White Paper

Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017

February 6, 2013

The Cisco® Visual Networking Index (VNI) Global Mobile Data Traffic Forecast Update is part of the comprehensive Cisco VNI Forecast, an ongoing initiative to track and forecast the impact of visual networking applications on global networks. This paper presents some of Cisco's major global mobile data traffic projections and growth trends.

Executive Summary

The Mobile Network in 2012

Global mobile data traffic grew 70 percent in 2012. Global mobile data traffic reached 885 petabytes per month at the end of 2012, up from 520 petabytes per month at the end of 2011.

Last year's mobile data traffic was nearly twelve times the size of the entire global Internet in 2000. Global mobile data traffic in 2012 (885 petabytes per month) was nearly twelve times greater than the total global Internet traffic in 2000 (75 petabytes per month).

Mobile video traffic exceeded 50 percent for the first time in 2012. Mobile video traffic was 51 percent of traffic by the end of 2012.

Mobile network connection speeds more than doubled in 2012. Globally, the average mobile network downstream speed in 2012 was 526 kilobits per second (kbps), up from 248 kbps in 2011. The average mobile network connection speed for smartphones in 2012 was 2,064 kbps, up from 1,211 kbps in 2011. The average mobile network connection speed for tablets in 2012 was 3,683 kbps, up from 2,030 kbps in 2011.

In 2012, a fourth-generation (4G) connection generated 19 times more traffic on average than a non-4G connection. Although 4G connections represent only 0.9 percent of mobile connections today, they already account for 14 percent of mobile data traffic.

The top 1 percent of mobile data subscribers generate 16 percent of mobile data traffic, down from 52 percent at the beginning of 2010. According to a mobile data usage study conducted by Cisco, mobile data traffic has evened out over the last year and is now lower than the 1:20 ratio that has been true of fixed networks for several years.

Average smartphone usage grew 81 percent in 2012. The average amount of traffic per smartphone in 2012 was 342 MB per month, up from 189 MB per month in 2011.

Smartphones represented only 18 percent of total global handsets in use in 2012, but represented 92 percent of total global handset traffic. In 2012, the typical smartphone generated 50 times more mobile data traffic (342 MB per month) than the typical basic-feature cell phone (which generated only 6.8 MB per month of mobile data traffic).

Globally, 33 percent of total mobile data traffic was offloaded onto the fixed network through Wi-Fi or femtocell in 2012. In 2012, 429 petabytes of mobile data traffic were offloaded onto the fixed network each month. Without offload, mobile data traffic would have grown 96 percent rather than 70 percent in 2012.

Android is now higher than iPhone levels of data use. By the end of 2012, average Android consumption exceeded average iPhone consumption in the United States and Western Europe.

In 2012, 14 percent of mobile devices and connections were potentially IPv6-capable. This estimate is based on network connection speed and OS capability.

In 2012, the number of mobile-connected tablets increased 2.5-fold to 36 million, and each tablet generated 2.4 times more traffic than the average smartphone. In 2012, mobile data traffic per tablet was 820 MB per month, compared to 342 MB per month per smartphone.

There were 161 million laptops on the mobile network in 2012, and each laptop generated 7 times more traffic than the average smartphone. Mobile data traffic per laptop was 2.5 GB per month in 2012, up 11 percent from 2.3 GB per month in 2011.

Nonsmartphone usage increased 35 percent to 6.8 MB per month in 2012, compared to 5.0 MB per month in 2011. Basic handsets still make up the vast majority of handsets on the network (82 percent).

The Mobile Network Through 2017

Mobile data traffic will reach the following milestones within the next five years.

- Monthly global mobile data traffic will surpass 10 exabytes in 2017.
- The number of mobile-connected devices will exceed the world's population in 2013.
- The average mobile connection speed will surpass 1 Mbps in 2014.
- Due to increased usage on smartphones, handsets will exceed 50 percent of mobile data traffic in 2013.
- Monthly mobile tablet traffic will surpass 1 exabyte per month in 2017.
- Tablets will exceed 10 percent of global mobile data traffic in 2015.

Global mobile data traffic will increase 13-fold between 2012 and 2017. Mobile data traffic will grow at a compound annual growth rate (CAGR) of 66 percent from 2012 to 2017, reaching 11.2 exabytes per month by 2017.

By the end of 2013, the number of mobile-connected devices will exceed the number of people on earth, and by 2017 there will be nearly 1.4 mobile devices per capita. There will be over 10 billion mobile-connected devices in 2017, including machine-to-machine (M2M) modules—exceeding the world's population at that time (7.6 billion).

Mobile network connection speeds will increase 7-fold by 2017. The average mobile network connection speed (526 kbps in 2012) will exceed 3.9 megabits per second (Mbps) in 2017.

In 2017, 4G will be 10 percent of connections, but 45 percent of total traffic. In 2017, a 4G connection will generate 8 times more traffic on average than a non-4G connection.

By 2017, 41 percent of all global mobile devices and connections could potentially be capable of connecting to an IPv6 mobile network. Over 4.2 billion devices and connections will be IPv6-capable in 2017.

Two-thirds of the world's mobile data traffic will be video by 2017. Mobile video will increase 16-fold between 2012 and 2017, accounting for over 66 percent of total mobile data traffic by the end of the forecast period.

Mobile-connected tablets will generate more traffic in 2017 than the entire global mobile network in 2012. The amount of mobile data traffic generated by tablets in 2017 (1.3 exabytes per month) will be 1.5 times higher than the total amount of global mobile data traffic in 2012 (885 petabytes per month).

The average smartphone will generate 2.7 GB of traffic per month in 2017, an 8-fold increase over the 2012 average of 342 MB per month. Aggregate smartphone traffic in 2017 will be 19 times greater than it is today, with a CAGR of 81 percent.

By 2017, almost 21 exabytes of mobile data traffic will be offloaded to the fixed network by means of Wi-Fi devices and femtocells each month. Without Wi-Fi and femtocell offload, total mobile data traffic would grow at a CAGR of 74 percent between 2012 and 2017 (16-fold growth), instead of the projected CAGR of 66 percent (13-fold growth).

The Middle East and Africa will have the strongest mobile data traffic growth of any region at 77 percent CAGR. This region will be followed by Asia Pacific at 76 percent and Latin America at 67 percent.

Appendix A summarizes the details and methodology of the VNI forecast.

2012 Year in Review

Global mobile data traffic grew 70 percent in 2012, and growth rates varied widely by region. Western Europe, in particular, experienced a slowdown in mobile data traffic, with growth of 44 percent in 2012, substantially lower than the global average. (Reasons for the slower growth of European mobile data traffic growth are outlined in the subsequent section.) Mobile data traffic in Asia Pacific, on the other hand, grew at 95 percent in 2012, a near-doubling of traffic. Table 1 illustrates the continued strong growth in many Asia Pacific countries, compared to the slower growth in Western Europe.

Table 1. Examples of Mobile Data Traffic Growth in 2012

Region	Mobile Traffic Growth Examples
Korea	As reported by Korean regulator KCC, mobile data traffic on 2G, 3G, and 4G networks increased approximately 80% between January and November of 2012.
China	China Mobile's mobile data traffic grew 77% from mid-2011 to mid-2012. China Unicom's mobile data traffic grew 112% from mid-2011 to mid-2012.
Japan	As measured by Japanese regulator MIC, mobile data traffic grew 113% from September 2011 to September 2012.
Australia	As reported by Australian regulator ACMA, mobile data traffic grew 40% from mid-2011 to mid-2012.
Italy	As reported by Italian regulator AGCOM, mobile traffic in Italy in 3Q12 was up 32% year-over-year.
Global	Telefonica's total year-over-year mobile traffic growth was 35% in 1Q12, down from 75% in 1Q11. Vodafone's year-over-year mobile traffic growth was 34% in FY2012, down from 69% in FY2011.

Why Was 2012 Growth Slower than Expected in Some Regions?

Reasons for the slower growth of mobile data traffic growth in some regions include:

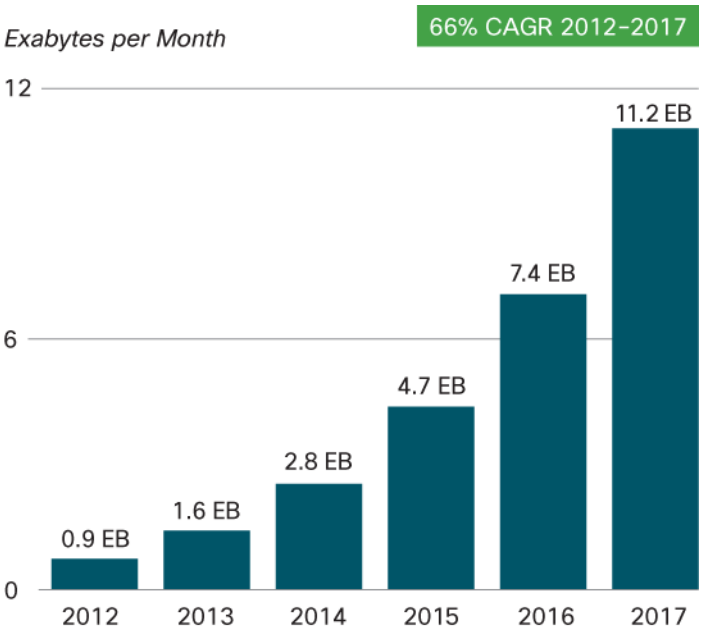
1. The implementation of tiered mobile data packages. First introduced in 2009 and 2010, the majority of mobile users have now been migrated to tiered plans. Many operators across the globe have eliminated unlimited data plans.
2. A slowdown in the number of mobile-connected laptop net additions. We estimate that the number of mobile-connected laptops in Europe declined from 33.8 million at the end of 2011 to 32.6 million at the end of 2012. Europe was the only region to experience a decline; all other regions exhibited flat-to-positive growth. Globally, the growth rate in mobile-connected laptops dropped from 28 percent in 2011 to 12 percent in 2012. Since mobile-connected laptops have historically been a major contributor to mobile data traffic volumes, the slowing growth has had a significant impact on our estimates.
3. An increase in the amount of mobile traffic offloaded to the fixed network. Operators have encouraged the offload of traffic onto Wi-Fi networks, and offload rates continue to be high around the world. Tablet traffic that might have migrated to mobile networks has largely remained on fixed networks.

In the long term, mobile data and fixed traffic should settle into the same growth rate, although the mobile data growth rate is likely to remain higher than the fixed growth rate over the next decade.

Global Mobile Data Traffic, 2012 to 2017

Overall mobile data traffic is expected to grow to 11.2 exabytes per month by 2017, a 13-fold increase over 2012. Mobile data traffic will grow at a CAGR of 66 percent from 2012 to 2017 (Figure 1).

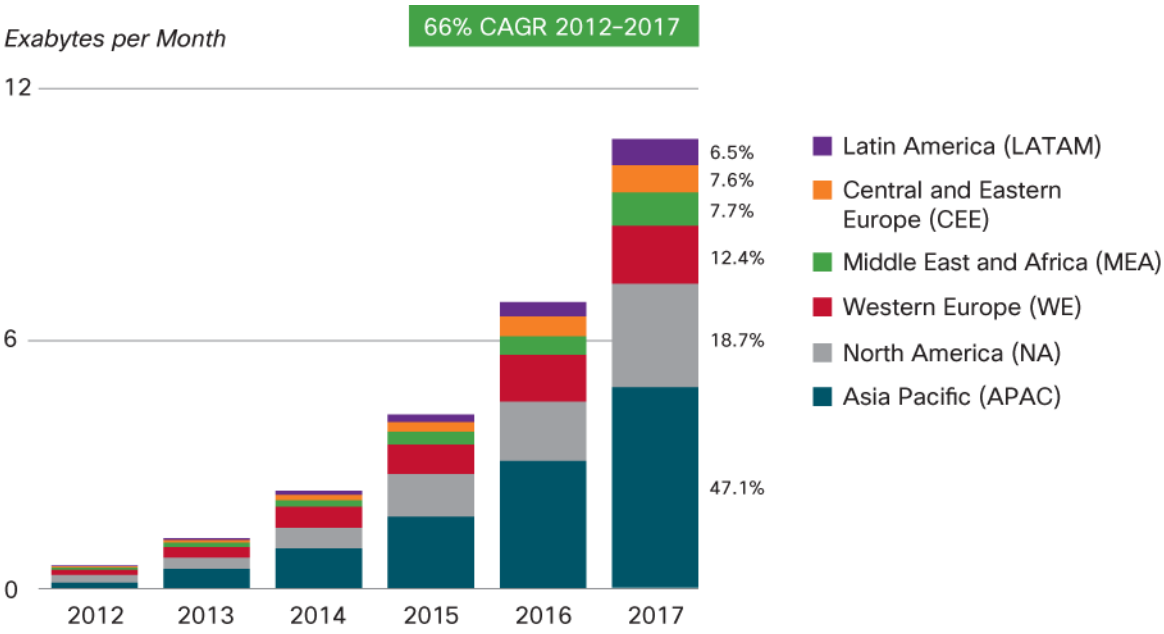
Figure 1. Cisco Forecasts 11.2 Exabytes per Month of Mobile Data Traffic by 2017



Source: Cisco VNI Mobile Forecast, 2013

The Asia Pacific and North America regions will account for almost two-thirds of global mobile traffic by 2017, as shown in Figure 2. Middle East and Africa will experience the highest CAGR of 77 percent, increasing 17.3-fold over the forecast period. Asia Pacific will have the second highest CAGR of 76 percent, increasing 16.9-fold over the forecast period. The emerging market regions of Latin America and Central and Eastern Europe will have CAGRs of 67 percent and 66 percent respectively, and combined with Middle East and Africa will represent an increasing share of total mobile data traffic, up from 19 percent at the end of 2012 to 22 percent by 2017.

Figure 2. Global Mobile Data Traffic Forecast by Region



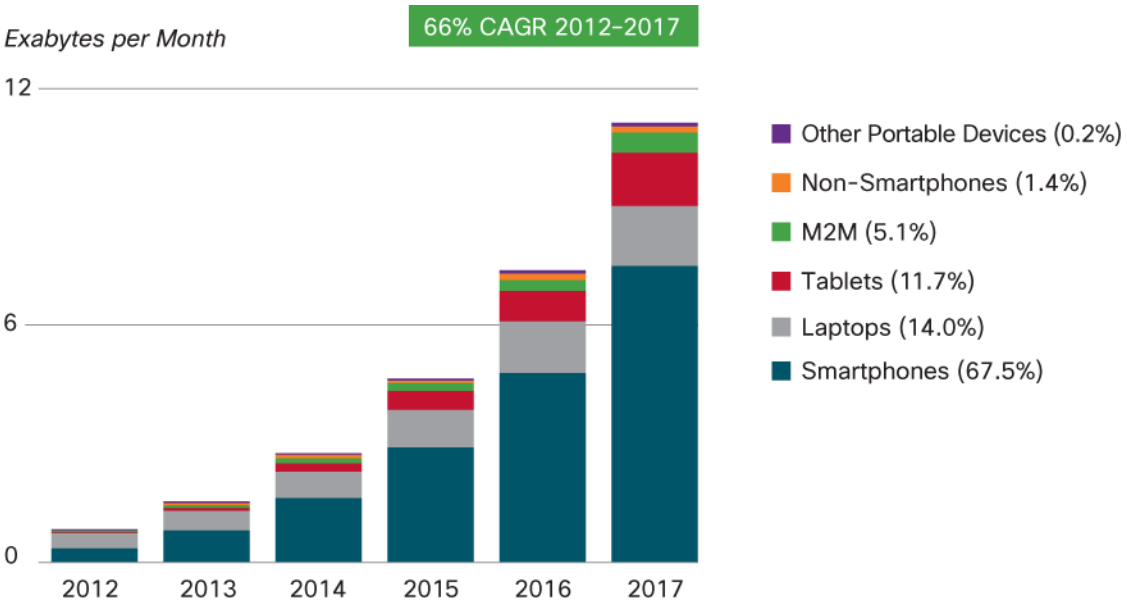
Source: Cisco VNI Mobile Forecast, 2013

In the sections that follow, we identify 10 major trends behind the growth of mobile data traffic.

Trend 1: Device Diversification

Figure 3 shows the devices responsible for mobile data traffic growth. Laptops generate a disproportionate amount of traffic today, but smartphones and newer device categories such as tablets and M2M nodes will begin to account for a more significant portion of the traffic by 2017.

Figure 3. Smartphones Lead Traffic Growth

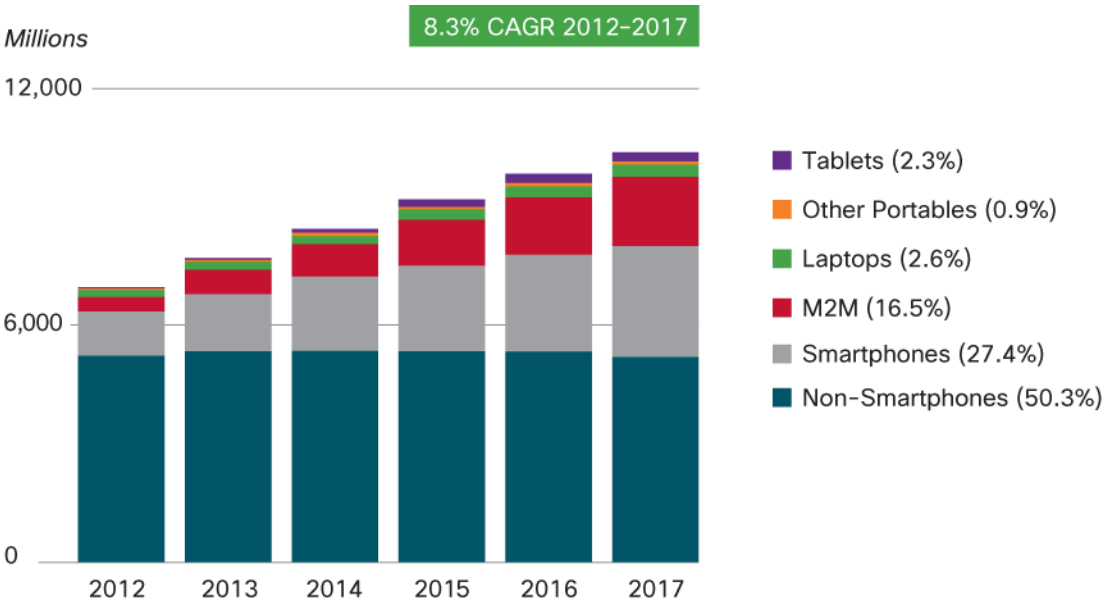


Figures in legend refer to traffic share in 2017.
Source: Cisco VNI Mobile Forecast, 2013

The increasing number of wireless devices that are accessing mobile networks worldwide is one of the primary contributors to traffic growth. Each year several new devices in different form factors and increased capabilities and intelligence are being introduced in the market. By 2017, there will be 8.6 billion handheld or personal mobile-ready devices and 1.7 billion machine-to-machine connections (e.g., GPS systems in cars, asset tracking systems in shipping and manufacturing sectors, or medical applications making patient records and health status more readily available, et al.). Regionally, North America and Western Europe are going to have the fastest growth in mobile devices and connections with 13 percent and 10 percent CAGR from 2012 to 2017 respectively.

While non-smartphones have the largest share of all mobile devices and connections, after 2015 the number of overall non-smartphones in use will start declining for the first time (Figure 4). While Asia-Pacific and Middle East and Africa will still show a low single digit growth for non-smartphones, all other regions will experience a decline. The highest decline will be experienced by North America (negative CAGR of 37 percent) and Western Europe (negative CAGR of 17 percent).

Figure 4. Global Mobile Devices and Connections: M2M, Smartphones and Tablets Drive Growth



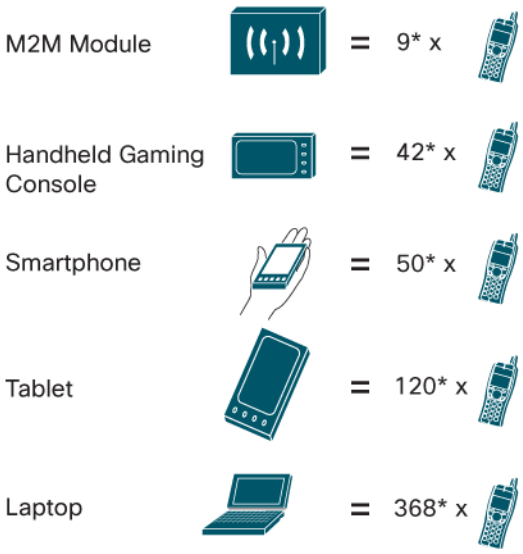
Figures in legend refer to device/connection share in 2017.

Source: Cisco VNI Mobile Forecast, 2013

The overall share of non-smartphones will decline from 75 percent of all mobile connections in 2012 to 50 percent in 2017. The biggest gain in share will be M2M (5 percent of all mobile connections in 2012 to 17 percent in 2017) and smartphones (16 percent of all mobile connections in 2012 to 27 percent in 2017). The highest growth will be in tablets (CAGR of 46 percent) and M2M (CAGR of 36 percent).

The proliferation of high-end handsets, tablets, and laptops on mobile networks is a major generator of traffic, because these devices offer the consumer content and applications not supported by previous generations of mobile devices. As shown in Figure 5, a single smartphone can generate as much traffic as 50 basic-feature phones; a tablet as much traffic as much as 120 basic-feature phones; and a single laptop can generate as much traffic as 368 basic-feature phones.

Figure 5. High-End Devices Significantly Multiply Traffic



* Monthly basic mobile phone data traffic

Source: Cisco VNI Mobile Forecast, 2013

Trend 2: Growth in Average Traffic per Device

Average traffic per device is expected to increase rapidly during the forecast period, as shown in Table 2.

Table 2. Summary of Per Device Usage Growth, MB per Month

Device Type	2012	2017
Nonsmartphone	6.8	31
M2M Module	64	330
Smartphone	342	2,660
4G Smartphone	1,302	5,114
Tablet	820	5,387
Laptop	2,503	5,731

Source: Cisco VNI Mobile Forecast, 2013

The growth in usage per device outpaces the growth in the number of devices. As shown in Table 3, the growth rate of new-device mobile data traffic is two to five times greater than the growth rate of users.

Table 3. Comparison of Global Device Unit Growth and Global Mobile Data Traffic Growth

Device Type	Growth in Devices, 2012–2017 CAGR	Growth in Mobile Data Traffic, 2012–2017 CAGR
Smartphone	20%	81%
Tablet	46%	113%
Laptop	11%	31%
M2M Module	36%	89%

Source: Cisco VNI Mobile Forecast, 2013

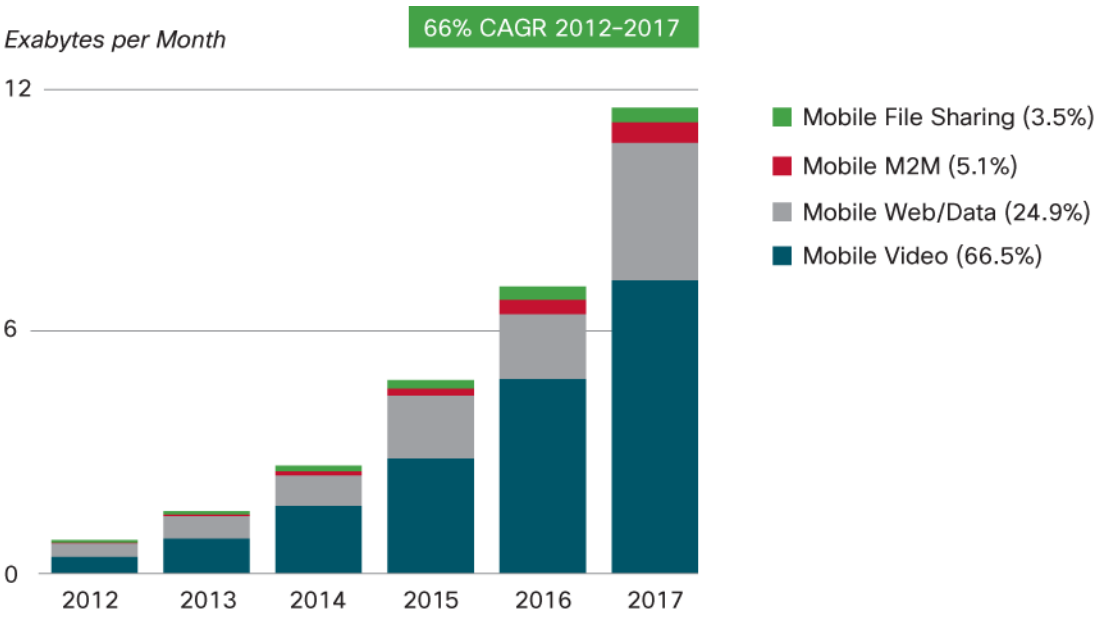
The following are a few of the main promoters of growth in average usage.

- As mobile network connection speeds increase, the average bit rate of content accessed through the mobile network will increase. High-definition video will be more prevalent, and the proportion of streamed content as compared to side-loaded content is also expected to increase with average mobile network connection speed.
- The shift toward on-demand video will affect mobile networks as much as it will affect fixed networks. Traffic can increase dramatically even while the total amount of time spent watching video remains relatively constant.
- As mobile network capacity improves and the number of multiple-device users grows, operators are more likely to offer mobile broadband packages comparable in price and speed to those of fixed broadband. This is encouraging mobile broadband substitution for fixed broadband, where the usage profile is substantially higher than average.
- Mobile devices increase an individual's contact time with the network, and it is likely that this increased contact time will lead to an increase in overall minutes of use per user. However, not all of the increase in mobile data traffic can be attributed to traffic migration to the mobile network from the fixed network. Many uniquely mobile applications continue to emerge, such as location-based services, mobile-only games, and mobile commerce applications.

Trend 3: Mobile Video

Because mobile video content has much higher bit rates than other mobile content types, mobile video will generate much of the mobile traffic growth through 2017. Mobile video will grow at a CAGR of 75 percent between 2012 and 2017, the highest growth rate of any mobile application category that we forecast. Of the 11.2 exabytes per month crossing the mobile network by 2017, 7.4 exabytes will be due to video (Figure 6).

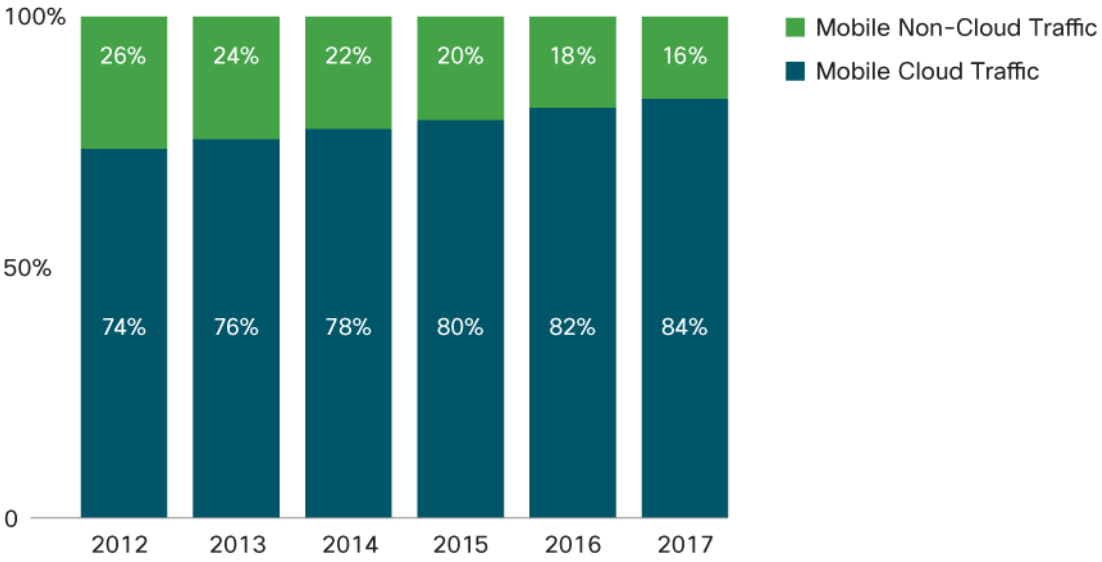
Figure 6. Mobile Video Will Generate Over 66 Percent of Mobile Data Traffic by 2017



Figures in legend refer to traffic share in 2017.
Source: Cisco VNI Mobile Forecast, 2013

Because many Internet video applications can be categorized as cloud applications, mobile cloud traffic follows a curve similar to video. Mobile devices have memory and speed limitations that might prevent them from acting as media consumption devices, were it not for cloud applications and services. Cloud applications and services such as Netflix, YouTube, Pandora, and Spotify allow mobile users to overcome the memory capacity and processing power limitations of mobile devices. Globally, cloud applications will account for 84 percent of total mobile data traffic in 2017, compared to 74 percent at the end of 2012, as shown in Figure 7. Mobile cloud traffic will grow 14-fold from 2012 to 2017, a compound annual growth rate of 70 percent.

Figure 7. 84 Percent of Total Mobile Data Traffic will be Due to Cloud in 2017



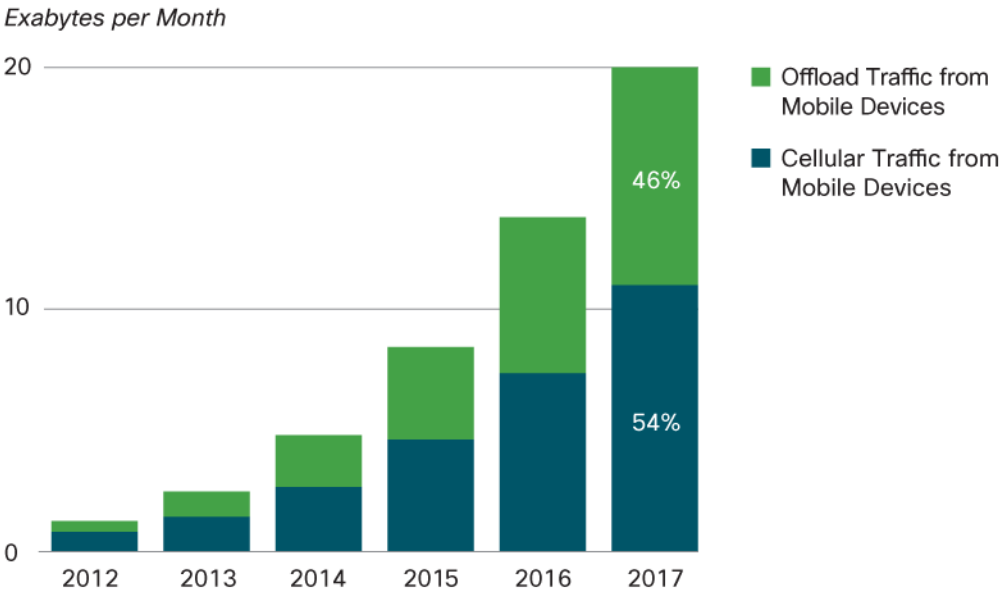
Source: Cisco VNI Mobile Forecast, 2013

Trend 4: Traffic Offload from Mobile Networks to Fixed Networks

Much mobile data activity takes place within the user's home. For users with fixed broadband and Wi-Fi access points at home, or for users served by operator-owned femtocells and picocells, a sizable proportion of traffic generated by mobile and portable devices is offloaded from the mobile network onto the fixed network.

As a percentage of total mobile data traffic from all mobile-connected devices, mobile offload increases from 33 percent (429 petabytes/month) in 2012 to 46 percent (9.6 exabytes/month) in 2017 (Figure 8). Without offload, Global mobile data traffic would grow at a CAGR of 74 percent instead of 66 percent. Offload volume is determined by smartphone penetration, dual-mode share of handsets, percentage of home-based mobile Internet use, and percentage of dual-mode smartphone owners with Wi-Fi fixed Internet access at home.

Figure 8. 46 Percent of Total Mobile Data Traffic will be Offloaded in 2017

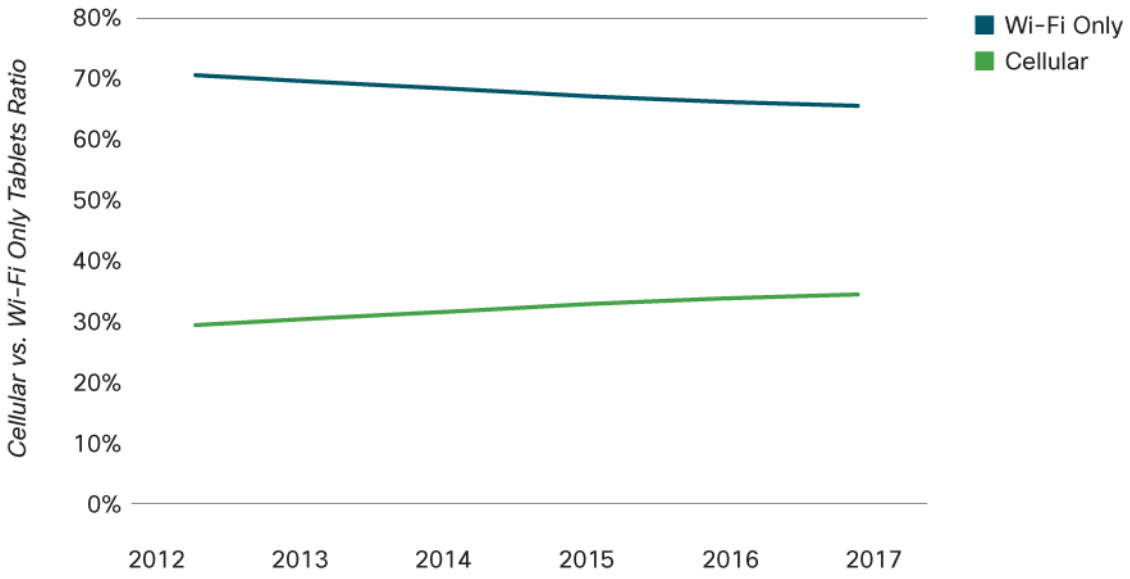


Source: Cisco VNI Mobile Forecast, 2013

The amount of traffic offloaded from smartphones will be 46 percent in 2017, and the amount of traffic offloaded from tablets will be 71 percent in 2017.

A supporting trend is the growth of cellular connectivity for devices such as tablets which in their earlier generation were limited to Wi-Fi connectivity only. With increase desire for mobility and mobile carriers offer of data plans catering to multi-device owners, we find that the cellular connectivity is on a rise albeit cautiously as the end users are testing the waters. As a point in case we estimate that by 2017, 34 percent of all tablets will have a cellular connection up from 29 percent in 2012 (Figure 9).

Figure 9. 34 Percent of Global Tablets will be Cellular Connected by 2017



Source: Cisco VNI Mobile Forecast, 2013

Trend 5: Mobile Network Connection Speeds to Increase 7-Fold

Globally, the average mobile network connection speed in 2012 was 526 kbps. The average speed will grow at a compound annual growth rate of 49 percent, and will exceed 3.9 Mbps in 2017. Smartphone speeds, generally third-generation (3G) and higher, are currently almost four times higher than the overall average. Smartphone speeds will triple by 2017, reaching 6.5 Mbps.

There is anecdotal evidence to support the idea that usage increases when speed increases, although there is often a delay between the increase in speed and the increased usage, which can range from a few months to several years. The Cisco VNI forecast relates application bit rates to the average speeds in each country. Many of the trends in the resulting traffic forecast can be seen in the speed forecast, such as the high growth rates for developing countries and regions relative to more developed areas (Table 4).

Table 4. Projected Average Mobile Network Connection Speeds (in kbps) by Region and Country

	2012	2013	2014	2015	2016	2017	CAGR 2012–2017
Global							
Global speed: All Handsets	526	817	1,233	1,857	2,725	3,898	49%
Global speed: Smartphones	2,064	2,664	3,358	4,263	5,284	6,528	26%
Global speed: Tablets	3,683	4,811	6,082	7,624	9,438	11,660	26%
By Region							
Middle East & Africa	219	371	640	1,101	1,837	2,898	68%
Central & Eastern Europe	551	909	1,458	2,288	3,426	4,760	54%
Latin America	200	349	586	956	1,492	2,207	62%
Western Europe	1,492	2,233	3,124	4,168	5,429	7,013	36%
Asia-Pacific	316	506	806	1,318	2,039	3,036	57%
North America	2,622	4,083	5,850	8,023	10,793	14,399	41%

Source: Cisco VNI Mobile Forecast, 2013

Current and historical speeds are based on data from Cisco's GiST (Global Internet Speed Test) application and Ookla's Speedtest. Forward projections for mobile data speeds are based on third-party forecasts for the relative proportions of 2G, 3G, 3.5G, and 4G among mobile connections through 2017. For more information about Cisco GIST, please visit http://ciscovni.com/gist/index.html.

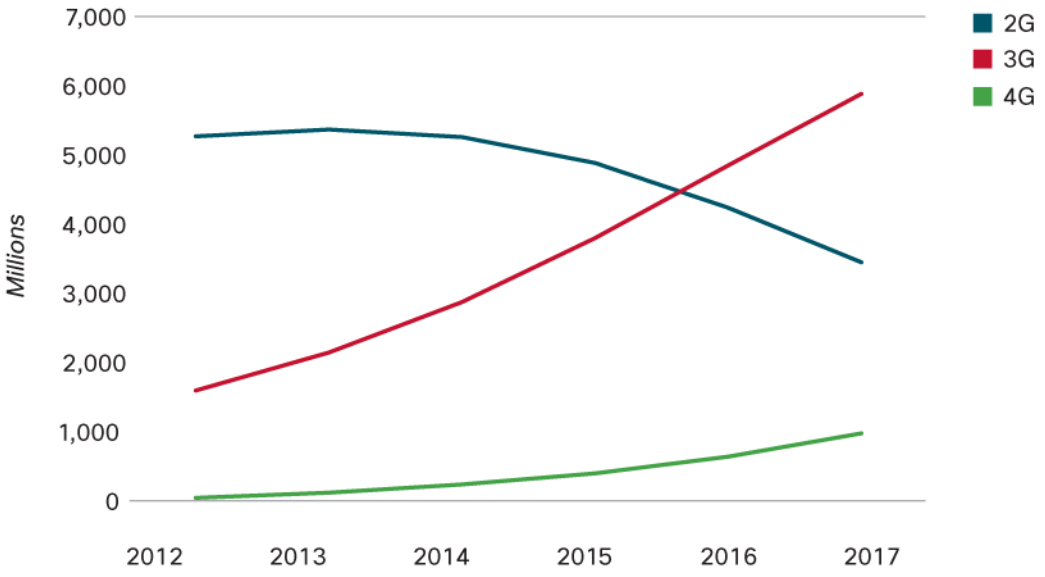
A crucial factor promoting the increase in mobile speeds over the forecast period is the increasing proportion of 4G mobile connections. The impact of 4G connections on traffic is significant, because 4G connections, which include mobile WiMAX and Long-Term Evolution (LTE), generate a disproportionate amount of mobile data traffic.

Trend 6: Impact of 4G Connections on the Increase

The explosion of mobile applications and phenomenal adoption of mobile connectivity by the end users on the one hand and the need for optimized bandwidth management and network monetization on the other hand is fueling the growth of Global 4G deployments and adoption. Service Providers, around the world, are busy rolling out 4G networks to help them meet the growing end-user demand for more bandwidth, higher security and faster connectivity on the move (Appendix B).

While, 3G capable devices and connections will gain the highest share (50 percent of all devices and connections) by 2015 10 percent of all global devices and connections will be 4G capable by 2017 (Figure 10). The global mobile 4G connections will grow from 60 million in 2012 to 992 million in 2017 at a CAGR of 75 percent.

Figure 10. Global Mobile Devices and Connections by 2G, 3G and 4G



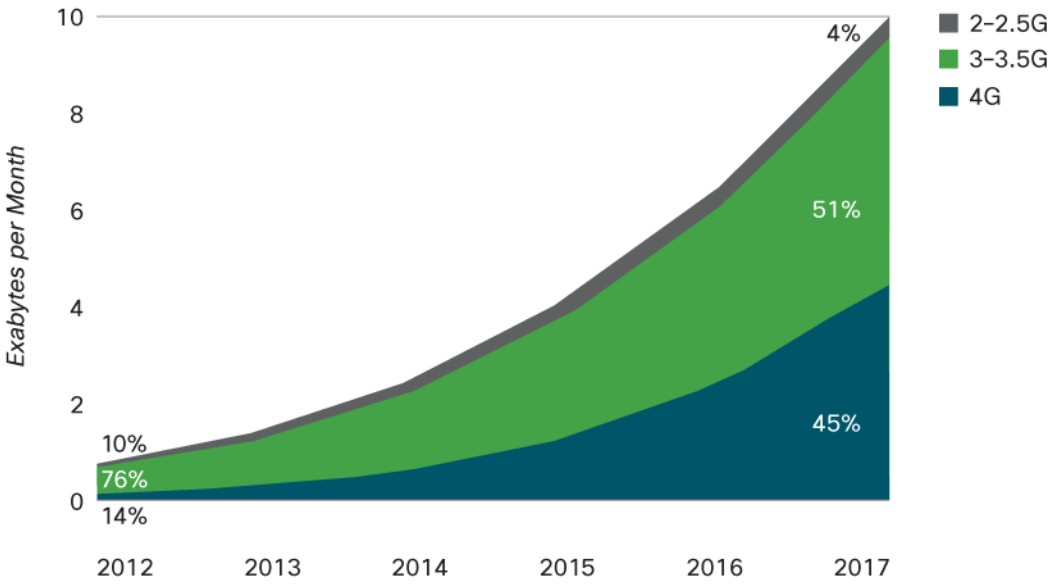
Source: Cisco VNI Mobile Forecast, 2013

While 4G deployment is a global phenomenon, regions such as North America (31 percent) and Western Europe (18 percent) will have the highest ratio of 4G connections by 2017 (Appendix B). Among countries Korea will have over 72 percent of the country's total connections on 4G by 2017 with Japan having 36 percent of all its connections on 4G by 2017. US and China are going to lead the world in terms of their share of the total global 4G connections with 25 percent and 15 percent share respectively.

The growth in 4G with it benefits of higher bandwidth, lower latency and increased security will help the regions bridge the gap between their mobile and fixed network performance leading to even higher adoption of mobile technologies by the end users making access to any content on any device from anywhere more of a reality.

Although 4G connections represent only 0.9 percent of mobile connections today, they already account for 14 percent of mobile data traffic. In 2017, 4G will represent 10 percent of connections, but 45 percent of total traffic (Figure 11).

Figure 11. 4G will be 10 Percent of Connections and 45 Percent of Traffic in 2017



Source: Cisco VNI Mobile Forecast, 2013

Currently, a 4G connection generates 19 times more traffic than a non-4G connection. There are two reasons for this. The first is that many of the 4G connections today are for residential broadband routers and laptops, which have a higher average usage. The second is that higher speeds encourage the adoption and usage of high bandwidth applications, so that a smartphone on a 4G network is likely to generate 50 percent more traffic than the same model smartphone on a 3G or 3.5G network.

As smartphones come to represent a larger share of 4G connections, the gap between the average traffic of 4G devices and non-4G devices will narrow, but in 2017 a 4G connection will still generate 8 times more traffic than a non-4G connection.

Trend 7: The Impact of Tiered Pricing—Shake-Up at the Top

An increasing number of service providers worldwide are moving from unlimited data plans to tiered mobile data packages. To make an initial estimate of the impact of tiered pricing on traffic growth, we repeated a case study based on the data of two Tier 1 Global service providers from mature mobile markets. The study tracks data usage from the timeframe of the introduction of tiered pricing three years ago. The findings in this study are based on Cisco's analysis of data provided by a third-party data analysis firm. This firm maintains a panel of volunteer participants who have given the company access to their mobile service bills, including KB of data usage. The data in this study reflects usage associated with over 22,000 devices and spans 12 months (October 2011 through September 2012) and also refers to the study from the previous update for longer term trends. The overall study spans three years. Cisco's analysis of the data consists of categorizing the pricing plans, operating systems, devices, and users; incorporating additional third-party information on device characteristics; and performing exploratory and statistical data analysis. While the results of the study represent actual data from Tier 1 mobile data operators, global forecasts that include emerging markets, and Tier 2 providers will lead to lower estimates.

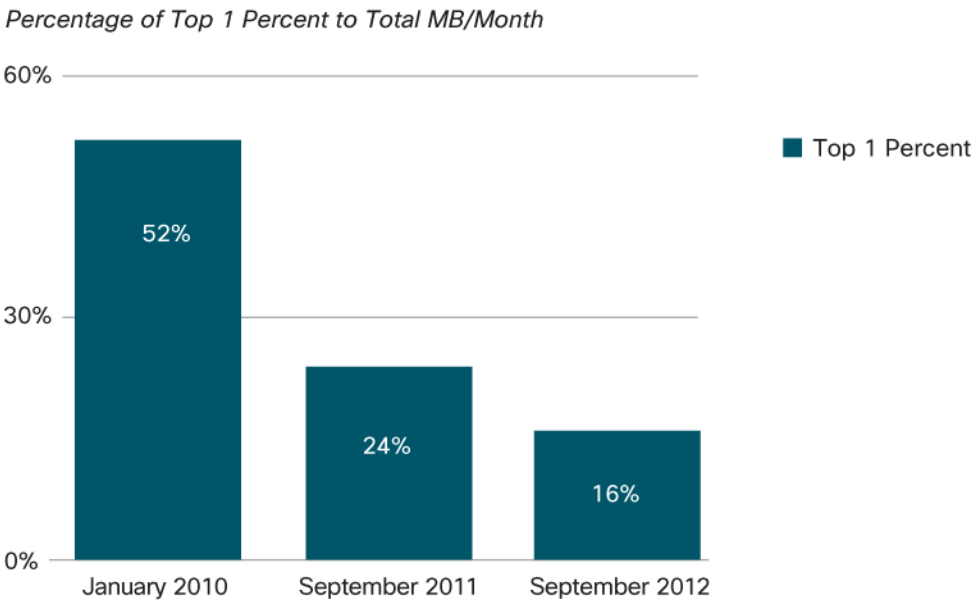
Over the period of the nearly 3-year study, the percentage of tiered plans compared to all data plans increased from 4 percent to 55 percent, while unlimited plans dropped from 81 percent to 45 percent. This has not, however, constrained usage patterns. From 2011 to 2012, average usage per device on a tiered plan grew from 425 MB per month to 922 MB per month, a rate of 117 percent, while usage per device of unlimited plans grew at a slower rate of 71 percent from a higher base of 738 MB per month to 1.3 GB per month.

However, tiered plans are effective. There is a narrowing of the bandwidth consumption gap between tiered and unlimited data plan connections, showing the general increase in consumption of mobile data traffic due to the increased consumption of services such as Pandora, YouTube, Facebook, and Netflix. Unlimited plans have promoted the adoption of mobile applications and increased web usage through mobile broadband.

Tiered pricing plans are often designed to constrain the heaviest mobile data users, especially the top 1 percent of mobile data consumers. An examination of heavy mobile data users reveals that the top 1 percent of mobile users is actually the top 5 percent, because the top 1 percent of users varies each month. For example, for a mobile data subscriber base of 1000 users; the top 1 percent is 10 users. However, the same set of 10 users does not appear in the top 1 percent category in each month; rather, a larger set of 50 subscribers rotates though the top 1 percent. This top 5 percent are the users who have the potential of being in the top 1 percent bracket in any given month and substitute for each other in subsequent months. The trend is due to the nature of consumption of mobile data applications.

At the beginning of the 3-year study, 52 percent of the traffic was generated by the top 1 percent. At the end of the three year time frame, the top 1 percent generated 16 percent of the overall traffic per month compared to 18 percent in October 2011 (Figure 12). Similarly, the top 20 percent of the mobile data users generated 79 percent of the monthly traffic in October 2011, but are now down to 71 percent in September 2012.

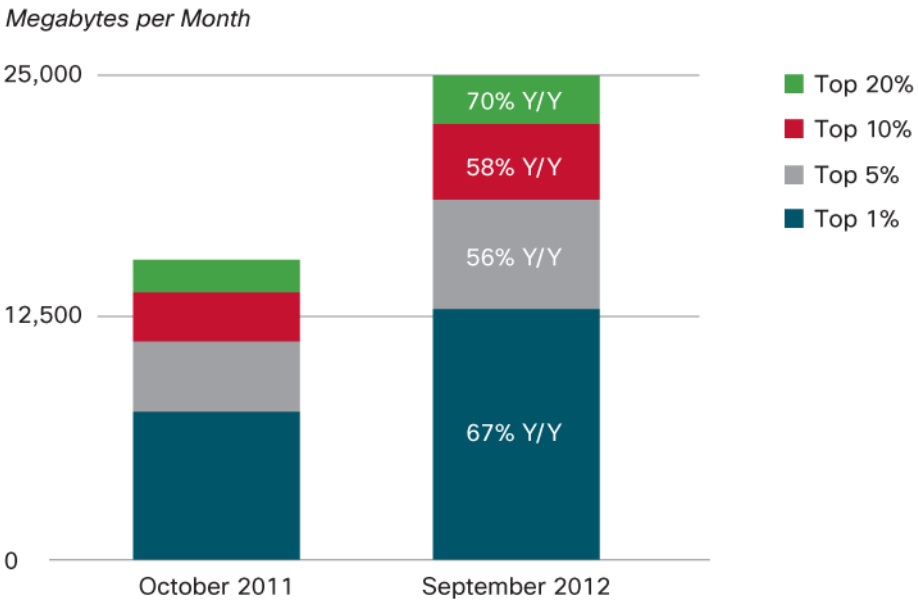
Figure 12. Top 1 Percent Generates 52 Percent of Monthly Data Traffic in Jan 2010 Compared to 16 Percent in Sept 2012



Source: Cisco, 2013

Additional evidence that tiered pricing plans are effectively constraining the top 1 percent of mobile users, and that the growth is being made up by those outside the top 1 percent, is that the usage of the top 20 percent is growing much more rapidly than the top 1 percent (Figure 13). With the introduction of new larger screen smartphones and tablets, reversing the trend displayed in the higher average consumption in the Top 1%.

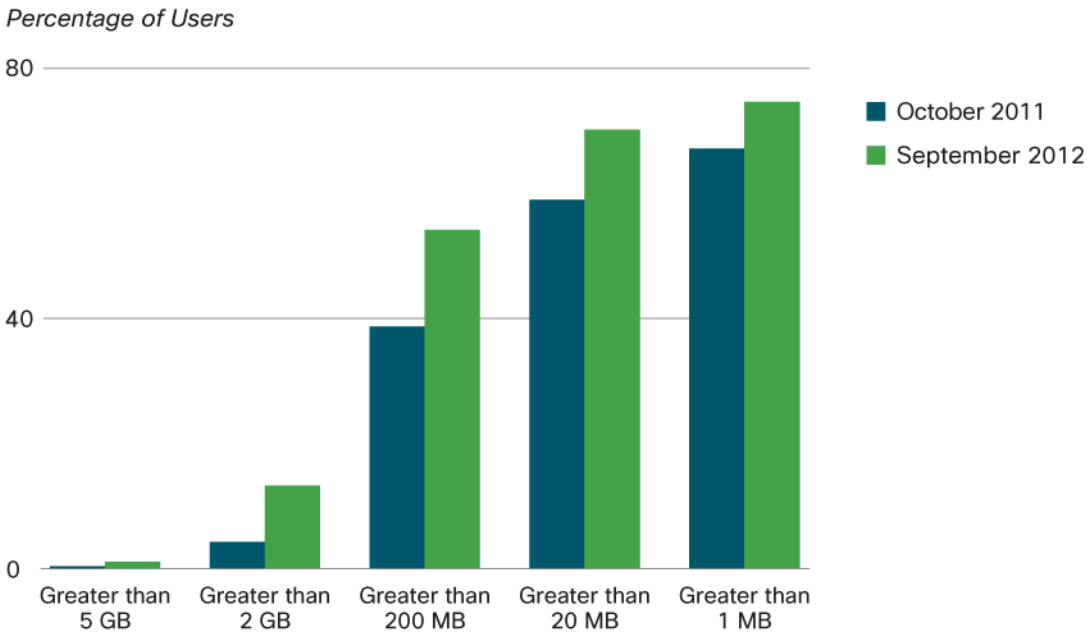
Figure 13. Top 20 Percent Growing at a Faster Rate of 70 Percent Year-to-Year



Source: Cisco VNI Mobile Forecast, 2013

The proportion of mobile users generating more than 2 gigabytes per month has increased significantly over the past year, reaching 18 percent of users towards the end of 2012 (Figure 14).

Figure 14. 1 Percent of Users Consume 5 GB per Month and 13 Percent Consume over 2 GB per Month



Note: While these averages represent actual data from Tier 1 mobile data operators, global forecasts that include emerging markets and Tier 2 providers will lead to lower estimates.

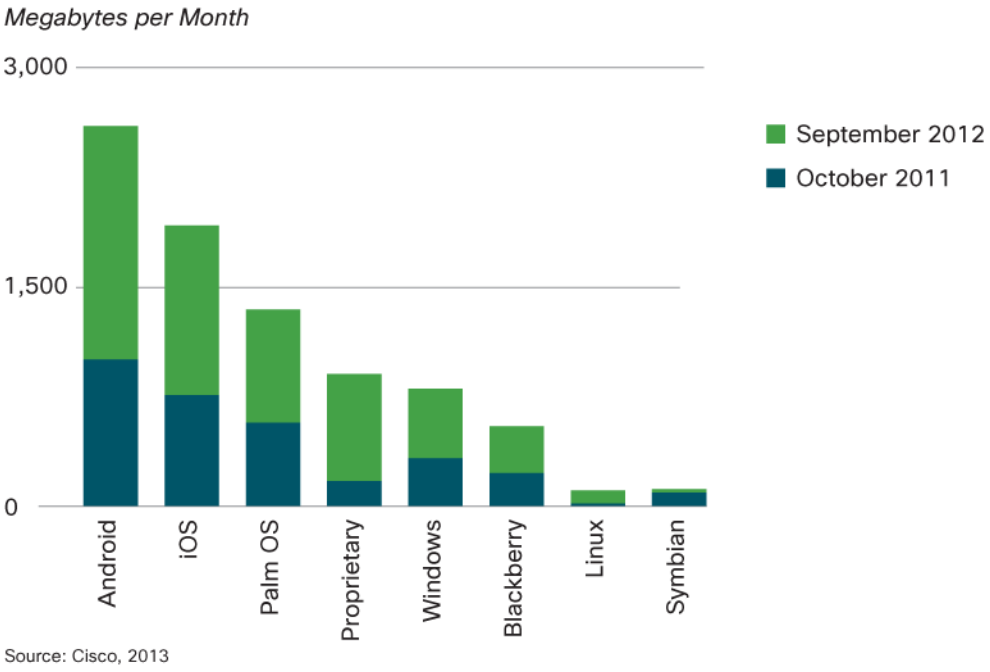
Source: Cisco, 2013

More detail on the tiered pricing case study is available in Appendix C.

Android Leads iOS in Data Usage

At the beginning of the three year tiered pricing case study, Apple operating systems' data consumption was equal to if not higher than other smartphone platforms. However, Android-based devices have now caught up and their data consumption is 38 percent higher than that of Apple devices in terms of megabytes per month per connection usage (Figure 15).

Figure 15. Megabytes per Month by Operating System



More detail on consumption by operating system is available in Appendix C.

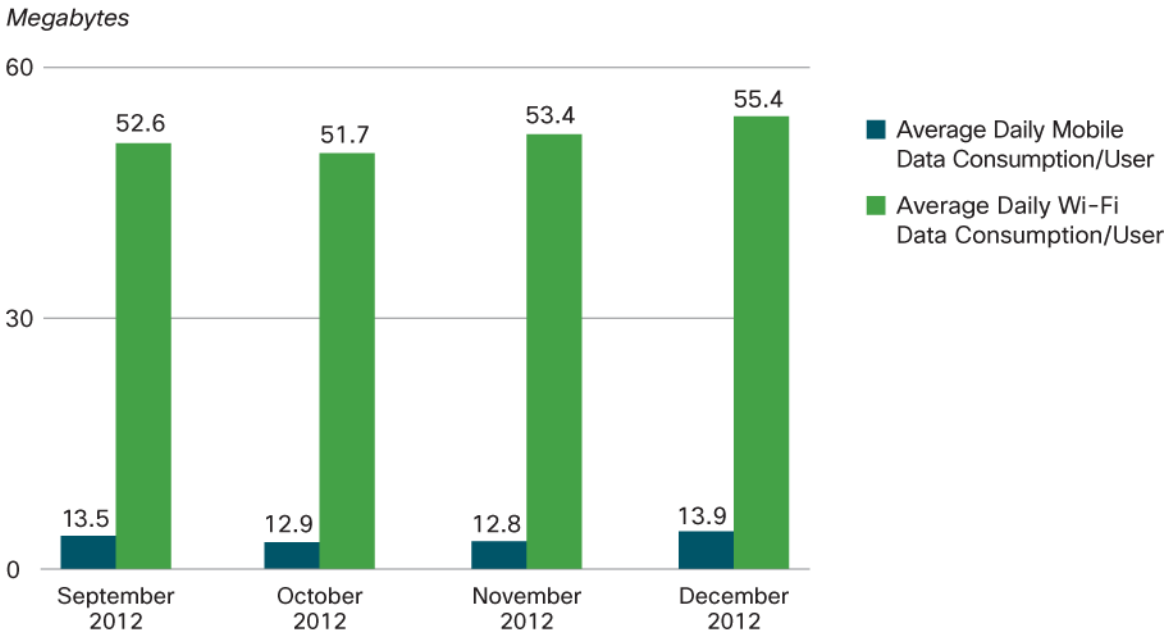
Trend 8: User Applications Driving Mobile Data Consumption

With the increasing number of smartphones and tablets connecting to mobile networks, attention naturally turns to data consumption trends impacting end-users and service providers. End-users are becoming increasingly knowledgeable about how their usage patterns can be tailored for highest efficiency—while still using the applications they want to use, where and when they want to use them. Service providers are looking to customer data usage trends in order to deploy real-time network performance optimization and to guide strategic investments that will increase network capabilities within a profitable services environment.

The Cisco VNI team has begun an analysis of a new source of mobile data consumption data available from the Cisco Data Meter application for Android smartphones and tablets. Cisco Data Meter is a free application that allows users to monitor their mobile data usage and find out which applications are using the most data. As of mid-January 2013, the Data Meter has over 12,000 users across the six global regions tracked by VNI. 80 percent of Data Meter users are on smartphones, 20 percent are on tablets. The data is analyzed in aggregate; individual user data is not accessible.

In an assessment of early Data Meter results, key data consumption trends are beginning to emerge. For example, in comparing data consumption over Wi-Fi and cellular networks, the global average for daily data consumption over Wi-Fi is four times that of cellular, averaging 55 MB per day for Wi-Fi, and 13 MB for cellular. For end-users, selecting Wi-Fi over cellular for the majority of their data consumption is an important consideration for staying within the limits of their cellular data plans. For service providers, recognizing that Wi-Fi off-load traffic will only continue to grow has strong implications for their future network planning.

Figure 16. Average Daily Wi-Fi and Mobile Data Consumption



Source: Cisco Data Meter, September–December 2012

Another key finding from the data is the type of application generating these data consumption trends. For smartphones and tablets globally, the top three application types (excluding system updates) are the same for both device types, although they differ in percentage rates. As shown in Table 5, video streaming and communications applications such as YouTube, Hulu, and Netflix ranks highest on both device platforms, although data consumption is slightly higher on tablets. Information applications rank second on tablets (Google Maps, PulseNews, Wall Street Journal). Social networking (Facebook, Twitter) ranks higher on smartphone, perhaps because the increased mobility of smartphones allows users to instantly connect socially.

Table 5. Top Applications for Data Consumption

	Smartphone (Percentage of Data Consumption)	Tablet (Percentage of Data Consumption)
Video/Communications	45%	50%
Information	12%	17%
Web Browsing	6%	7%
Social Networking	7%	3%
Music/Audio Streaming	4%	3%

Source: Cisco Data Meter, September–December 2012

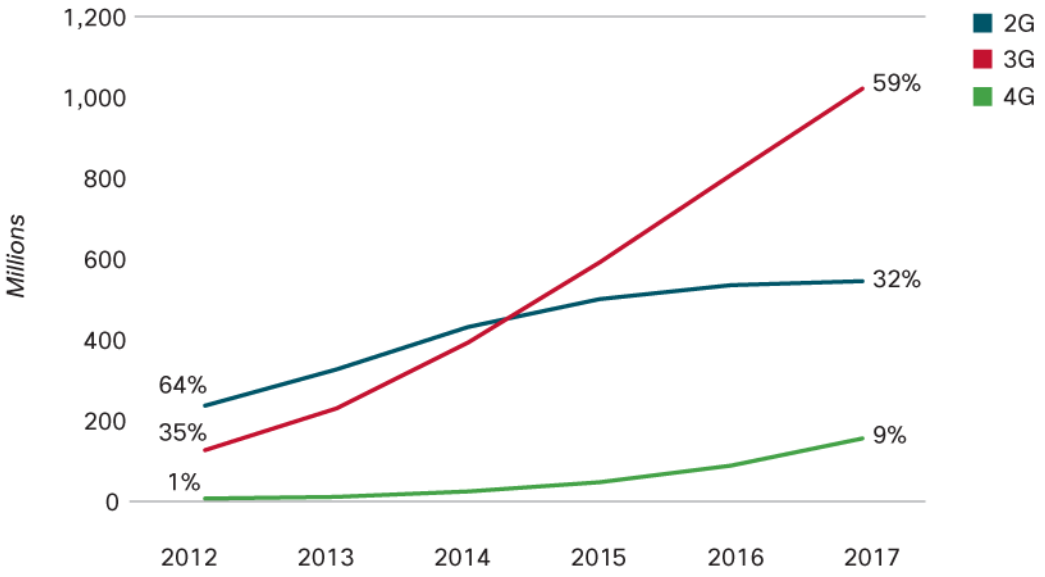
The Cisco VNI team will continue build upon this initial analysis in future VNI updates. For additional device, network type, and regional data, you can visit the Cisco Data Meter web site. And you can download to your Android smartphone or tablet from Google Play. An iPhone version of the Data Meter application will be coming soon.

Trend 9: The (Mobile) Internet of Things

Cellular communication between objects, machines, or sensors has led to the growth of M2M connections. These connections are in the form of home and office security and automation, smart metering and utilities, maintenance, building automation, automotive, healthcare and consumer electronics etc.M2M technologies are being used across a broad spectrum of industries. As real-time information monitoring is helping companies to deploy new video-based security systems and hospitals and helping healthcare professionals to remotely monitor the progress of their patients, bandwidth-intensive M2M connections become more prevalent. Among various verticals healthcare M2M segment is going to experience the highest CAGR at 74 percent from 2012 to 2017, followed by automotive industry at 42 percent CAGR.

M2M capabilities similar to mobile devices are migrating from second-generation (2G) to 3G and 4G technologies. In 2012, 64 percent of global mobile M2M connections were connected via 2G connectivity, 35 percent via 3G and only 1 percent via 4G. By 2017, only 32 percent of M2M modules will have 2G connectivity, 59 percent will have 3G connectivity and 9 percent will have 4G connectivity (Figure 17).

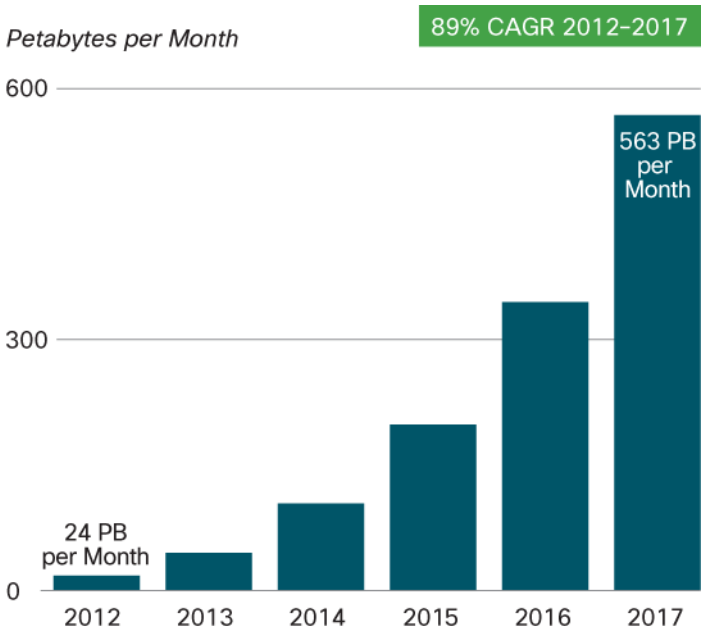
Figure 17. Machine to Machine: Migration from 2G to 3G and 4G



Source: Cisco VNI Mobile Forecast, 2013

While the mobile global M2M modules are going to grow 4.6-fold, a CAGR of 36 percent, from 369 million in 2012 to 1.7 billion in 2017, globally, M2M traffic will grow 24-fold from 2012 to 2017, a compound annual growth rate of 89 percent, with M2M traffic reaching 563 petabytes per month in 2017. M2M will account for 5 percent of total mobile data traffic in 2017, compared to 3 percent at the end of 2012. The average M2M module will generate 330 megabytes of mobile data traffic per month in 2017, up from 64 megabytes per month in 2012 (Figure 18).

Figure 18. Machine-to-Machine Traffic to Increase 24-Fold Between 2012 and 2017



Source: Cisco VNI Mobile Forecast, 2013

The Asia Pacific region will lead the M2M category in 2016 with 217 petabytes per month and a CAGR of 91 percent between 2012 and 2017. Western Europe will experience the highest CAGR of 97 percent from 2012 to 2017 with 112 petabytes per month of M2M traffic in 2017.

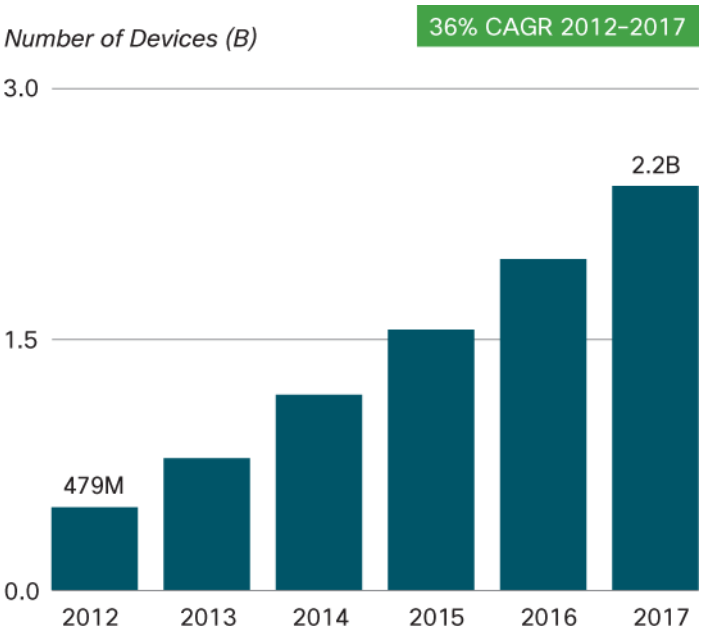
Trend 10: IPv6-Capable Mobile Devices

As the telecommunications industry increasingly recognizes the scalability benefits of IPv6 in addressing the global depletion of IPv4, attention is turning to the operational management and efficiency features of IPv6 to support the ever-increasing demand for ubiquitous connectivity to rich content services. This is particularly relevant in the mobile network environment, which is experiencing a proliferation of newer generation devices driving mobile network usage and data traffic growth.

In light of these ongoing developments, the Cisco VNI 2012–2017 forecast provides an update on IPv6-capable mobile devices and connections. Building upon our analysis initiated last year the forecast is intended as a projection of the number of IPv6-capable mobile devices, not mobile devices with an IPv6 connection configured by the ISP, or IPv6 mobile data traffic.

Focusing on the high growth mobile device segments of smartphones and tablets, we forecast that 73 percent of smartphones and tablets (2.2 billion) could be IPv6 capable by 2017 (up from 41 percent or 479 million smartphones and tablets in 2012). This is based on the projection that a significant percentage of these devices will be capable via OS (Android iOS, next-gen RIM, WindowsPhone) as well estimating the type of mobile network infrastructure the device is capable of connecting to (3.5G or higher).

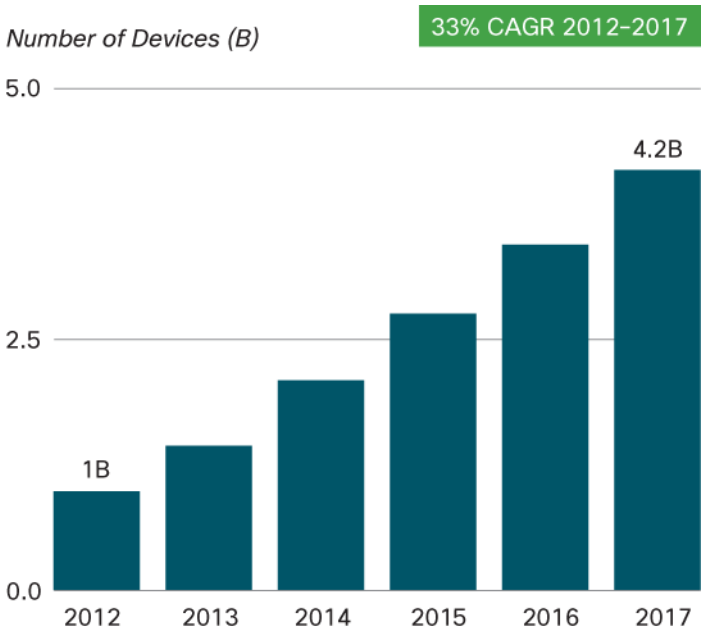
Figure 19. Global IPv6-Capable Smartphones and Tablets Reach 2.2 Billion by 2017



Source: Cisco VNI, 2013

Considering all mobile devices and connections landscape, by 2017 we project that 41 percent of global mobile devices will be IPv6-capable, up from 14 percent (1 billion) in 2012. Segments with strong IPv6-capability potential include laptops—which generally have IPv6 enabled by default when connected to a mobile network infrastructure—and machine-to-machine (M2M), due to the utilization of IPv6 to enable the burgeoning number of connections to be deployed in the “Internet of Everything.”

Figure 20. Global IPv6-Capable Mobile Devices Reach 4.2 Billion by 2017



Source: Cisco VNI, 2013

For a regional view, Asia Pacific will lead throughout the forecast period with highest number of IPv6-capable devices/connections reaching 1.9 billion in 2017. Asia-Pacific and Central and Eastern Europe will have the highest growth rates during the forecast period, at 37.2 percent CAGR and 36.4 percent CAGR respectively. In regards to end-user segmentation, 87 percent of IPv6-capable mobile devices/connections will be consumer (3.65 billion) and 13 percent will be business (567 million.) While this analysis is a measure of potential, it does not predict the point a user or ISP will actively enable IPv6 connectivity alongside or in place of IPv4 connectivity. However, service providers around the world are reporting success in deploying the IPv6 networks to support the requirements of an increasing number of devices and connections. The confluence of IPv6 capability, customer demand, and service enablement establishes a strong basis for continued IPv6 deployment and the advantages it has to offer to operators and end-users alike.

Conclusion

Mobile data services are well on their way to becoming necessities for many network users. Mobile voice service is already considered a necessity by most, and mobile data, video, and TV services are fast becoming an essential part of consumers' lives. Used extensively by consumer as well as enterprise segments, with impressive uptakes in both developed and emerging markets, mobility has proven to be transformational. Mobile subscribers are growing rapidly and bandwidth demand due to data and video is increasing. Mobile M2M connections continue to increase. The next 5 years are projected to provide unabated mobile video adoption despite uncertain macroeconomic conditions in many parts of the world. Backhaul capacity must increase so mobile broadband, data access, and video services can effectively support consumer usage trends and keep mobile infrastructure costs in check.

Deploying next-generation mobile networks requires greater service portability and interoperability. With the proliferation of mobile and portable devices, there is an imminent need for networks to allow all these devices to be connected transparently, with the network providing high-performance computing and delivering enhanced real-time video and multimedia. This openness will broaden the range of applications and services that can be shared, creating a highly enhanced mobile broadband experience. The expansion of wireless presence will increase the number of consumers who access and rely on mobile networks, creating a need for greater economies of scale and lower cost per bit.

As many business models emerge with new forms of advertising, media and content partnerships, mobile services including M2M, live gaming, and (in the future) augmented reality, a mutually beneficial situation needs to be developed for service providers and over-the-top providers. New partnerships, ecosystems, and strategic consolidations are expected as mobile operators, content providers, application developers, and others seek to monetize the video traffic that traverses mobile networks. Operators must solve the challenge of effectively monetizing video traffic while increasing infrastructure capital expenditures. They must become more agile and able to quickly change course and provide innovative services to engage the Web 3.0 consumer. While the net neutrality regulatory process and business models of operators evolve, there is an unmet demand from consumers for the highest quality and speeds. As wireless technologies aim to provide experiences formerly only available through wired networks, the next few years will be critical for operators and service providers to plan future network deployments that will create a adaptable platform upon which will deploy the multitude of mobile-enabled devices and applications of the future.

For More Information

Inquiries can be directed to traffic-inquiries@cisco.com.

Appendix A. The Cisco VNI Global Mobile Data Traffic Forecast

Table 6 shows detailed data from the Cisco VNI Global Mobile Data Traffic Forecast. The portable device category includes laptops with mobile data cards, USB modems, and other portable devices with embedded cellular connectivity.

Table 6. Global Mobile Data Traffic, 2012–2017

	2012	2013	2014	2015	2016	2017	CAGR 2012–2017
By Application Category (TB per Month)							
Data	313,550	526,838	871,942	1,369,022	2,011,512	2,778,386	55%
File Sharing	92,574	142,411	214,889	298,095	369,068	395,342	34%
Video	455,216	858,026	1,603,384	2,834,963	4,714,310	7,418,322	75%
M2M	23,566	49,973	106,827	198,405	343,620	563,481	89%
By Device Type (TB per Month)							
Nonsmartphones	35,401	47,383	64,187	88,226	122,629	161,249	35%
Smartphones	391,024	854,642	1,672,271	2,947,545	4,852,994	7,531,736	81%
Laptops	402,877	523,330	708,908	981,904	1,269,683	1,563,861	31%
Tablets	29,707	97,035	237,273	474,432	833,633	1,309,324	113%
M2M	23,566	49,973	106,827	198,405	343,620	563,481	89%
Other portable devices	2,331	4,886	7,576	9,974	15,949	25,881	62%
By Region (TB per Month)							
North America	222,378	378,611	630,820	989,712	1,468,040	2,085,309	56%
Western Europe	181,397	276,405	426,152	655,201	975,681	1,384,072	50%
Asia Pacific	310,394	613,699	1,167,631	2,053,003	3,377,458	5,256,979	76%
Latin America	54,907	96,617	179,361	304,239	480,840	722,986	67%
Central and Eastern Europe	66,084	116,012	210,841	365,498	577,265	844,887	66%
Middle East and Africa	49,747	95,905	182,237	332,833	559,225	861,298	77%
Total (TB per Month)							
Total Mobile Data Traffic	884,906	1,577,248	2,797,042	4,700,486	7,438,510	11,155,531	66%

Source: Cisco VNI Mobile Forecast, 2013

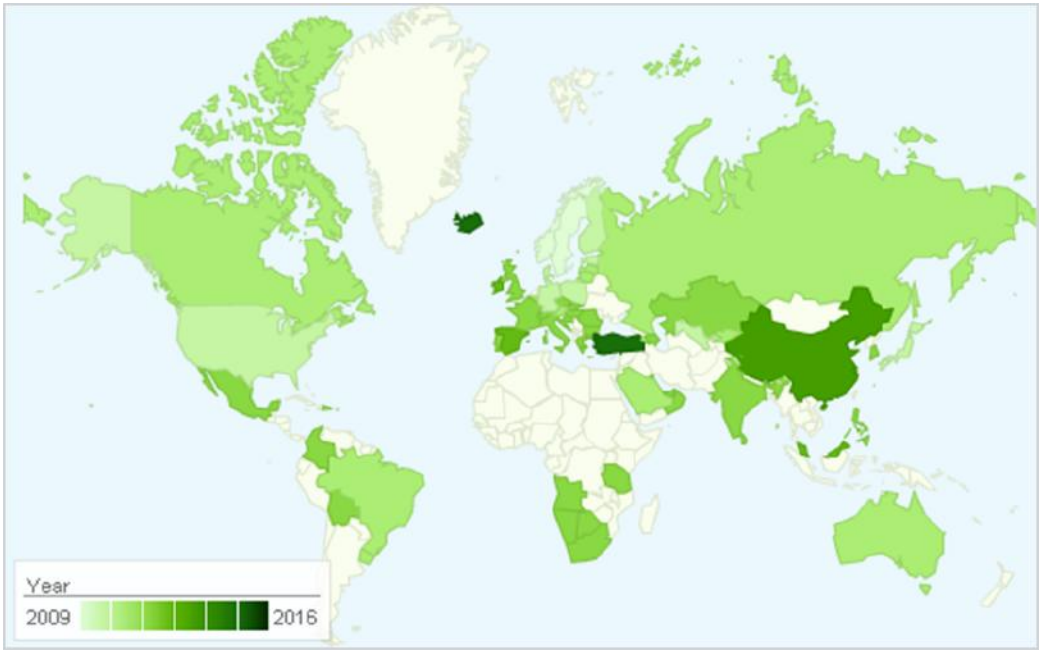
The Cisco VNI Global Mobile Data Traffic Forecast relies in part upon data published by Informa Telecoms and Media, Strategy Analytics, Infonetics, Ovum, Gartner, IDC, Dell'Oro, Synergy, ACG Research, Nielsen, comScore, Arbitron Mobile, Maravedis and the International Telecommunications Union (ITU).

The Cisco VNI methodology begins with the number and growth of connections and devices, applies adoption rates for applications, and then multiplies the application's user base by Cisco's estimated minutes of use and KB per minute for that application. The methodology has evolved to link assumptions more closely with fundamental factors, to use data sources unique to Cisco, and to provide a high degree of application, segment, geographic, and device specificity.

- **Inclusion of fundamental factors**. As with the fixed IP traffic forecast, each Cisco VNI Global Mobile Data Traffic Forecast update increases the linkages between the main assumptions and fundamental factors such as available connection speed, pricing of connections and devices, computational processing power, screen size and resolution, and even device battery life. This update focuses on the relationship of mobile connection speeds and the KB-per-minute assumptions in the forecast model. Proprietary data from the Cisco Global Internet Speed Test (GIST) application was used as a baseline for current-year smartphone connection speeds for each country.
- **Device-centric approach**. As the number and variety of devices on the mobile network continue to increase, it becomes essential to model traffic at the device level rather than the connection level. This Cisco VNI Global Mobile Data Traffic Forecast update details traffic to smartphones; nonsmartphones; laptops, tablets, and netbooks; e-readers; digital still cameras; digital video cameras; digital photo frames; in-car entertainment systems; and handheld gaming consoles.
- **Estimation of the impact of traffic offload**. The Cisco VNI Global Mobile Data Traffic Forecast model now quantifies the effect of dual-mode devices and femtocells on handset traffic. Proprietary data from Cisco's IBSG Connected Life Market Watch was used to model offload effects.
- **Increased application-level specificity**. The forecast now offers a deeper and wider range of application specificity.

Appendix B. Global 4G Networks and Connections

Figure 21. Global Heatmap by Year of LTE Deployment



Source: Cisco, 2013

Table 7. Regional 4G Connections Growth

	2012		2017	
Regions	**Number of 4G Connections**	**Percentage of Total Connections**	**Number of 4G Connections**	**Percentage of Total Connections**
Asia Pacific	24,143,897	0.7%	425,094,836	8%
Central and Eastern Eurpoe	903,123	0.2%	50,913,035	6%
Latin America	326,212	0.0%	51,772,961	6%
Middle East and Africa	168,536	0.0%	28,437,977	2%
North America	31,329,522	6.8%	264,618,277	31%
Western Europe	3,544,454	0.6%	171,013,933	18%
Global	60,415,743	0.9%	991,851,020	10%

Source: Cisco VNI Mobile Forecast, 2013

Appendix C. A Case Study on the Initial Impact of Tiered Pricing on Mobile Data Usage

Tiered Offerings and Mobile Data Traffic Growth

The impact of tiered pricing is gradual. Mobile data traffic per user grew 5.5 percent per month, on average (Table 8).

Table 8. On Average, Mobile Data Traffic per User Grew 6 Percent per Month

	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Average Monthly Growth
All Mobile Users	579	638	638	683	729	729	845	845	947	986	968	1,031	5.5%
Mobile Data Users	582	653	653	702	729	749	859	866	983	1,031	1,022	1,092	6.0%

Source: Cisco, 2013

Traffic in megabytes per month per user in month 12 (September 2012) of the study is significantly higher than month 1 (October 2011) (Table 9). The growth rates of megabytes per month per user for all mobile plans versus mobile data plans are fairly similar. While it is possible that there are early signs of slower growth rates for mobile data due to the effects of tiered pricing, the data available at this time indicates no significant change in the overall growth of mobile data traffic per user.

Table 9. Mobile Users Generated Significantly More Traffic after introduction of tiered pricing; Growth Rate Did Not Slow

	MB per User per Month in Month 1	MB per User per Month in Month 12	Statistically Significant Increase in Volume?	Year over Year Growth	Statistically Significant Decline in Growth Rate?
All Mobile Users	579	1,031		78%	No
Mobile Data Users	582	1,092	Yes	88%	No

Source: Cisco, 2013

The number of mobile data users generating more than 2 GB per month has tripled over the course of the study, and the percentage of users generating over 200 MB per month surpassed 50 percent (Table 10).

Table 10. One Percent of Mobile Data Users Consume 5 GB per Month

Percentage	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
Greater than 5 GB	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Greater than 2 GB	4%	5%	5%	7%	7%	8%	8%	9%	12%	13%	11%	13%
Greater than 200 MB	38%	40%	41%	46%	46%	46%	48%	49%	48%	53%	53%	53%
Greater than 20 MB	58%	59%	60%	66%	66%	65%	65%	65%	63%	69%	69%	69%
Greater than 1 MB	66%	66%	67%	73%	72%	71%	71%	70%	68%	74%	73%	73%

Source: Cisco, 2013

The rapid increase in data usage presents a challenge to service providers who have implemented tiers defined solely in terms of usage limits. Mobile data caps that fall too far behind usage volumes may create opportunities for competitors in the market. Therefore, many service providers are creating more nuanced tiers and data add-ons, such as a separate charge for tethering and hotspot functionality. Such offerings tend to require less vigilance on the part of subscribers than data caps, yet still monetize scenarios that tend to have high data usage. Shared data family plans are being introduced and their effects on overall mobile data traffic are yet to be determined.

Mobile Data Traffic Volume by Operating System

While the effect of the tiered plan is clear, the average consumption per connection continues to increase for both tiered and unlimited plans Both Android- and Apple-based devices are prominent bandwidth promoters in tiered as well as unlimited plans. Android-based devices led in average megabyte-per-month usage both with tiered and unlimited plans over Apple-based and other devices with mobile operating systems (Tables 11 and 12).

Table 11. MB per Month Usage per Mobile Operating System in Unlimited Plans

Operating System	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
Android	968	1,036	1,002	1,036	1,132	1,068	1,305	1,303	1,365	1,469	1,498	1,610
Proprietary	269	262	258	247	225	220	323	381	642	1,184	1,220	1,300
iOS	782	844	824	838	862	843	979	948	1,018	1,015	1,085	1,108
Palm OS	605	651	594	610	703	586	663	805	812	799	771	911
Windows	440	435	347	308	364	388	487	555	694	385	533	481
Linux	90	112	256	264	240	191	301	252	158	148	243	371
Blackberry	184	210	173	173	168	158	182	208	224	257	236	248
Symbian	409	133	143	6	3	0.1	1	1	3	0.4	1	1

Source: Cisco, 2013

Table 12. MB per Month Usage per Mobile Operating System in Tiered Pricing Plans

Operating System	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
Android	623	741	731	833	831	917	932	971	1,190	1,231	1,024	1,122
iOS	456	539	549	599	586	647	692	673	809	818	793	840
Proprietary	182	199	215	244	261	365	387	436	467	559	603	806
Windows	281	310	280	339	372	389	410	392	432	420	421	438
Palm OS	357	446	321	480	372	327	359	300	418	401	320	434
Blackberry	208	218	240	279	280	283	295	293	359	289	251	304
Linux	24	29	38	17	26	20	33	34	79	100	67	78
Symbian	32	60	40	30	109	37	4	3	3	5	1	4

Source: Cisco, 2013

The Changing Role of the Top 1 Percent of Mobile Data Subscribers

As with fixed broadband, the top 1 percent of mobile data subscribers is responsible for a disproportionate amount of mobile data traffic. However, according to the data from this study, this disproportion is becoming less pronounced with time. The amount of traffic due to the top 1 percent of subscribers declined from 18 percent to 16 percent in the 12 months (Table 13).

Table 13. Percentage of Traffic by User Tier, Months 1–11

Data Users	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12
% Traffic Due to Top 1%	18%	17%	15%	14%	18%	14%	17%	16%	14%	16%	16%
% Traffic Due to Top 10%	59%	57%	55%	52%	55%	53%	53%	52%	50%	49%	50%

Source: Cisco, 2013

Although the traffic share of the top tiers may be declining, their volumes continue to increase (Table 14).

Table 14. Average Traffic by User Tier in MB per Month

Average MB per Month	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
Top 1%	7,758	8,371	7,501	7,861	10,658	7,934	11,323	10,294	9,861	13,150	12,279	12,991
Top 5%	3,554	3,785	3,591	3,845	4,399	3,848	4,746	4,534	4,675	5,452	5,303	5,542
Top 10%	2,480	2,674	2,587	2,831	3,109	2,896	3,378	3,278	3,420	3,843	3,746	3,907
Top 20%	1,662	1,810	1,780	1,964	2,107	2,022	2,306	2,257	2,491	2,756	2,619	2,818

Source: Cisco, 2013

Tiered pricing plans have lower megabyte-per-month consumption compared to unlimited plans. However, the overall measures displayed healthy growth with few signs of this growth slowing, and the move to tiered pricing does not appear to have an immediate effect on overall mobile data traffic.

Appendix D: IPv6-Capable Devices, 2012–2017

Table 15 provides regional IPv6-capable forecast detail. Table 16 provides the segmentation of IPv6-capable devices by device type.

Table 15. IPv6-Capable Devices by Region, 2012–2017

IPv6 Capable Devices by Region (K)	2012	2013	2014	2015	2016	2017	CAGR 2012–2017
Global	1,000,112	1,469,383	2,127,324	2,801,190	3,478,615	4,218,685	33%
APAC	392,445	589,479	883,395	1,199,465	1,519,353	1,906,083	37%
LATAM	93,002	133,642	194,788	257,955	321,554	395,189	34%
NA	154,928	229,501	312,983	385,241	452,180	520,153	27%
WE	186,763	262,326	358,051	444,259	517,176	582,218	26%
CEE	64,028	92,731	138,724	192,597	258,842	301,999	36%
MEA	108,944	161,705	239,383	321,672	409,510	513,042	36%

Source: Cisco, 2013

Table 16. IPv6-Capable Devices by Device Type, 2012–2017

IPv6 Capable Devices by Device Type (K)	2012	2013	2014	2015	2016	2017	CAGR 2012–2017
Global	1,000,112	1,469,383	2,127,324	2,801,190	3,478,615	4,218,685	33%
Smartphones	458,269	701,653	1,023,750	1,349,327	1,700,506	2,059,758	35%
Tablets	20,542	44,356	77,501	116,628	155,009	184,797	55%
Laptops	143,390	166,691	197,974	227,740	240,551	249,415	12%
Other Portables	22,817	34,918	46,038	52,081	60,616	71,278	26%
Non-Smartphones	348,223	504,945	734,534	957,712	1,146,055	1,364,733	31%
M2M	6,871	16,820	47,527	97,702	174,745	288,705	111%

Source: Cisco, 2013

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Printed in USA

FLGD 10855 02/13