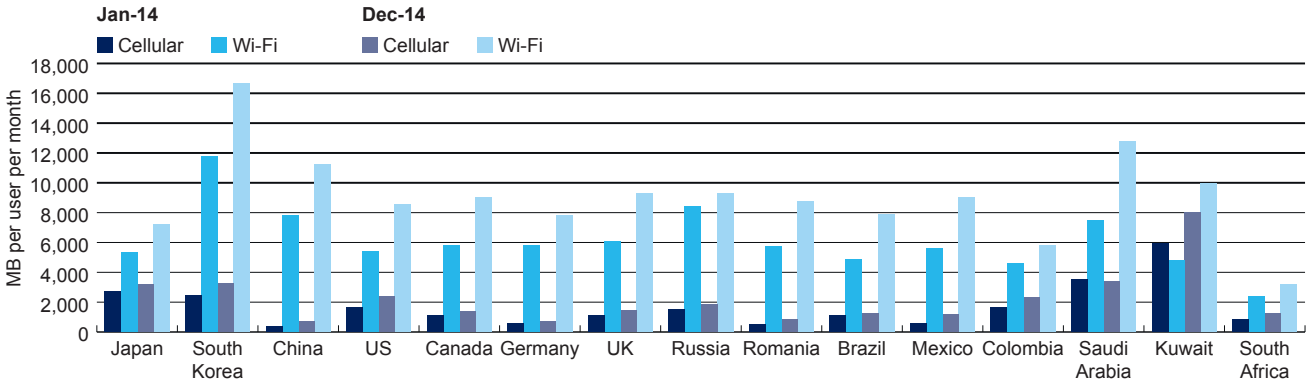


Source: Mobidia

4G drives migration to larger data plans

With tiered data plans now mainstream in the mobile industry, it is vital for carriers to understand how usage patterns change by data-plan size. For example, do users with relatively small cellular data plans rely heavily on Wi-Fi for the bulk of their data access? Similarly, do users with large cellular data plans rely less on Wi-Fi?

Figure 10: Android 4G smartphone users, average monthly data use by country, cellular and Wi-Fi, January 2014 and December 2014



Note: 4G user base is limited in China, Russia, Romania, Brazil, Colombia, Saudi Arabia, and Kuwait.
Source: Mobidia

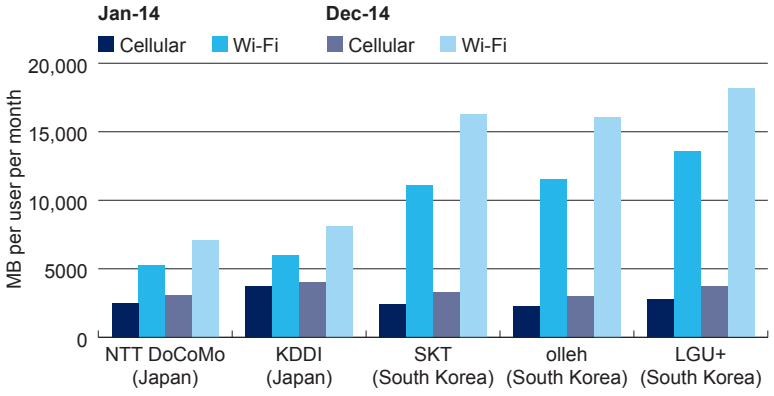
Mobidia's data reveals a striking trend in that cellular data usage naturally increases as plan size increases, but Wi-Fi usage remains remarkably consistent across all cellular plan sizes (see Figure 12). This suggests there is something of a "natural" level of data usage that end users tend toward when they are not limited by price, which is often the case with Wi-Fi access, given that the majority of usage is in homes and offices.

However, the data also suggests that this level of usage is gated by devices (and by extension networks), with more advanced 4G devices generating more than twice the Wi-Fi data consumption per user in December compared to 3G devices.

Of even more interest to mobile operators is how the migration from 3G to 4G impacts the distribution of users across data plans. The answer is that it impacts the distribution dramatically and positively for operators (see Figure 13). In both January and December those with Android 3G smartphones are weighted toward smaller monthly data plans, while those with 4G devices are weighted far more toward larger data plans. For example, in December the majority of 3G smartphone users have plans up to 1GB/month, while the majority of 4G smartphone users have plans larger than 1GB/month. The positive impact of 4G on operator data revenues could not be clearer.

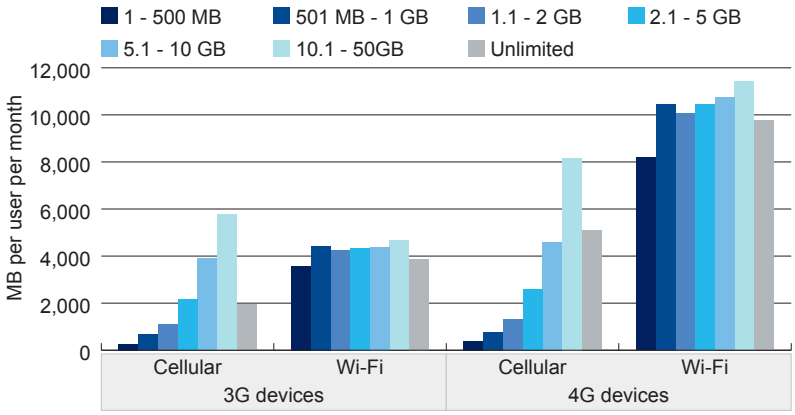
Applying the same segmentation at the country level, a similar picture emerges, although the trend is not as clear-cut in relatively new LTE markets with small sample sizes (see Figure 14). Nevertheless, across the majority of the markets the transition from 3G to 4G clearly leads to migration to larger monthly data plans.

Figure 11: Android 4G smartphone users, by selected major operator, average monthly data use, cellular and Wi-Fi, January 2014 and December 2014



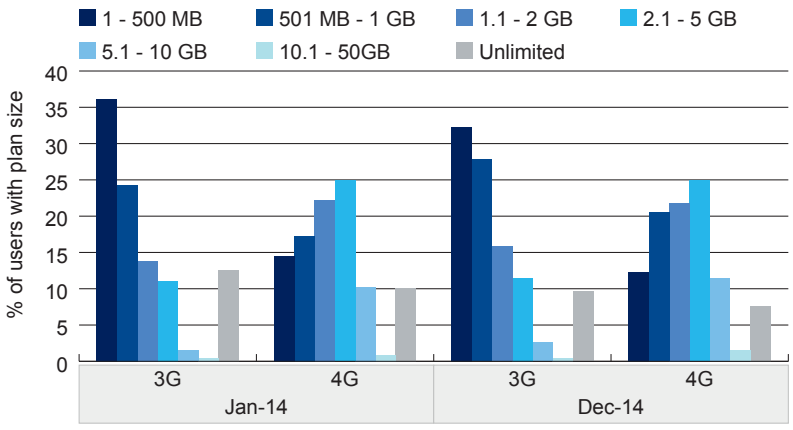
Source: Mobidia

Figure 12: Global, Android smartphone users, average monthly data use by plan size, cellular and Wi-Fi, December 2014



Source: Mobidia

Figure 13: Global, Android 3G and 4G smartphone users, monthly data-plan size distribution, January 2014 and December 2014



Source: Mobidia

Table 2: Android 3G and 4G smartphone users, monthly data-plan size distribution, major markets, December 2014

% of users with plan size	Japan		South Korea		China		US		Canada	
	3G	4G	3G	4G	3G	4G	3G	4G	3G	4G
1 - 500 MB	7%	1%	52%	6%	63%	47%	20%	7%	39%	23%
501 MB - 1 GB	29%	7%	28%	26%	21%	26%	14%	12%	31%	30%
1.1 - 2 GB	19%	16%	5%	20%	6%	10%	22%	30%	10%	16%
2.1 - 5 GB	10%	30%	2%	25%	2%	6%	26%	30%	8%	15%
5.1 - 10GB	7%	36%	1%	12%	1%	0%	2%	10%	7%	12%
10.1 - 50 GB	1%	0%	0%	2%	0%	1%	0%	3%	0%	0%
Unlimited	27%	9%	11%	9%	7%	10%	16%	8%	5%	4%
% of users with plan size	Germany		UK		Russia		Romania		Brazil	
	3G	4G	3G	4G	3G	4G	3G	4G	3G	4G
1 - 500 MB	75%	52%	56%	22%	7%	3%	44%	23%	52%	35%
501 MB - 1 GB	12%	23%	29%	31%	23%	16%	27%	31%	13%	13%
1.1 - 2 GB	2%	9%	4%	17%	18%	11%	12%	26%	10%	21%
2.1 - 5 GB	3%	7%	3%	16%	31%	49%	8%	14%	12%	19%
5.1 - 10GB	0%	2%	0%	5%	4%	6%	1%	1%	2%	4%
10.1 - 50 GB	0%	0%	0%	2%	5%	4%	0%	0%	1%	0%
Unlimited	7%	7%	7%	7%	12%	11%	8%	5%	11%	8%
% of users with plan size	Mexico		Colombia		Saudi Arabia		Kuwait		South Africa	
	3G	4G	3G	4G	3G	4G	3G	4G	3G	4G
1 - 500 MB	29%	31%	9%	3%	10%	9%	2%	1%	49%	45%
501 MB - 1 GB	30%	32%	25%	15%	14%	12%	3%	1%	24%	24%
1.1 - 2 GB	9%	7%	35%	33%	48%	53%	45%	19%	13%	18%
2.1 - 5 GB	10%	13%	19%	34%	17%	9%	12%	32%	5%	6%
5.1 - 10GB	12%	8%	1%	7%	1%	2%	7%	18%	1%	1%
10.1 - 50 GB	0%	0%	0%	0%	1%	1%	6%	15%	0%	0%
Unlimited	11%	8%	11%	9%	10%	15%	23%	14%	8%	6%

Note: 4G user base is limited in China, Russia, Romania, Brazil, Colombia, Saudi Arabia and Kuwait.

Source: Mobidia

Many buy more data than they need

In conclusion, we combine plan size and consumption data to reveal the extent to which mobile subscribers are actually using their monthly data plans. Specifically, we examine the percentage of Android smartphone users globally who used half or less of their monthly data plan in January and December 2014, respectively (see Figure 14). The results make for sobering reading, in that an average of 60% of those with 3G smartphones used 0–50% of their data plan in January, compared to 52% of those with 4G smartphones. The averages declined in December to 53% for those with 3G smartphones and 48% for those with 4G devices, but this does not change the fact that across all plan sizes, device capabilities, and regions, approaching half of all end users consumed half or less of their monthly data plan.

How long will it be before more end users become aware of this situation and downgrade their data plans? And how long will it be before some operators see this as an opportunity to change their data plans in an attempt to gain market share?

The answer to the second question is that it has already happened, with T-Mobile US launching Data Stash in December 2014. The new data plan feature lets unused data roll over for up to a year, and is T-Mobile's latest attempt to differentiate itself from competitors and gain market share. As T-Mobile US CEO John Legere said at the launch, "Americans have been

gamed by the carriers into buying huge data plans – all to avoid getting screwed with overage penalties. Only to find out they bought more than they need which is then confiscated by the carrier. For the consumer it's lose, lose."

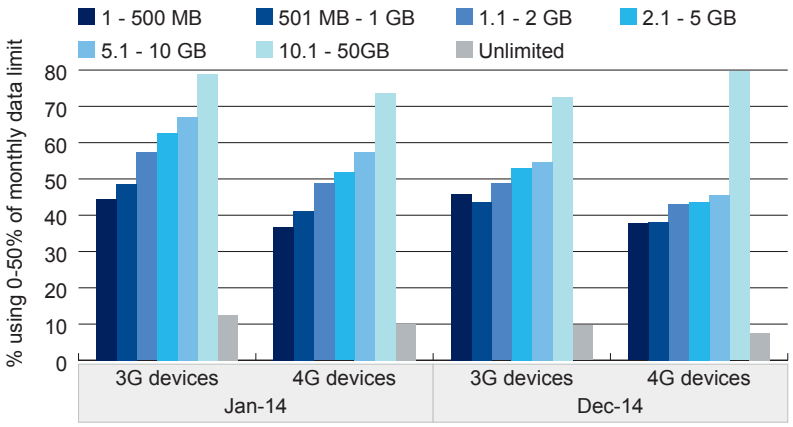
Whether that's the case or not, the fact that a major carrier is building marketing campaigns around this idea will have an impact in the US market and globally. For example, in the US market AT&T has already responded to T-Mobile's move by launching its own "Rollover Data" feature.

In any case, Mobidia's data does reveal that in December, the majority of Android 4G smartphone customers of the top four US mobile operators used half or less of their monthly data plan (see Figure 15). It also highlights that T-Mobile has the lowest – although still sizable – percentage of users with 0–50% usage of their data plan, across all plan sizes, ranging from 38% of users on 1–500MB plans to 53% of users on 10.1–50GB plans.

Finally, we look at the other end of the usage spectrum, namely those who are using more than their monthly data plan, to gauge the potential for upsell by data-plan size (see Figure 16). While it is not surprising that the share of end users going over their data limits declines as plan size increases, or that overages are higher for 4G devices compared to 3G devices, it is interesting that overages decline from January to December for 4G device users across smaller plan sizes, and only increase marginally in larger plan sizes.

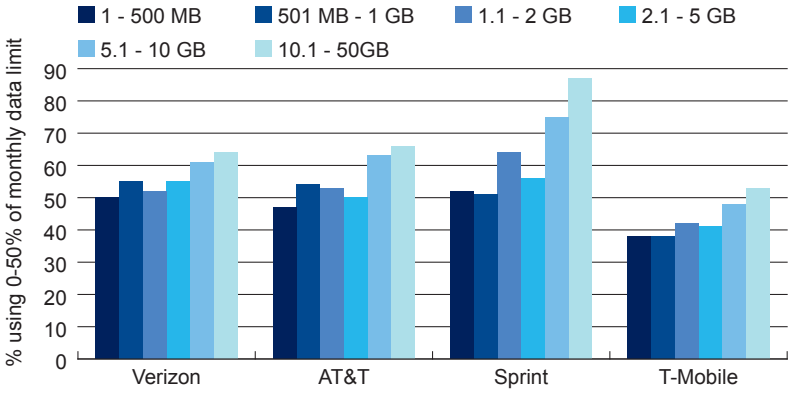
This is likely due to end users migrating to larger data plans as their usage increases, another positive result of the migration of smartphone users from 3G to 4G devices.

Figure 14: Global, share of Android 3G and 4G smartphone users using 0–50% of monthly data limit, by plan size, January 2014 and December 2014



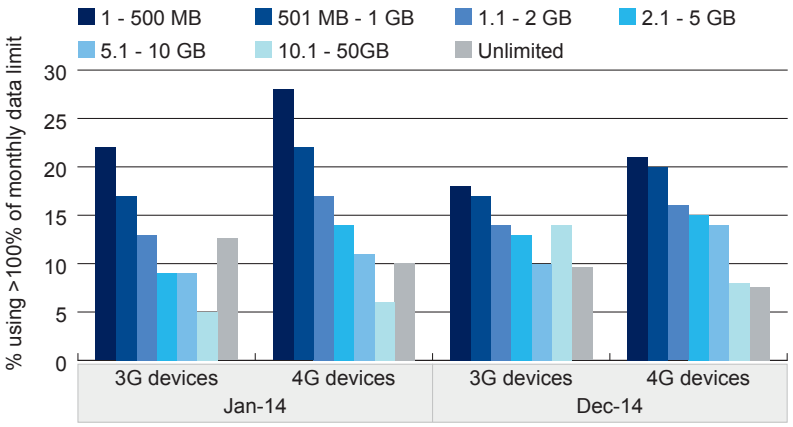
Source: Mobidia

Figure 15: US, major operators, Android 4G smartphone users, share who used 0–50% of monthly data limit, by plan, December 2014



Source: Mobidia

Figure 16: Global, share of Android 3G and 4G smartphone users using >100% of monthly data limit, by plan size, January 2014 and December 2014



Source: Mobidia

Appendix

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