

Cisco VNI Service Adoption Forecast, 2013–2018



The [Cisco® Visual Networking Index Services Adoption \(VNI SA\) Forecast](#) provides a unique view into global and regional trends of next-generation end-user services and applications. The study also reviews the underlying addressable markets (subscribers and users) and the relevant devices and connections that support the projections. The forecast provides projections for 24 select end-user application and service penetration rates in three primary user categories: residential, consumer mobile, and business.

What You Will Learn

The Cisco VNI SA Forecast provides a holistic view into global and regional trends of next-generation services and applications across mobile and fixed networks and business and consumer segments. These next-generation services are constantly redefining the manner and devices on which information and content can be accessed, and network requirements and business models for service providers.

Who Can Benefit from This Research?

- **Service providers:** Discover potential network-based monetization opportunities.
- **Businesses:** Improve collaboration and productivity through network resources.
- **Consumers:** Understand the broad range of residential and mobile service options.
- **Media and analysts:** Use and reference our research for your articles and reports.

Overview

The Cisco VNI SA focuses on those services (Figure 1) that have a profitability impact on service provider networks from either their monetization potential or through their network infrastructure provisioning and maintenance cost implications. Service provider networks are essential to the delivery and the optimum end-user experience for all of these services even though the applications or the content might not be provided by the carrier.

Figure 1. Cisco VNI Service Adoption Overview: Selection Criteria

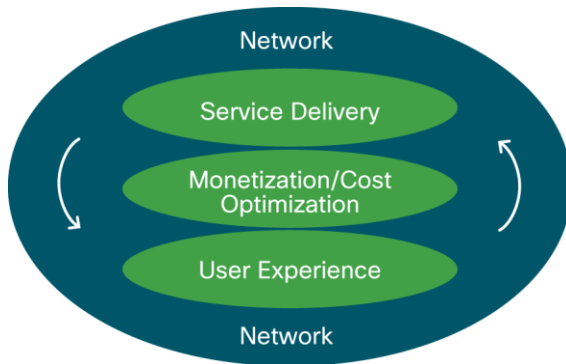


Table 1 lists the 24 services by segment that are covered under this research.

Table 1. Cisco VNI Service Adoption Forecast Categories and Services

Residential Services	Consumer Mobile Services	Business Services
Digital TV	Consumer Multimedia Message Service (MMS)	Room-based videoconferencing
Time-delayed TV	Consumer mobile email	Desktop videoconferencing
Video on demand (VoD)	Mobile gaming	Audio conferencing
Voice over IP (VoIP)	Mobile music	Web conferencing without video
Online gaming	Mobile video	Business IP telephony
Online music	Mobile social networking	Business mobile LBS
Online video	Consumer mobile location-based services (LBS)	Business mobile email
Social networking	Mobile commerce	Business mobile Short Message Service (SMS)

For methodology details, see Appendix A.

For service definitions, see Appendix B.

Global Service Adoption Factors from 2013 to 2018

To fully understand service adoption trends, it is important to assess two main factors that significantly affect the penetration rates of all the services included in this study:

- The growing number of users (residential, mobile, and business) who rely on global network resources
- The increasing number of user devices and machine-to-machine (M2M) nodes that connect to global networks

From a growth perspective, over the 2013 to 2018 forecast period, the total number of global devices and connections (10.7 percent CAGR) will grow faster than the global population (1.1 percent CAGR). Besides acquiring more powerful devices consumers are also using more services and applications, so service adoption growth rates are generally outpacing both population growth and addressable market growth. In both mature and emerging markets, the impact of multiple device ownership and widespread increase in M2M applications are creating both challenges and opportunities for public and private network operators. Herein are some top-level projections to quantify the projected views of global network users and their devices and connections.

Global Population, Households, and Workforce Growth, 2013 to 2018

- Global population is projected to grow from 7.2 billion in 2013 to 7.6 billion by 2018 at a CAGR of 1.1 percent.
- Global households are projected to grow from 2 billion in 2013 to 2.2 billion by 2018 at a CAGR of 1.6 percent.
- Global workforce is projected to grow from 3.2 billion in 2013 to 3.4 billion by 2018 at a CAGR of 1.3 percent.

Global Addressable Markets: Residential, Consumer Mobile, and Business, 2013 to 2018

As the total global population grows, so too do the respective addressable markets for residential consumer mobile and business services:

- Globally, residential Internet users with fixed Internet access will grow from 1.9 billion in 2013 to 2.5 billion by 2018 (5 percent CAGR).
- Globally, the number of TV households will grow from 1.6 billion in 2013 to 1.8 billion by 2018 (1.7 percent CAGR).
- Globally, mobile consumers will grow from 4 billion in 2013 to 4.8 billion by 2018 (3.6 percent CAGR).
- Globally, business Internet users will grow from 1.5 billion in 2013 to 2.1 billion by 2018 (6.7 percent CAGR).
- Globally, business mobile users will grow from 526 million in 2013 to 582 million by 2018 (2.1 percent CAGR).

Global Devices and Connections, 2013 to 2018

Following are projections for global devices and connections supported by mobile and fixed networks and including both the consumer and business segments:

- Globally, total mobile and fixed devices and connections (including M2M) will grow from 12.4 billion in 2013 to 20.6 billion by 2018 (10.7 percent CAGR).
- Globally, fixed Internet residential devices and connections will grow from 3.8 billion in 2013 to 7.9 billion by 2018 (15.9 percent CAGR).
- Globally, mobile Internet consumer devices and connections will grow from 6.1 billion in 2013 to 8.9 billion by 2018 (7.7 percent CAGR).
- Globally, business Internet fixed and mobile devices and connections (including M2M connections) will grow from 2.5 billion in 2013 to 3.9 billion by 2018 (9.3 percent CAGR).

Global Service Adoption Forecast Highlights

Residential Services

- Social networking was the service with the highest penetration in 2013 (1.3 billion users; 67 percent of residential Internet users).
- Online video will be the most highly adopted service by 2018. It will also be the fastest growing residential Internet service, growing from 1.2 billion users in 2013 to 1.9 billion users by 2018 (9.7 percent CAGR).
- Globally, digital TV will grow from 1.0 billion households in 2013 to 1.5 billion households by 2018 (8.1 percent CAGR).
- Globally, time-delayed TV service (personal/digital video recorder [PVR/DVR]) will be the fastest-growing digital TV service, growing from 131 million subscribers in 2013 to 198 million subscribers by 2018 (8.6 percent CAGR).
- Globally, video on demand (VoD) will grow from 306 million subscribers in 2013 to 451 million subscribers by 2018 (8.1 percent CAGR).

For detailed global residential services adoption data, see Appendix E.

Mobile Consumer Services

- Globally, consumer mobile LBS will be the fastest-growing consumer mobile service, growing from 236 million users in 2013 to 1.1 billion users by 2018 (36 percent CAGR).
- Globally, mobile social networking will continue to be the consumer mobile service with the highest penetration in both 2013 and 2018. In 2013, there were 1.1 billion users (29 percent of consumer mobile users), increasing to 3.1 billion users (64 percent of consumer mobile users) by 2018 (21.7 percent CAGR).
- Globally, the consumer mobile segment has seven services with CAGRs exceeding 20 percent over the forecast period (2013 to 2018).

For detailed global consumer mobile services adoption data, see Appendix E.

Business Services

- Globally, desktop videoconferencing will be the fastest-growing service, with 37.4 million users in 2013, increasing to 238.3 million users by 2018 (44.8 percent CAGR).
- Globally, web conferencing without video will decline from 18 million in 2013 to 17 million by 2018 (-1.2 percent CAGR).
- Globally, business mobile LBS is the fastest-growing business mobile service at 24.9 percent CAGR.

For detailed global business services adoption data, see Appendix E.

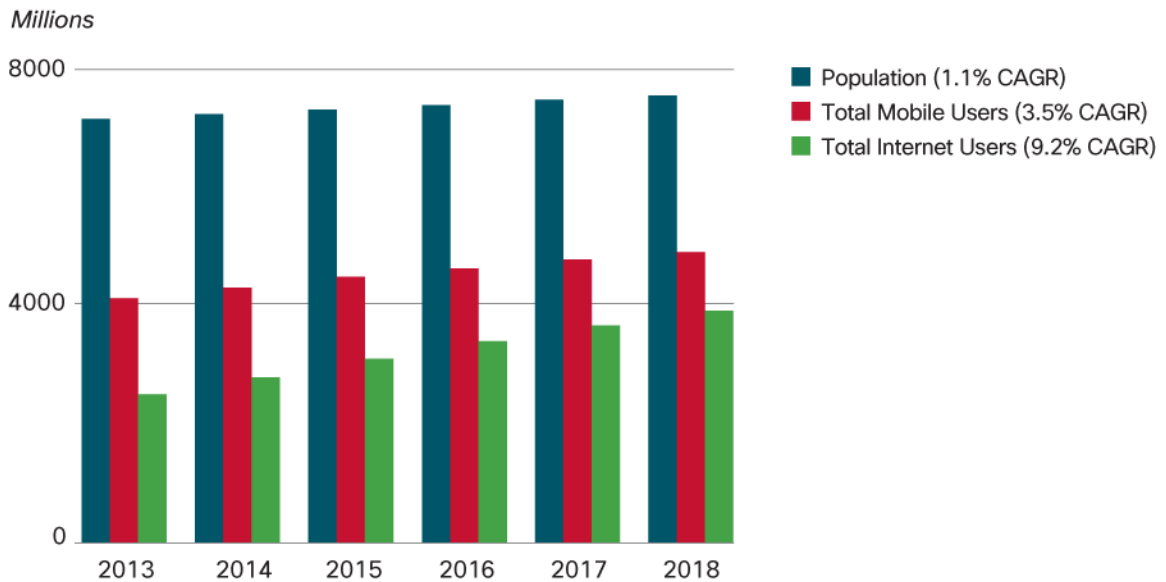
Top Cisco VNI Service Adoption Forecast Findings and Trends (2013–2018)

1. Macro Trends

A. Global Internet Users and Mobile Users Continue to Outpace Population Growth

The global population is projected to grow at 1.1 percent CAGR from 2013 to 2018. This modest growth continues to be superseded by growth in Internet users (fixed and mobile) and total mobile users (Figure 2). By 2018, over half, or 52 percent, of the population will have Internet access, up from 35 percent in 2013. This increase represents a CAGR of 9.2 percent from 2013 to 2018. Globally, 58 percent of the population had mobile access in 2013, and that percentage will grow to 65 percent by 2018.

Figure 2. Growth in Global Internet Users and Mobile Users Outpaces Population

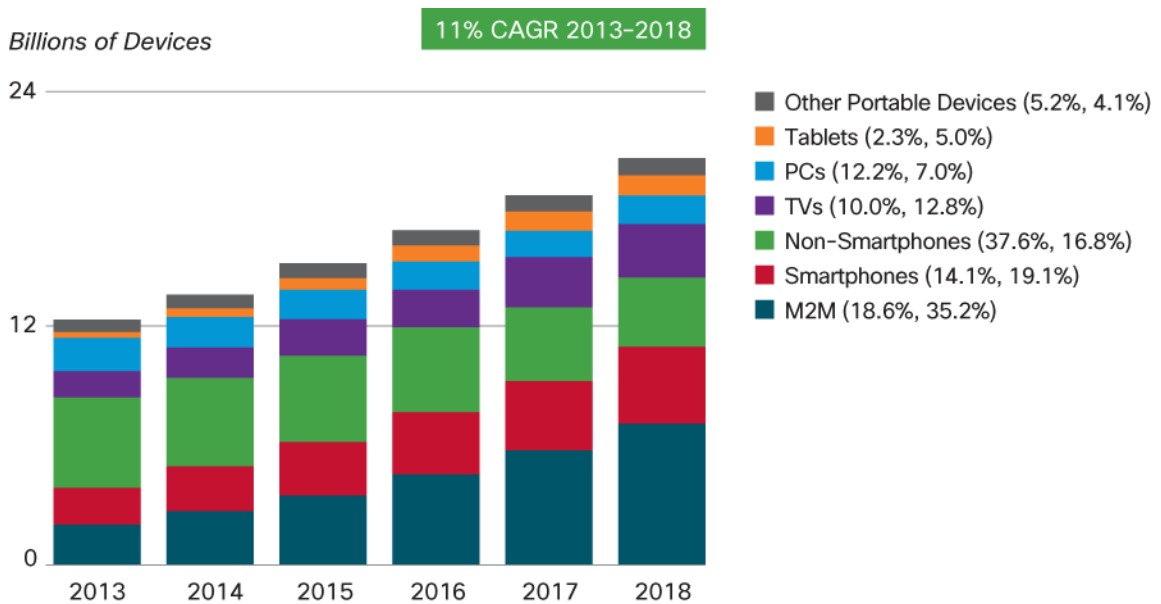


Source: Cisco VNI Service Adoption Forecast, 2013–2018

B. Smart Devices and Connections Proliferation

Globally, devices and connections (10.7 percent CAGR) are growing faster than both the population (1.1 percent CAGR) and Internet users (9.2 percent CAGR). See Figure 3. This trend is accelerating the growth in the average number of devices and connections per household and per Internet user. Each year, various new devices in different form factors with increased capabilities and intelligence are introduced and adopted in global markets. A growing number of M2M applications, such as smart meters, video surveillance, healthcare monitoring, transportation, and package and asset tracking, also are driving connection growth.

Figure 3. Global Devices and Connections Growth



Source: Cisco VNI Service Adoption Forecast, 2013-2018

The percentages in parentheses next to the legend denote the device share for the years 2013 and 2018, respectively.

Tablets are the fastest-growing device category with 29 percent CAGR (3.6-fold growth) over the forecast period, followed by machine-to-machine (M2M) connections with a 26 percent CAGR (threefold growth). Device categories such as non-smartphones are actually going to experience a decline over the forecast period, increasingly being replaced by smartphones, which will more than double at an 18 percent CAGR over the forecast period. Connected TVs, which includes flat-panel TVs, set-top boxes (STBs), digital media adapters, Blu-ray disc players, and gaming consoles, will double to 2.6 billion by 2018. PCs will also decline by 1 percent CAGR over the forecast period. This decline is more pronounced in Western Europe and North America. More tablets than laptops will be in use by the end of 2018.

Consumer share of the total devices will be about 80 percent, with business claiming the remaining 20 percent. Consumer share will grow slightly faster at an 11 percent CAGR relative to the business segment, which will grow at a 9 percent CAGR.

Globally, the average number of devices and connections per capita will grow from 1.7 in 2013 to 2.7 by 2018 (Table 2).

Table 2. Average Number of Devices and Connections per Capita

	2013	2018	CAGR
Asia Pacific	1.41	2.24	9.7%
Central and Eastern Europe	2.10	3.39	10.1%
Latin America	1.75	2.58	8.1%
Middle East and Africa	0.92	1.28	6.7%
North America	5.34	9.26	11.7%
Western Europe	3.89	6.52	10.9%
Global	1.73	2.73	9.5%

Source: Cisco VNI Service Adoption Forecast, 2013-2018

Considering the number of devices and connections per internet user, the averages are even higher, growing from 4.91 in 2013 to 5.27 by 2018, globally (Table 3).

Table 3. Average Number of Devices and Connections per Internet User

	2013	2018	CAGR
Asia Pacific	4.45	4.34	-0.5%
Central and Eastern Europe	4.51	4.86	1.5%
Latin America	4.59	4.51	-0.4%
Middle East and Africa	5.95	4.57	-5.1%
North America	6.61	10.81	10.4%
Western Europe	5.02	7.97	9.7%
Global	4.91	5.27	1.4%

Source: Cisco VNI Service Adoption Forecast, 2013-2018

Interestingly, over the forecast period, some emerging economies now have a lower average of devices and connections per Internet user than in the past. This is because in these regions the growth of Internet users is outpacing growth in devices and connections. It's also because of affordability, or the availability of disposable income to purchase multiple devices and connections. Even with this constraint, the average number of devices and connections per Internet user in these regions is much higher than one. In mature economies such as North America and Europe, where Internet access as a percentage of the population is already very high, the growth in network services and demand comes mainly from growth in the number of devices and connections and their evolution toward more advanced multimedia features.

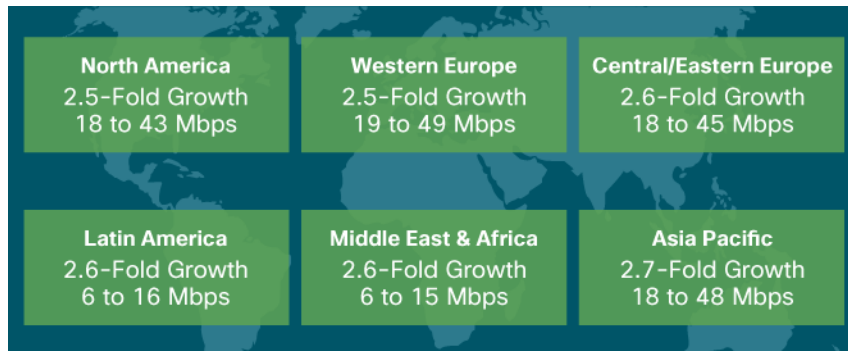
C. Increasing Network Speeds Enable Multimedia Services

Average network speeds, are expected to increase significantly during the forecast period. Faster network speeds, combined with lower latencies and enhanced device capabilities, act as enablers for the growth of interactive and multimedia services such as video streaming and video communications.

Wired (Fixed) Speeds

Globally, the average fixed broadband speed will grow 2.6-fold from 2013 to 2018, from 16 Mbps to 42 Mbps. Western Europe will experience the fastest average speed of 49 Mbps by 2018, and Asia Pacific will have the greatest average speed increase, 2.7-fold growth by 2018 with fixed speeds reaching 48 Mbps by 2018. See Figure 4.

Figure 4. Global Fixed Broadband Speed Growth

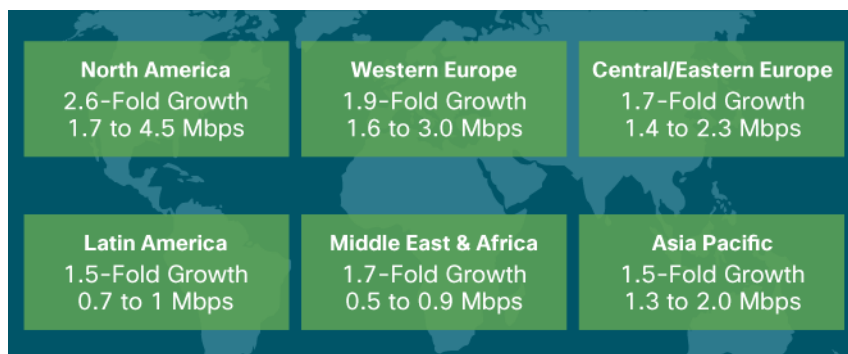


Source: Cisco VNI Global IP Traffic Forecast, 2013-2018

Mobile Speeds

A crucial factor promoting the increase in mobile speeds over the forecast period is the increasing proportion of fourth-generation (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. See Figure 5.

Figure 5. Global Mobile Speed Growth



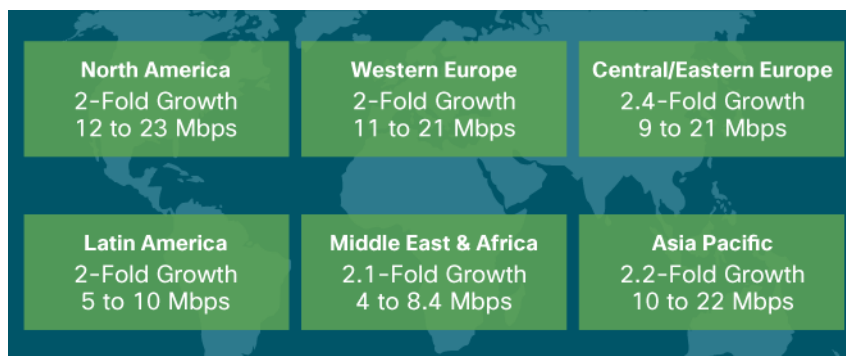
Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013-2018

Globally, mobile network connection speeds will nearly double by 2018. The average mobile network connection speed (1.4 Mbps in 2013) will increase to 2.5 Mbps by 2018. North America will have the highest average mobile speed (4.5 Mbps) by 2018 along with the fastest growth (2.6-fold) from 2013 to 2018.

Wi-Fi Speeds from Mobile Devices

Historically, the IEEE 802.11 and 802.11b standards were the early types of Wi-Fi technologies. These access sources provided speeds from 2 to 11 Mbps, when Internet text browsing and email was made available wirelessly. The 802.11g/a standard, which is the third generation of the Wi-Fi standard, brought a maximum data rate of 54 Mbps, creating use cases with richer web experiences. The 802.11n standard, which was ratified in 2007, provides a much higher range of speeds with the maximum of 600 Mbps (prevalent speeds are much lower). This standard supports medium-resolution video streaming because of higher throughput. The latest standard, 802.11ac with theoretical speeds of 3.6 Gbps, is considered a true wired complement and can enable higher-definition video streaming and services that require higher data rates.

Figure 6. Global Wi-Fi Speed Growth



Source: Cisco VNI Global IP Traffic Forecast, 2013–2018

Globally, Wi-Fi connection speeds originated from dual-mode mobile devices will more than double by 2018. The average Wi-Fi network connection speed (10 Mbps in 2013) will exceed 21 Mbps by 2018. North America will experience the highest mobile Wi-Fi speeds of 23.2 Mbps by 2018, and the Central and Eastern Europe region will have the highest Wi-Fi speed growth (2.4-fold) by 2018, reaching nearly 21 Mbps. See Figure 6.

The combination of increased network connectivity; proliferation of more powerful, full-featured devices; and faster network speeds encourages users to adopt real-time and multimedia communication applications as well as video-based entertainment and information services.

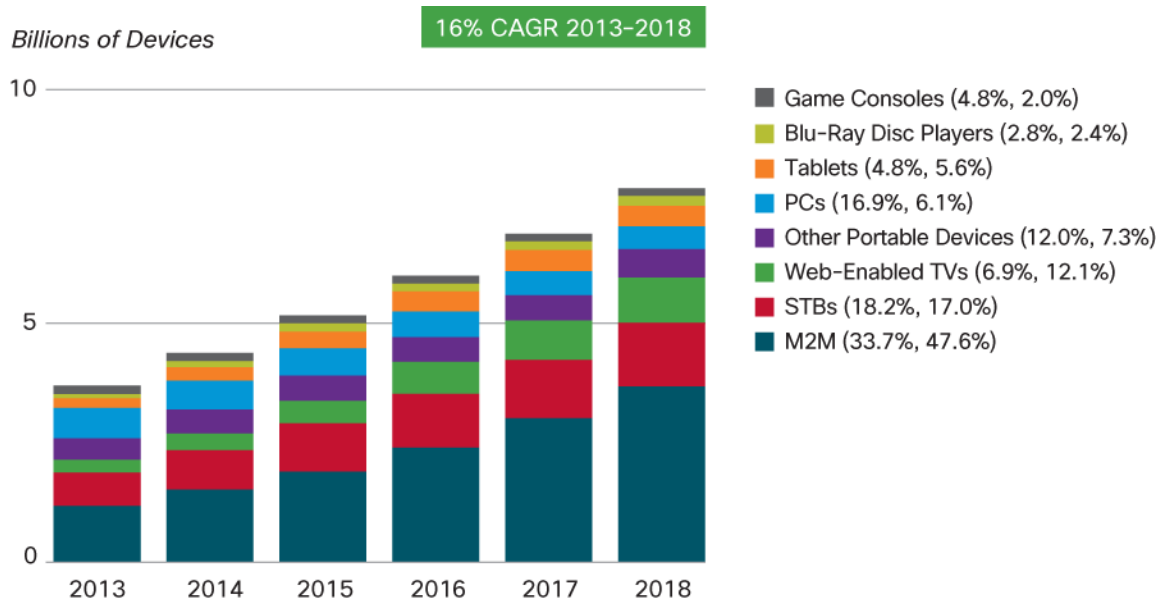
2. Residential Segment Trends

In this segment, we look at services and devices and connections that rely on fixed network connectivity to the consumer or residential segment. Mobile consumer services and devices and connections are covered separately in the consumer mobile segment.

A. Proliferation of Devices and Connections per Household

The total number of global fixed consumer devices and connections relevant to the residential segment will grow from 3.8 billion in 2013 to 7.9 billion by 2018 (15.9 percent CAGR). M2M connections, included in this total, will grow nearly threefold from 1.3 billion in 2013 to 3.8 billion by 2018. See Figure 7.

Figure 7. Global Residential Devices and Connections Growth



Source: Cisco VNI Service Adoption Forecast, 2013-2018

The percentages in parentheses next to the legend denote the device share for the years 2013 and 2018, respectively.

Web-enabled TVs will grow the fastest at a 30 percent CAGR (3.7-fold), increasing from 260 million in 2013 to 957 million by 2018. M2M connections will grow nearly threefold during the forecast period at a 24 percent CAGR to 3.8 billion connections by 2018. Tablets are going to grow 2.5-fold (20 percent CAGR).

Residential PCs will experience a 6 percent CAGR decline over the forecast period. Game consoles will also face a 2 percent CAGR decline over the forecast period. In Appendix F, see excerpts from the Digital Home Survey, 2014, conducted by the University of Southern California Communication Technology Management, which highlights the changing landscape of residential Internet device ownership in the United States and Canada.

Since the growth of residential devices and connections is faster than household growth (1.6 percent CAGR), globally, the number of devices and connections per household will nearly double from 1.9 in 2013 to 3.7 by 2018 (14 percent CAGR). See Table 4.

Table 4. Average Number of Devices and Connections per Household

	2013	2018	CAGR
Asia Pacific	1.3	2.7	15.4%
Central and Eastern Europe	1.3	3.1	19.5%
Latin America	1.5	3.1	16.3%
Middle East and Africa	0.3	0.6	19.6%
North America	7.9	14.4	12.7%
Western Europe	4.2	7.6	12.7%
Global	1.9	3.7	14.1%

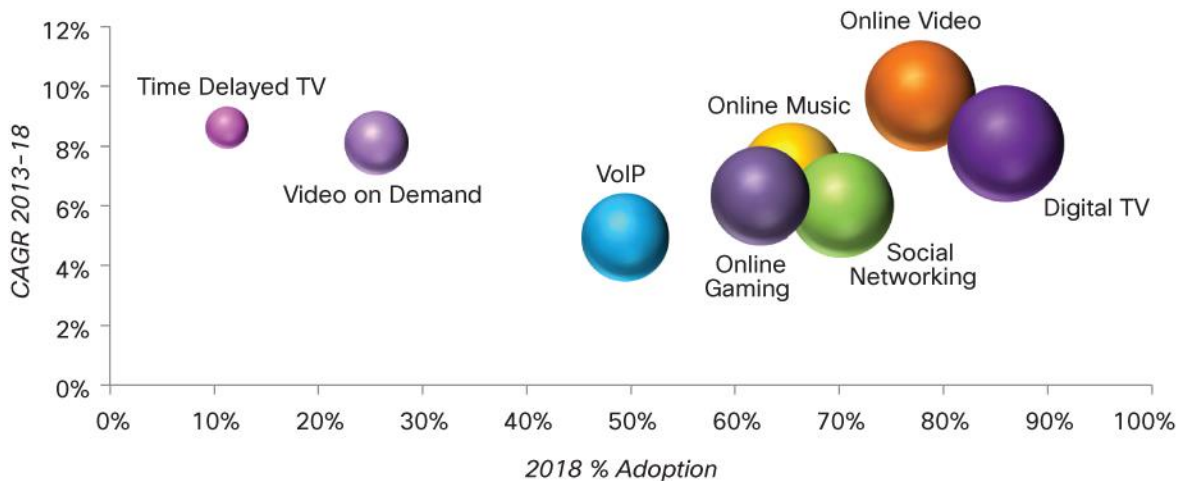
Source: Cisco VNI Service Adoption Forecast, 2013-2018

The average number of devices and connections does not include consumer mobile devices and connections that could potentially connect to a residential fixed network through Wi-Fi connectivity. If those mobile devices and connections were included in this analysis, the averages in Table 4 would be even higher.

B. Residential Services: Video Continues to Grow

Between 2012 and 2013, the highest growth happened on the Internet side in online video with 16 percent year-over-year growth. On the TV side, VoD grew 17 percent and digital TV and PVR services grew at 15 percent. See Figure 8.

Figure 8. Global Residential Services Adoption and Growth



Source: Cisco VNI Service Adoption Forecast, 2013-2018

Note: By 2018, the global residential fixed Internet population will be 2.5 billion; the number of global TV households will be 1.8 billion.

By 2018, digital TV and online video will be the two most highly penetrated services, 86 percent and 78 percent respectively. The fastest growth will come from online video (10 percent CAGR). Online music and video are both driven by cloud-based personal storage and sharing sites, in addition to both copyrighted and user generated content use.

Among the digital TV services, time-delayed or DVR/PVR service will grow the fastest at a 9 percent CAGR.

For details on other regions, visit the [VNI SA Highlights Tool](#).

For details on all services shown in Figure 8, see Appendix B.

C. Residential Segment: Implications and Opportunities

In summary, the number of devices and connections in the residential segment is increasing. Also, a preference for mobility, or Wi-Fi connectivity, is increasing, with significant growth of portable devices. These factors have led to an increased demand on service provider networks and infrastructure, creating a growing need to monetize these demands for carrier solvency.

Network service providers are in a unique position to translate this network demand into new revenue streams. They can do so by:

- Extending content and service reach across new devices and connections. For example, [Orange's Content Everywhere](#) service is an integrated TV and video service across TV, PC, and mobile devices (where feasible). Orange acquires premium content rights and takes full advantage of its acquired content expertise, operations/business support systems (OSS/BSSs), and R&D assets to build custom offerings (on an increasingly unified platform) for different devices.

Another example is [Du's digital content strategy](#) that supports both fixed and mobile communication devices through internet TV service, reaching a large audience.

Service providers can also offer cloud services, such as personal storage lockers, to help customers access and use content across devices and networks. An example is [KT's ucloud](#) offer to consumers, (Olleh Home). Service pricing is based on data storage tiers ranging from 20 to 300 GB. Existing KT broadband or mobile subscribers receive discounted pricing when signing up for the cloud service, and users gain additional storage capacity after referring new subscribers.

- Blending walled services with online services. For example, [BSkyB's multiscreen TV](#) service allows existing clients to access content on other screens such as a second TV screen using an Xbox console, a PC, or a mobile phone. BSkyB offers value-added features such as remote record functionality through the user's mobile phone. For customers who cannot access Sky's content through satellite or cable networks, they can instead gain access by using a PC, Xbox, or dedicated STB such as Fetch TV.

As digital television service adoption rates climb, service providers can monetize this platform further by offering or bundling value-added services, such as VoD and PVR/DVR services. As an example, [Telstra is doing this through its T-Box service](#), which is an effort to capture a major share of the Australian VoD market through pricing and content differentiation.

- Forming new business partnerships and creating new eco-systems for mutual profitability. An example is the 2014 partnership with Netflix by both Comcast and Verizon). Netflix has entered into a deal with Comcast and Verizon whereby Netflix will pay to get direct access to the ISP network, which helps to improve the viewing experience for video streaming customers. These partnerships will be even more significant when ultra-high-definition (UHD) or 4K video streaming becomes more popular.

[Telia's partnership with Spotify](#) is another such example of mutually beneficial partnership that provides exclusive music service on Telia's STB.

- Developing Wi-Fi and mobility plans. With customers' increased need for portability and desire to use Wi-Fi to save mobile data usage charges when possible, service providers have an opportunity to develop Wi-Fi offers. In the United States, for example, Comcast and other providers are aggressively offering paid and unpaid Wi-Fi connectivity to their customers. This creates an additional revenue stream when offered as a paid service and greater customer loyalty when offered as an unpaid customer perk. Comcast has also entered into Wi-Fi roaming deals with cellular providers.
- Bolstering a service portfolio with value-added Internet of Everything (IoE) or M2M applications. The proliferation of residential M2M connections creates new monetization opportunities for service providers. These include video surveillance and other smart home service offers. In the United States, AT&T ([Digital Life](#)), Comcast ([XFINITY Home](#)), and other providers offer home automation and security services to broadband customers.

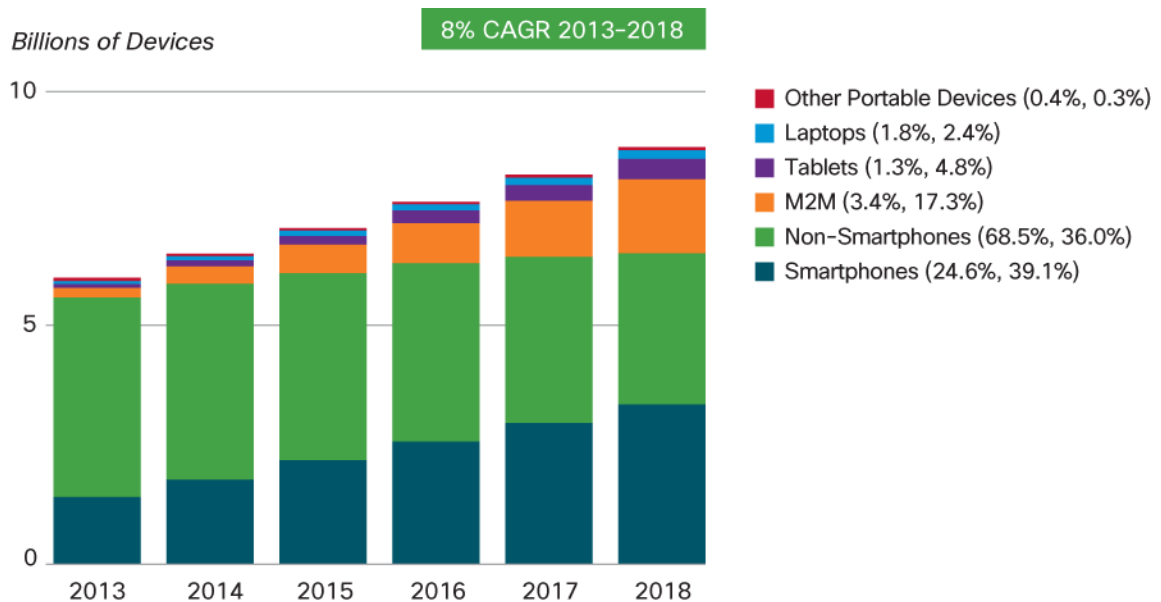
3. Consumer Mobile Segment Trends

This segment focuses on consumer mobile services, devices, and connections.

A. Proliferation of Devices and Connections per Mobile Consumer

The total number of global consumer mobile devices and connections will grow from 6.1 billion in 2013 to 8.9 billion by 2018 (8 percent CAGR). See Figure 9.

Figure 9. Global Consumer Mobile Devices and Connections Growth



Source: Cisco VNI Service Adoption Forecast, 2013-2018

The percentages in parentheses next to the legend denote the device share for the years 2013 and 2018, respectively.

Smartphones will have the largest device share by 2018, overtaking non-smartphones by 2018. There will be 3.5 billion consumer smart phones by 2018, up from 1.5 billion in 2013. M2M will grow the fastest at 49 percent CAGR (7.3-fold), from 211 million in 2013 to 1.5 billion in 2018. Tablets will grow 5.5-fold during the forecast period at 40 percent CAGR. By 2018, consumer mobile tablets (429 million) will be more than double the number of consumer mobile laptops (212 million).

Non-smartphones will decline 5 percent over the forecast period, reducing from 4.2 billion in 2013 to 3.2 billion by 2018.

Since the growth of consumer mobile devices and connections at an 8 percent CAGR is faster than the growth of mobile consumers (3.6 percent CAGR), globally, the number of devices and connections per mobile consumer will grow from 1.5 in 2013 to 1.8 by 2018 (3.9 percent CAGR). See Table 5.

Table 5. Average Number of Devices and Connections per Mobile Consumer

	2013	2018	CAGR
Asia Pacific	1.5	1.7	3.3%
Central and Eastern Europe	1.6	1.9	4.5%
Latin America	1.5	1.8	3.1%
Middle East and Africa	1.7	1.9	2.4%
North America	1.4	2.0	8.3%
Western Europe	1.6	2.4	8.7%
Global	1.5	1.8	3.9%

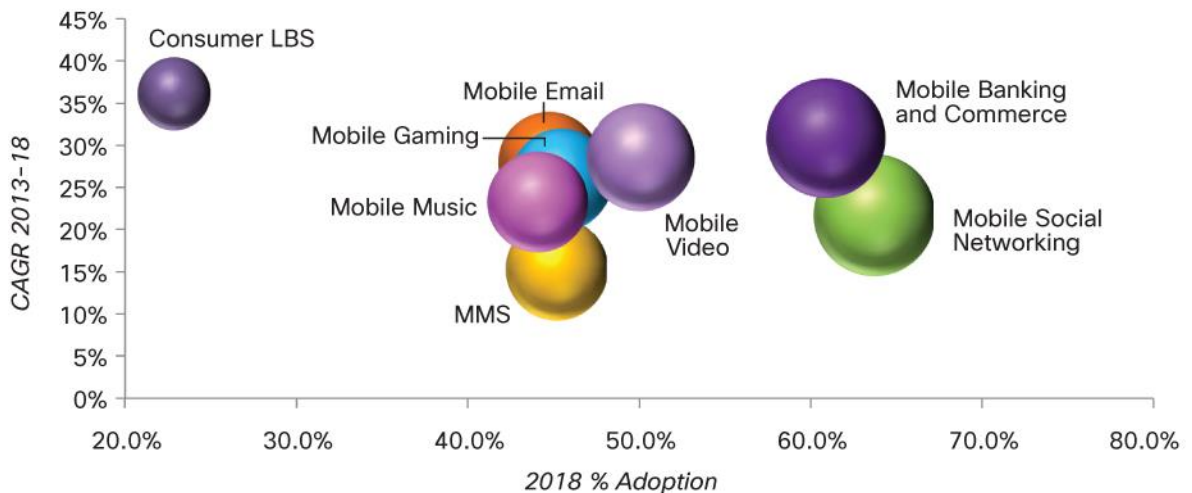
Source: Cisco VNI Service Adoption Forecast, 2013-2018

Note that many regions have higher device-to-user ratios for this segment than for the residential segment especially in 2013. This is an indicator of how those economies are bridging the fixed network infrastructure gap through mobile network expansion.

B. Consumer Mobile Services

Between 2012 and 2013, all the services grew more than 20 percent year over year (Figure 10). The highest growth was in consumer LBS with year-over-year growth of 81 percent, although from a very small base of 130 million users in 2012 to 236 million in 2013. Other significant year-over-year growth was in mobile banking and commerce (61 percent) followed by mobile video (59 percent). The Middle East and Africa had the largest growth at 112 percent, more than doubling the online video users from 14 million to 30 million.

Figure 10. Global Consumer Mobile Services Adoption and Growth



Source: Cisco VNI Service Adoption Forecast, 2013-2018

Note: By 2018, the global consumer mobile population will be 4.8 billion.

From 2013 to 2018, seven out of eight consumer mobile services will grow at more than 20 percent CAGRs, and two will grow at more than 30 percent CAGRs. The fastest growth will be in consumer LBS (36 percent), followed by mobile commerce (31 percent). Regions that are really driving mobile commerce growth are Latin America, Asia Pacific, and Middle East and Africa, which have been historically underserved (or not reached) by traditional brick-and-mortar financial institutions.

For details on other regions, visit the [VNI SA Highlights Tool](#).

For details on all services shown in the figure above, see Appendix B.

C. Consumer Mobile Segment: Implications and Opportunities

The main takeaways of this segment are similar to the residential segment. The number of devices and connections with enhanced features and computing are increasing, and a preference for seamless handoffs between fixed and mobile networks is also increasing. While enhanced device functionality creates demand for faster mobile networks, the prevalence of data cap plans is creating demands for Wi-Fi connectivity for offload purposes. As service providers invest in their mobile networks and infrastructure to meet these growing demands, they also have a growing need to monetize their investments.

The consumer mobile segment provides the following opportunities for service providers:

- Extending the reach of traditional or brick-and-mortar services. Mobile network providers are in a position to form unique partnerships and create new ecosystems to bring services, such as banking and commerce, healthcare, and more, to underserved populations. An example is the [EcoCash service from Econet Wireless in Zimbabwe](#). EcoCash offers basic person-to-person (P2P) money transfers to enhanced mobile wallet services, to banking or nonbanking customers.

Another example is [QTel's Mobile Money Service](#), a mobile money service offered to customers without access to traditional banking facilities in collaboration with financial institutions, including the Qatar National Bank. Customers can transfer money domestically and overseas, make utility bill and credit card payments, and complete merchant transactions.

- Bridging information or infrastructure gaps. Mobile providers are not only filling network infrastructure gaps in many regions and countries, but they are also in a position to address the local needs of unserved and underserved markets in an affordable way while creating increased revenue streams for themselves. An example of this innovative approach of fulfilling a need while creating monetization is TIM Brasil's Seguro Proteção Premiada micro-insurance service, which provides personal accident insurance coverage to low-income customers in the country.

Another example is [Tawk2Me \(T2M\)](#), a voice-driven social messaging service developed by T2M Communications and given its debut launch by mobile operator MTN in Swaziland in February 2013. T2M Communications provides a social messaging experience to Africa, which has limited infrastructure and technology to support it (not to mention literacy is still a major challenge in many countries). The solution is a voice-based messaging service available on even the most basic phone.

In yet another example, [Roshan, a mobile provider in Afghanistan, offers Malomat](#), a mobile-based agriculture information service. Local farmers, suppliers, traders, and wholesalers gain access to agricultural commodity pricing, and supply and demand information via SMS and interactive voice response (IVR). Customers pay regular message or airtime charges for SMS requests, alerts, or IVR calls to and from the service.

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- Instituting shared data plans. When considering multiple mobile device users in particular, service providers are looking for new ways to bundle and price services to satisfy existing customer expectations and attract new subscribers. For example, [Verizon Wireless's "Share Everything"](#) mobile data plans allow customers to share a data allowance among up to 10 devices on one account. From the provider's perspective, the shared-plan model shifts the customer engagement focus from subscription connectivity to account connectivity, with opportunities to increase average revenue per account (ARPA), strengthen user loyalty, and move customers to higher efficiency and more profitable LTE networks. For customers, this type of offering gives them an integrated customer interface to simplify device management, a wider choice of popular devices, and options to cost-effectively upgrade devices and service levels.
 - Blending with online services and content. Service providers can offer exclusive content to their mobile customers, either on multiple screens or multiple devices. Or, if they have both fixed networks and mobile networks, they can offer exclusive content across both networks, thus giving their customers a seamless experience. The partnership between [NTT DOCOMO and DeNA for Mobage Social Mobile Gaming](#) illustrates how operators can introduce a new revenue stream, reduce churn, and gain new subscribers by offering access to exclusive content in the highly competitive gaming market.
 - Developing or monetizing Wi-Fi offers. Several mobile providers, particularly those with a fixed network as well, provide a higher number of Wi-Fi points to their customer base. This way they can offload some traffic from the more expensive mobile networks to their less expensive fixed networks while maintaining customer satisfaction. Customers are also happy as the Wi-Fi helps them to optimize their data usage on tiered data plans.

An example of deploying Wi-Fi service for increased customer satisfaction and retention is the service offered by Sweden's Tele2. [Tele2 has launched +46 VoIP applications](#), allowing its Swedish customers to make and receive calls while traveling without incurring roaming charges. Customers using the app rely on Wi-Fi-based Internet access to make and receive calls when they are outside Sweden.

- Planning for the peak. Mobile operators plan their networks for peak usage or congestion so they can help ensure an optimum experience for their user base on an equitable basis. For this they do employ various traffic management (transcoding and optimizing) techniques in addition to tiered pricing, additional allowances for off-peak usage, and Wi-Fi offloading.
- Bolstering service portfolios with value-added Internet of Everything (IoE) and M2M applications. Mobile service providers can also offer M2M services. Some M2M applications do not require super low latency and high bandwidth or the enhanced intelligence of 4G or LTE networks and can be run on 2G and 3G networks. AT&T's offer of FiLIP, a wearable smart locator for kids, is an example of a current consumer M2M application.

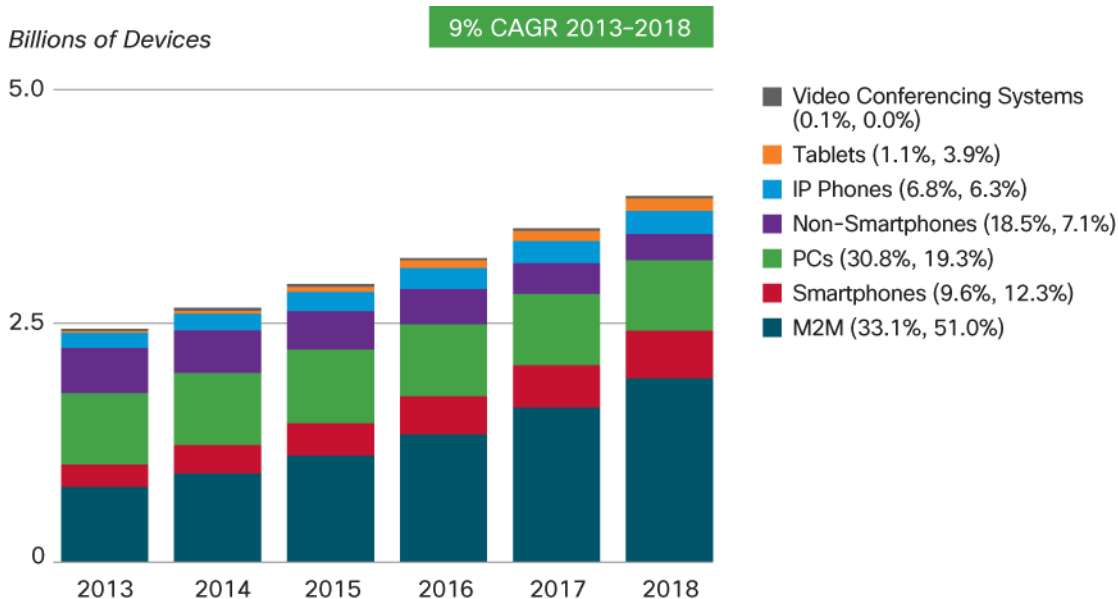
4. Business Segment Trends

This segment focuses on business Internet and mobile services, devices, and connections.

A. Proliferation of Business Devices and Connections

The total number of global business devices and connections will grow from 2.5 billion in 2013 to 3.9 billion by 2018 (9.3 percent CAGR). Included in this total are business mobile devices and connections, which will grow from 878 million in 2013 to 1.4 billion by 2018 (a 9.2 percent CAGR). See Figure 11.

Figure 11. Global Business Devices and Connections Growth



Source: Cisco VNI Service Adoption Forecast, 2013-2018

The percentages in parentheses next to the legend denote the device share for the years 2013 and 2018, respectively.

M2M will have the largest device share by 2018, growing 2.4-fold (19 percent CAGR) from 820 million in 2013 to nearly 2 billion by 2018. Smartphones will double from 237 million in 2013 to 474 million by 2018. PCs will decline slightly from 762 million in 2013 to 746 million by 2018. PCs are increasingly being replaced by tablets. Tablets will be the fastest growth category, growing at a 40 percent CAGR or 5.3-fold from 2013 to 2018. Non-smartphones will decline 10 percent over the forecast period, reducing from 459 million in 2013 to 274 million by 2018.

Globally, the number of devices and connections per business Internet user will grow from 1.6 in 2013 to 1.8 by 2018 (2.4 percent CAGR). See Table 6.

Table 6. Average Number of Devices and Connections per Business Internet User

	2013	2018	CAGR
Asia Pacific	1.34	1.38	0.6%
Central and Eastern Europe	1.88	2.12	2.4%
Latin America	1.36	1.45	1.3%
Middle East and Africa	0.76	0.80	1.2%
North America	3.15	4.88	9.2%
Western Europe	2.91	4.13	7.2%
Global	1.63	1.84	2.4%

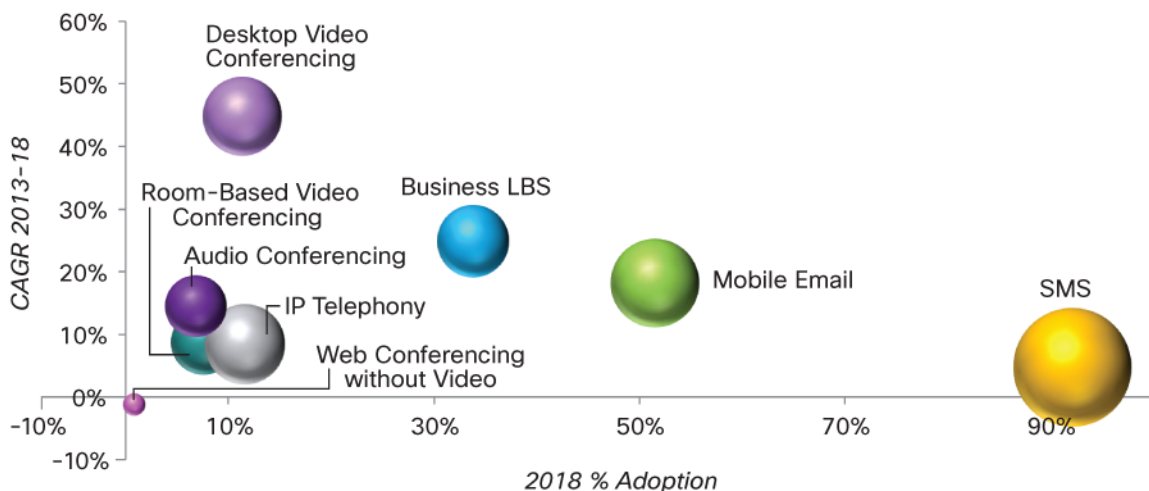
Source: Cisco VNI Service Adoption Forecast, 2013-2018

The highest average number of devices and connections per business Internet user is in North America, followed by Western Europe. Other regions, such as the Middle East and Africa, Asia Pacific, and Latin America, have a much lower average, because many devices and connections are shared across multiple business users in those regions.

B. Business Services

Between 2012 and 2013, the highest year-over-year growth was in business LBS (47 percent), growing from 44 million users in 2012 to 65 million in 2013. Other significant year-over-year growth was in desktop videoconferencing (44 percent). See Figure 12.

Figure 12. Global Business Services Adoption and Growth



Source: Cisco VNI Service Adoption Forecast, 2013-2018

Note: By 2018, the global business Internet population will be 2.1 billion; the number of business mobile users will be 582 million.

The business LBS category includes location services used by business subscribers in which the subscription is generally paid for by the employer. As such, it includes but is not limited to services such as sales-force and field-force automation, fleet management, etc.

This year's study suggests lower growth in room-based videoconferencing users. Single-codec videoconferencing systems grew, but with the exception of Latin America, all regions experienced a decline in executive conferencing systems and multicodec systems. Multicodec systems are typically fully managed and as such are expensive to keep and operate. As unit sales drop, so does the network of units to connect to, and therefore, usage may be limited. Low-use systems are decommissioned over time due to the high fixed cost of maintaining these systems.

From 2013 to 2018, the fastest-growing business service is expected to be desktop or personal videoconferencing. The growth of personal videoconferencing, specifically unified communications-based videoconferencing, has recently accelerated due to the higher quality and lower price of new services and products, and also due to the availability of desktop videoconferencing offers, which can stand alone or be integrated. Also, the growth of mobile clients is going to support videoconferencing growth. Conversely, the use of web conferencing without video will show a decline of 1 percent CAGR over the forecast period.

For details on other regions, visit the [VNI SA Highlights Tool](#).

For details on all services shown in Figure 12, see Appendix B.

C. Business Segment: Implications and Opportunities

The dynamics of business segment market can be summarized as:

- A market with more and new devices and connections that are also leading to a growing demand for the bring-your-own-device (BYOD) trend
- The above trend also underlines heightened requirements for premium security.
- Growing demand for service transition from fixed to mobile
- Growth of business M2M connections

The above trends have given rise to the following opportunities for service providers serving this segment:

- Enhance productivity and customer support. Service providers can provide optimized network services such as videoconferencing to help businesses increase employee productivity. Videoconferencing also enhances business productivity through better partner and customer interaction. As an example, [T-Systems offers Cross Company Exchange Platform \(CCEP\)](#), a centralized services suite for corporate videoconferencing, unified communications, and collaboration that helps enterprises reduce IT costs. CCEP services are designed for different types of corporate environments with key differentiators in solution interconnectivity, support for any device, and global services availability.
- Offer cloud services and storage. The BYOD trend, the need to reduce costs, and the evolution of virtualization technologies have created a viable market for cloud services. Because service providers own the network, they are well-positioned to deploy such services. [Telstra's cloud service](#) offer includes infrastructure as a service (IaaS), software as a service (SaaS), and unified communications as a service (UCaaS). This model provides a good example of how service providers can use cloud to monetize their networks.
- Offer IoE and M2M services. Our forecast projects that by 2018, M2M connections will be more than half of business devices and connections. Service providers can capitalize on this monetization opportunity by offering industry-specific M2M services. [VimpelCom is taking a leading role in developing M2M market in Russia](#). VimpelCom provides basic, low-cost connectivity to entry-level customers, while offering more complex, packaged solutions to customers who require additional development or management support. Through its new, value-added M2M services, VimpelCom aims to raise subscriber numbers as well as the average revenue per user (ARPU).

Conclusion

The proliferation of devices in consumer and business segments sets the stage for the adoption of services and applications. Although new services and applications emerge, increased adoption of existing services occurs as well. The adoption of services is influenced by a region's network readiness, physical and infrastructural resources, regulatory environment, and cultural preferences.

The popularity of anchor services, such as digital television, creates opportunities for the growth of ancillary services, such as VoD and PVR. And because customers want to access content ubiquitously, they are interested in and willing to pay for services offered on various platforms and devices. In response, some global providers offer "everywhere TV" services, making TV content available on PCs and smartphones alike, with growing integration with social media.

With the higher adoption of mobile devices comes the added requirement for providers to offer cross-device access to user content in a highly secure manner. Especially since advanced network services such as mobile banking and commerce are among the fastest-growing consumer mobile services.

Growth in video services is not limited to just consumer or residential segments but is becoming more pervasive in business environments as well, as seen in the growth trends for adoption of desktop videoconferencing services. Web conferencing without video is giving way to increased adoption of conferencing with video. As businesses deploy next-generation networks, videoconferencing is increasingly becoming a viable option for increasing employee productivity and reducing business travel expenses.

New business models and ecosystems are being created for support and monetization of these varied services, as showcased in several Cisco VNI SA case studies. For a detailed view of the addressable market and service adoption growth, visit [Cisco VNI SA Highlights Tool](#) and [Cisco VNI SA Graphing Tool](#). Inquiries can be directed to ask-vnisa@cisco.com.

Appendix A: Methodology

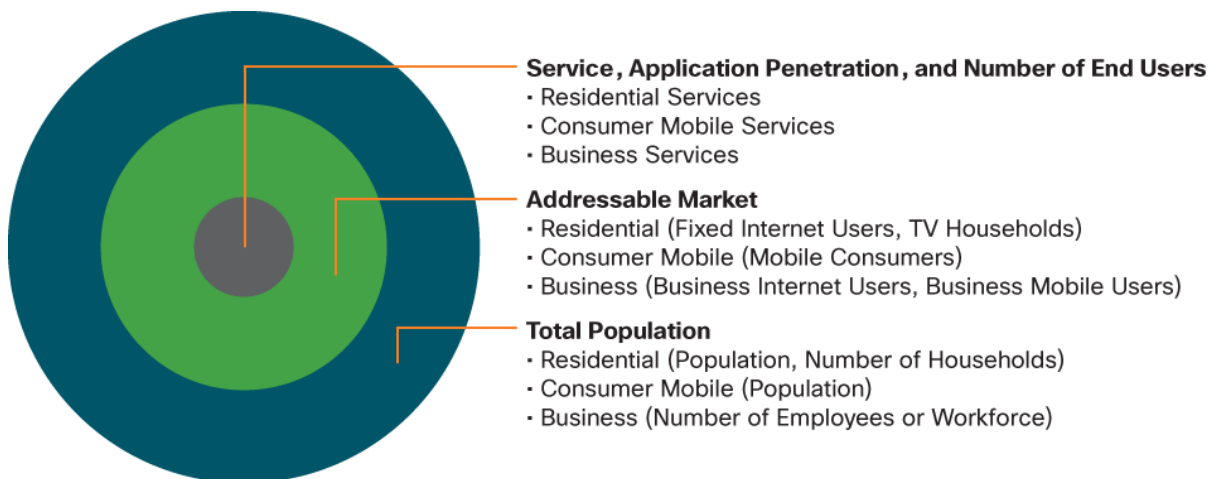
The Cisco VNI SA Forecast is closely aligned with the Cisco VNI Global IP Fixed and Mobile Data Traffic Forecasts, which focus on global network bandwidth consumption. Both the service adoption and traffic studies are based on the same global and regional estimates for population, network users and subscribers, and devices and connections. The Cisco VNI SA Forecast follows a rigorous methodology that uses various data sources:

- Publicly available data from international and national institutions, such as the United Nations Department of Population, International Labor Organization (ILO), and the World Bank
- Regulatory and government reports, such as those provided by Ministries of Information such as CNNIC, NIC.br, ACMA, and OfCom)
- Independent research and survey data from respected research firms such as AMI, Arbitron, Informa, IDC, Gartner, Machina Research, Media Partners Asia, IHS/Screen Digest, Strategy Analytics, SNL Kagan, comScore, Ovum, and Wainhouse Research

Cisco VNI analysts have developed and applied extensive data modeling techniques to analyze both supply-side data, such as shipments of technology products, and demand-side data, such as user adoption and preferences. This approach provides a consistent and reliable means to predict how global and regional populations; addressable markets, devices, and connections; and ultimately service adoption rates will grow over the forecast period.

The Cisco VNI SA Forecast begins with estimates of total population, households, and workers, globally and for six regions (North America, Latin America, Western Europe, Central and Eastern Europe, Middle East and Africa, and Asia Pacific), as shown in Figure 13.

Figure 13. Cisco VNI SA Forecast Parameters: Outside-In Approach



Next, analysts identify global and regional addressable markets for each of the following primary user categories:

- Residential (TV households and fixed Internet users)
- Consumer mobile (mobile subscribers)
- Business (business Internet users and business mobile subscribers)

Finally, analysts forecast the penetration rates of 24 specific services and applications globally and regionally in the context of the applicable population and addressable market parameters. Table 1 lists the Cisco VNI Service Adoption Forecast categories and services.

For more information and details, visit [Cisco VNI Service Adoption Forecast Methodology](#).

Appendix B: Service Definitions

Residential Services

This category includes the following services:

- **Consumer VoIP:** VoIP including both Internet VoIP such as Skype and dedicated VoIP subscriptions from a broadband service provider or an independent VoIP service provider such as Vonage
- **Online gaming:** Games downloaded from or played over the Internet, including Internet-connected console gaming
- **Online music:** Songs or music tracks downloaded from or streamed over the Internet
- **Online video:** Video downloaded from or streamed over the Internet
- **Social networking:** Social media such as Facebook or MySpace and microblogging such as Twitter
- **Digital TV:** Services such as digital cable TV, Internet Protocol Television (IPTV), digital satellite TV (DTH), and digital terrestrial TV (DTT)
- **Personal video recording:** PVRs or DVRs that allow recording of TV content to be viewed at a user's discretion, using a digital TV service
- **VoD:** On-demand video programming that is streamed or downloaded through a TV set-top box, using a next-generation TV service

Consumer Mobile Services

This category includes the following services used by consumer mobile users:

- **Mobile MMS:** Mobile services that include multimedia objects such as images, videos, audio, and rich text in addition to text
- **Mobile email:** Email on mobile phones
- **Mobile gaming:** Downloads of full games as well as online gaming on mobile phones, including single-player and multiplayer online games
- **Mobile music:** Full-track downloads and music streaming services on mobile phones
- **Mobile video:** On-demand video content downloaded or streamed to the mobile handset
- **Mobile social networking:** Mobile services ranging from simple chat rooms with only texting tools, to comprehensive multimedia environments and user-generated content (UGC) sharing communities
- **Mobile LBS:** Services that include personal navigation, point of interest (POI), friend-finder, and family-tracker services
- **Mobile commerce:** Services such as mobile banking, local and remote mobile payments, and domestic and international funds transfer

Business Services

This category includes the following services (note that mobile enterprise services are included to provide a comprehensive view of global business services):

- **Business IP telephony:** IP telephony lines or endpoints that are attached to a dedicated IP-enabled or a dedicated IP phone system; also included is an IP Centrex shared or multitenant solution
- **Business audio conferencing:** Phone-based conferencing with no video
- **Business web conferencing without video:** Collaborative sessions that use a standard web browser or downloaded client to share an application or to make a remote presentation over the Internet
- **Business desktop videoconferencing:** Includes client-server PC-software-based desktop conferencing, as well as integrated videoconferencing with unified communications and web conferencing solutions, web conferencing with video, and executive videoconferencing
- **Business room-based videoconferencing:** Solutions that include executive videoconferencing, and multicodec and single-codec conferencing systems such as Cisco TelePresence[®] conferencing
- **Mobile business email:** Business email for users on an enterprise mobile account; this email is considered an extension of office email service
- **Mobile business messaging:** Messaging for users on an enterprise mobile account; this messaging is considered an extension of the office messaging service
- **Mobile business location-based services:** Business LBS for mobile employees such as the salesforce and field-force automation services

Appendix C: Service and Application Bandwidth Requirements

The applications and services covered within the Cisco VNI SA Forecast range from those with basic network requirements (for example, text-based services) to those requiring advanced network requirements, as in the case of streaming services. To learn more about the various bandwidth requirements of sample residential, consumer mobile, and business services, refer to the [Cisco VNI SA Services Gauge](#) and Table 7.

Table 7. Sample Service and Application Bandwidth Comparisons

Segment	Application or Service Name	KB
Consumer mobile	SMS	0.13
Consumer mobile	MMS with video	100
Business	IP telephony (1-hour call)	28,800
Residential	Social networking (1 hour)	90,000
Residential	Online music streaming (1 hour)	72,000
Consumer mobile	Video and TV (1 hour)	120,000
Residential	Online video streaming (1 hour)	247,500
Business	Web conferencing with webcam (1 hour)	310,500
Residential	HD TV programming (1 hour, MPEG 4)	2,475,000
Business	Room-based videoconferencing (1 hour, multicodec telepresence)	5,850,000

Appendix D: Network Reach and Quality

Network reach and quality are essential to the efficient delivery of the services and applications included in this report. Faster, more reliable networks can support more devices, allowing network users to adopt new services. For details about global and regional network characteristics, visit [Cisco Global Cloud Index Supplement: Cloud Readiness Regional Details](#).

Appendix E: Global Service Adoption by Segment

Tables 8 through 10 summarize the global service adoption of residential, consumer mobile, and business services.

Table 8. Residential Services: Global Adoption (Millions of Subscribers or Users)

	2013	2014	2015	2016	2017	2018	CAGR 2013–18
Digital TV	1,029	1,163	1,292	1,383	1,440	1,517	8.07%
PVR	131	147	162	175	186	198	8.61%
VoD	306	342	378	412	431	451	8.10%
Residential VoIP	955	1,015	1,073	1,127	1,173	1,216	4.95%
Social networking	1,288	1,393	1,481	1,571	1,649	1,726	6.02%
Online music	1,141	1,240	1,351	1,443	1,525	1,608	7.10%
Online video	1,205	1,367	1,513	1,656	1,777	1,912	9.68%
Online gaming	1,129	1,232	1,320	1,400	1,467	1,534	6.33%

Source: Cisco VNI Service Adoption Forecast, 2013-2018

Table 9. Consumer Mobile Services: Global Adoption (Millions of Subscribers or Users)

	2013	2014	2015	2016	2017	2018	CAGR 2013–18
Mobile video	686	991	1,338	1,662	2,026	2,410	28.55%
Mobile banking and commerce	763	1,110	1,515	1,934	2,417	2,929	30.86%
Mobile music	743	961	1,211	1,484	1,801	2,117	23.28%
Consumer mobile LBS	236	359	513	690	881	1,099	36.07%
Mobile gaming	691	957	1,251	1,540	1,855	2,182	25.85%
Mobile social networking	1,148	1,525	1,917	2,282	2,674	3,062	21.68%
Consumer mobile email	627	852	1,128	1,448	1,775	2,149	27.92%
Consumer MMS	1,065	1,288	1,520	1,726	1,949	2,171	15.31%

Source: Cisco VNI Service Adoption Forecast, 2013-2018

Table 10. Business Services: Global Adoption (Millions of Users)

	2013	2014	2015	2016	2017	2018	CAGR 2013–18
Business mobile SMS	426	461	489	510	526	536	4.72%
Business mobile LBS	65	89	115	141	169	197	24.91%
Business mobile email	130	162	196	228	264	300	18.14%
Desktop videoconferencing	37	69	114	182	210	238	44.84%
Business IP telephony	169	190	209	222	232	244	7.58%
Room-based conferencing	109	117	126	136	146	159	7.85%
Audio conferencing	76	87	99	113	127	143	13.66%
Web conferencing without video	18	19	20	19	18	17	-1.16%

Source: Cisco VNI Service Adoption Forecast, 2013-2018

Appendix F: 2014 Digital Home Survey by the University of Southern California Institute for Communication Technology Management

The Changing Residential Internet Environment

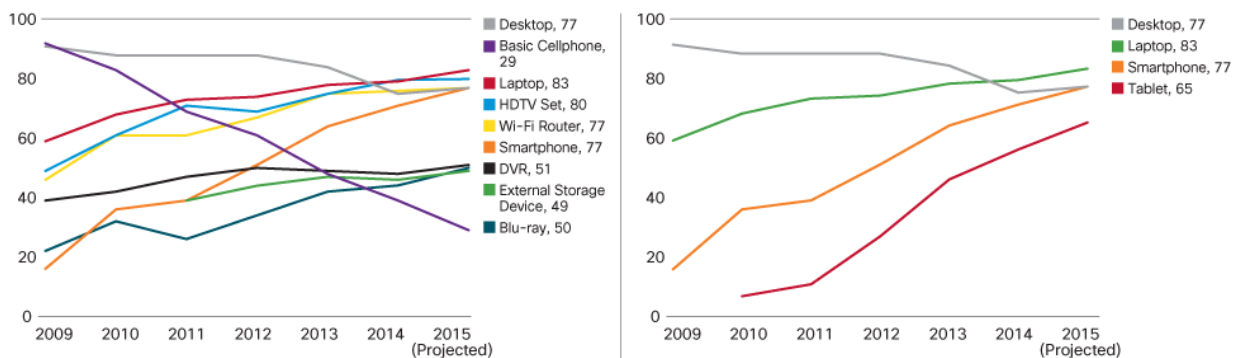
Residential Internet connected devices are undergoing an evolution from traditional laptop and desktop devices to tablets, smartphones, and streaming devices (Roku, Slingbox, etc.), and most recently to wearable devices.

In January 2014, the University of Southern California (USC) Institute for Communication Technology Management (CTM) conducted its latest iteration of the Digital Home survey across the United States and Canada to understand the trends across the household adoption of digital devices, device ecosystem and segments, device uses, and comparisons. The digital home survey has undergone several iterations since 2009. Cisco and several other technology companies have been co-sponsors of this research for several years.

When considering the USC Digital Home Survey several key trends emerge:

- Smartphone adoption will reach 77 percent and tablet adoption is expected to grow to 65 percent by 2015
- Increase in smartphone adoption will come largely from U.S. residents that are 35 years old and older
- Wearable computing devices appear to be one of the most tangible disruptors in the market, with a projected adoption of 27 percent by 2015

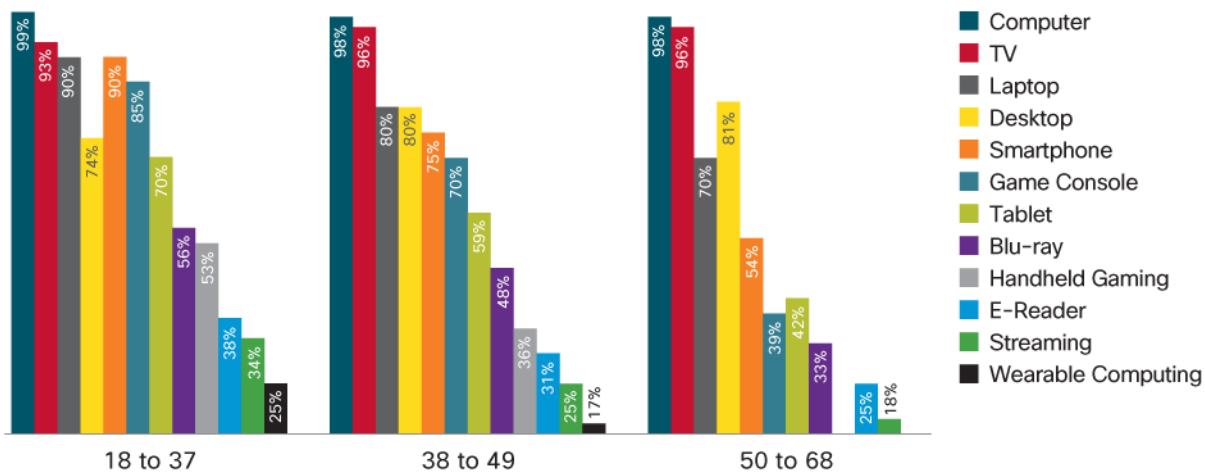
Figure 14. Adoption of Digital Home Devices Variance from 2009 to 2015



Source: USC CTM Digital Home Survey 2014

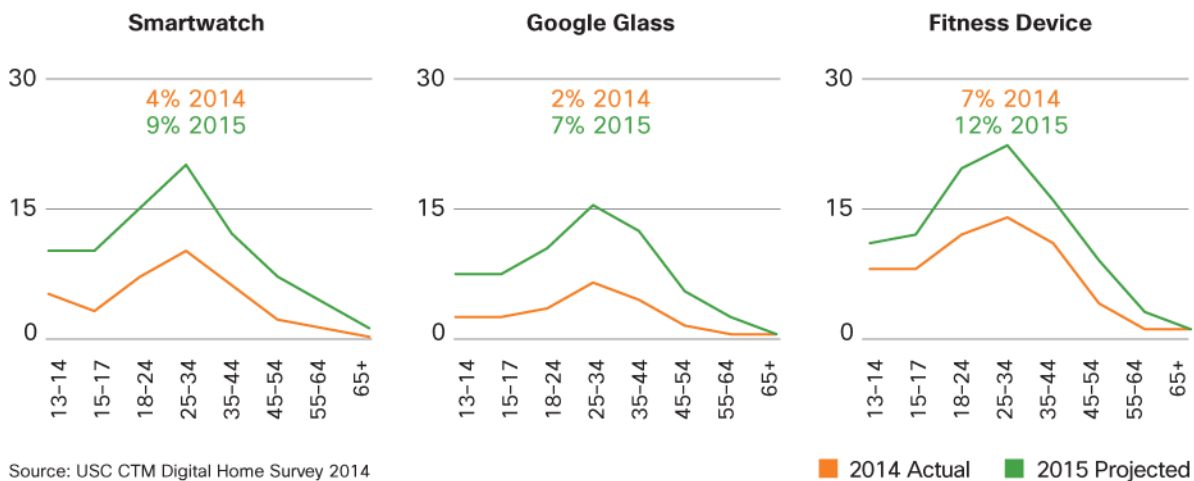
As Figure 14 shows, among all digital devices in a home, basic cellphones have seen the steepest decline in ownership (from 92 percent in 2009 to 29 percent in 2015), followed by desktops (from 92 percent in 2009 to 77 percent in 2015). Conversely, smartphones have seen the sharpest increase in ownership (from 16 percent in 2009 to 77 percent in 2015), followed by tablets (from 7 percent in 2009 to 65 percent in 2015). As Figure 15 shows, smartphone adoption has been the lowest in baby boomers.

Figure 15. Digital Home Devices Used by Different Age Groups



Source: USC CTM Digital Home Survey 2014

Figure 16. Wearable Computing Devices: The Latest Disruptors in the Market



Source: USC CTM Digital Home Survey 2014

Wearable computing devices will be the latest disruptors in the market (Figure 16). Smart watches, Google glasses, and fitness devices will see the largest adoption in 2015, most prominently among the early-adopting 25- to 34-year-old category. The next tier of wearable devices includes more specific computational applications related to personal health diagnostics (13 percent in 2015), pet activity tracking (6 percent by 2015), smart clothing (4 percent by 2015), and posture sensor (3 percent by 2015).

In conclusion, the survey brought home that further adoption of Internet-connected devices will yield an increased demand for bandwidth. Smartphone and tablet use is now mainstream, and there is steady adoption of Blu-ray players, smart TVs, and streaming devices. Smartphones are used in the largest number of locations, while laptops are used for the widest array of activities. Gaming, music, news, and communication are top activities performed on smartphones, laptops, and tablets. When comparing mobile devices, tablets and laptops are most similar both in terms of the activities performed and locations of use. Laptops have the greatest overall user experience compared with other devices. Increasing speed and reliability has the greatest potential impact on how much people use tablets or smartphones for a variety of activities.



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