# Cisco Visual Networking Index: Global Mobile Data Traffic Forecast, 2013–2018

*February 5, 2014*

## About the Cisco Visual Networking Index

**Q.** Why did Cisco develop the Cisco Visual Networking Index™ (VNI) Forecast?

**A.** The ramifications of prior Internet traffic growth rates prompted Cisco to develop a realistic forecast that is based on multiple levels and sources of real data and projections. This data is of great interest to Cisco, but we also expect that our customers (in all segments) and the industry at large can benefit from our findings.

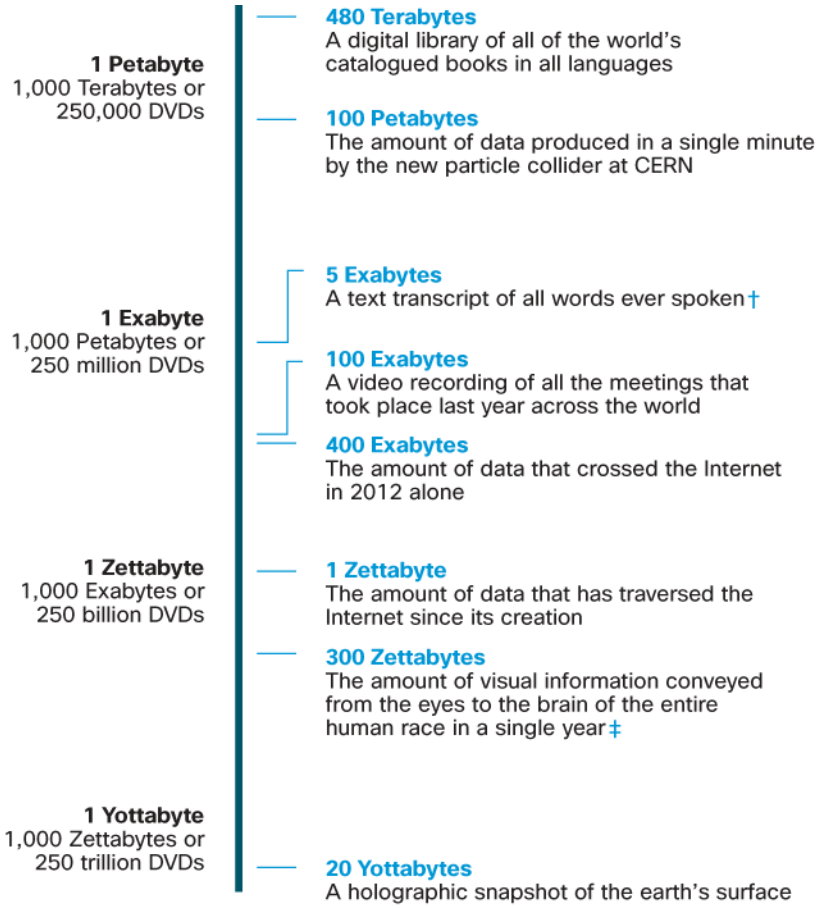
**Q.** What is visual networking?

**A.** Consumer and business IP networking trends are largely generated by video and by social networking and collaboration technologies (such as Web 2.0 applications), the combination of which is termed visual networking. A visual networking experience can range from a prearranged Cisco TelePresence® meeting to the upload or download of video and multimedia content to and from any device a consumer chooses: TV, PC, mobile handset, or any of the new consumer devices available today, such as e-readers, digital photo frames, and video cameras.

**Q.** What is an exabyte? What is a zettabyte?

**A.** An exabyte is 1,000,000,000 gigabytes. A zettabyte is 1,000 exabytes. Figure 1 shows examples of data that reaches such scales.

**Figure 1.** The Byte Scale and Equivalencies




† Roy Williams, "Data Powers of Ten," 2000
‡ Based on a 2006 estimate by the University of Pennsylvania School of Medicine that the retina transmits information to the brain at 10 Mbps.

All other figures are Cisco estimates.
Source: Cisco VNI 2014

## About the Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018

**Q.** What is the Cisco VNI Global Mobile Data Traffic Forecast?

**A.** The Cisco VNI Global Mobile Data Traffic Forecast projects future mobile data traffic over cellular networks—for example, second-, third-, or fourth-generation (2G, 3G, or 4G) networks or radio networks. The mobile data traffic forecast is part of the comprehensive Cisco VNI study. The Cisco VNI Global Mobile Data Traffic Forecast is published annually in February. The comprehensive Cisco VNI Forecast is published annually in June, and it includes a fixed IP traffic forecast as well as the updated Mobile Data Traffic Forecast of the same year.

**Q.** Why does Cisco develop and maintain the Cisco VNI Global Mobile Data Traffic Forecast?

**A.** Although mobile data traffic has historically been a small percentage of overall global IP traffic, mobile data traffic is expected to grow at a 61 percent compound annual growth rate (CAGR) from 2013 to 2018, three times faster than the growth of global IP fixed traffic during the same period. Given the rapid growth and changing dynamics in the mobile data space, this data is of great interest to Cisco. We also expect that our customers (in all segments) and the industry at large can benefit from our findings.

**Q.** Does the Cisco VNI Global Mobile Data Traffic Forecast include Wi-Fi?

**A.** Wi-Fi is not included, except in the calculation of traffic offloaded from the mobile network (along with femtocell). Wi-Fi is included as a fixed network component in the comprehensive Cisco VNI Traffic Forecast. For the purposes of this study, offload pertains to traffic from dual mode devices (i.e., supports cellular and Wi-Fi connectivity; excluding laptops) over Wi-Fi and small cell networks. Offloading occurs at the user/device level when one switches from a cellular connection to Wi-Fi/small cell access. Our mobile offload projections include traffic from both public hotspots as well as residential Wi-Fi networks.

**Q.** What was the global mobile data traffic growth rate in 2013?

**A.** In 2013, global mobile data traffic grew more than 81 percent, year over year, to 1.5 exabytes per month. Mobile data traffic growth varied by region, with the slowest year-over-year growth experienced by Western Europe at 57 percent. The highest growth rates were experienced by the Middle East and Africa (107 percent) and Latin America (105).

**Q.** What were the reasons behind the comparatively slower mobile data traffic growth rates in Western Europe in 2013?

**A.** There are three key reasons for the lower mobile data traffic growth in Europe last year:

- The ongoing 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.
- A continued slowdown in the number of mobile-connected laptop net additions: The number of mobile-connected laptops in Western Europe grew only 6 percent last year, reaching nearly 39 million at the end of 2013. Western Europe was the only region to experience single-digit laptop growth; all other regions exhibited at least 17 percent or higher laptop growth. Because mobile-connected laptops have historically been a major contributor to mobile data traffic volume, the slowing growth has had a significant impact on our estimates.
- 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.

**Q.** What is the future outlook for mobile data traffic growth based on the updated forecast?

**A.** Major findings of the Cisco VNI Global Mobile Data Forecast, 2013–2018 include the following points:

- By 2018, global mobile data traffic will reach 15.9 exabytes per month, or a run rate of 190 exabytes annually.
- Smartphones will be 66 percent of total mobile data traffic in 2018, compared to 62 percent in 2013.
- 4G connections will be 15 percent of total mobile connections in 2018 and will account for 51 percent of mobile data traffic.
- Globally, the average mobile network connection speed increased 2.6-fold in 2013 (1.4 Mbps) and will nearly double by 2018, reaching 2.5 Mbps.
- 52 percent of global mobile data traffic will be offloaded in 2018, up from 45 percent in 2013.
- By 2018, 69 percent of the world's mobile data traffic will be video, up from 53 percent in 2013.
- The Middle East and Africa will have the strongest mobile data traffic growth of any region over the forecast period, with a 70 percent CAGR, followed by Central and Eastern Europe at 68 percent and Asia Pacific at 67 percent.
- Globally, 79 percent of smartphones and tablets will be IPv6-capable in 2018, up from 46 percent in 2013.

**Q.** In the 2013 Cisco VNI Global Mobile Data Forecast, you predicted a 2012–2017 global CAGR of 66 percent. In this update, you predict a 2013–2018 global CAGR of 61 percent. Why is the projected global growth rate slowing?

**A.** The slight slowing in the growth rate is a typical example of S-curve growth, but the actual amount of traffic continues to represent significant growth. Although the growth in 2018 is projected to be less than 50 percent year over year, down from 81 percent in 2013, the incremental amount of traffic being added to the mobile Internet just between 2017 and 2018 is 5.1 exabytes per month—a little over three times the estimated size of the entire mobile Internet in 2013 (1.5 exabytes per month).

**Q.** Have there been any methodological changes since the last forecast update?

**A.** In the February 2014 update of the Cisco VNI Global Mobile Data Forecast, we have added two new countries: Sweden (in the Western Europe region) and Saudi Arabia (in the Middle East and Africa region). We have also developed a new device/connection analysis on mobile "wearable devices" (within the machine-to-machine [M2M] category). The study has also been expanded to compare 2G, 3G, 4G, and Wi-Fi connection speeds over the forecast period.

**Q.** How are mobile devices and connections categorized and defined in the current Cisco VNI Global Mobile Data Forecast?

**A.** The current Cisco VNI Global Mobile Data Forecast includes the following mobile device categories:

- **Nonsmartphones**: Handheld phones with a closed operating system.
- **Smartphones**: Mobile phones offering advanced capabilities such as the ability to run applications, often with functionality like that of a PC. Smartphones run complete operating system software and provide a standardized interface and platform for application developers.
- **Laptops**: This category includes laptop computers, netbooks, and ultra-mobile PCs connected to the mobile network through mobile broadband data cards, dongles, embedded modems, or mobile hotspots.
- **Tablets**: This category includes mobile-connected tablets (typically with average screen size of 7 inches) and what are usually referred to as mobile Internet devices (typically with average screen size of 4 to 6 inches).
- **Other portables**: This category includes e-readers, handheld gaming consoles, digital cameras and camcorders, digital photo frames, and in-car entertainment systems. E-readers are handheld consumer electronics devices that can access and store a wide range of digitized books for portable use. Newer generations of e-readers are also taking on tablet-type functionality. Photo frames can read, store, and display digital photos in slideshow mode (the most popular screen sizes fall in the 7-inch to 8-inch range). Cellular-enabled digital photo frames can download photos from online photo sites through an embedded cellular modem card. In some cases, the digital photo frame is assigned a phone number or email address so that pictures can be sent directly from a mobile phone to the frame.
- **M2M modules**: Machine-to-machine technologies that allow systems to communicate with other devices of the same capability, such as utility metering, security and surveillance, fleet management, GPS and navigation, asset tracking, and healthcare record devices.
- **Wearable devices**: Devices that people wear with the capability to connect and communicate to the network, either directly through embedded cellular connectivity or through another device (primarily a smartphone) over Wi-Fi, Bluetooth, and so forth. These devices come in various shapes and forms, ranging from smart watches, smart glasses, heads-up displays (HUD), health and fitness trackers, health monitors, wearable scanners and navigation devices to smart clothing and more.

**Q.** What are smart devices? What is the impact on mobile data traffic from smart devices?

**A.** We define smart devices and connections as those having advanced multimedia capabilities with a minimum of 3G connectivity. Throughout the forecast period, we see that the device mix is getting smarter, the share of smart devices and connections as a percentage of the total will increase from 21 percent in 2013 to more than half, at 54 percent, by 2018, growing 3.8 fold during the forecast period. Globally, the traffic from these smart devices, smart traffic, is going to grow from 88 percent of the total global mobile traffic to 96 percent by 2018. This is significantly higher than the ratio of smart devices and connections (54% by 2018), because on an average smart devices generate much higher traffic than non-smart devices.

**Q.** What mobile applications are covered in the current Cisco VNI Global Mobile Data Forecast?

**A.** The updated forecast covers a variety of applications, some of which are not included in the formal study. The following applications, based on two mobile device groups (handsets and portables) are generally covered.

Handset-related applications:

- Email and instant messaging
- Gaming and game downloads
- Enterprise mobile applications
- Mobile Internet
- Music streaming and downloads
- Picture messaging and downloads
- Text messaging
- Social networking
- Application downloads
- Video downloads
- Video messaging and calling
- Video streaming

Portable-related applications:

- Internet video (includes video communications)
- Internet gaming
- File sharing (peer-to-peer [P2P] and web-based)
- Voice over IP (VoIP)
- Web browsing and other data

Detailed definitions, assumptions, methodology, and analysis are available in the Cisco VNI Global Mobile Data Forecast, 2013–2018 White Paper.

**Q.** Can you define the relationship between subscriber, user, device, and connection?

**A.** Within the mobile data forecast, the terms subscriber and user are used interchangeably to identify the end user generating the mobile data traffic. The device is the endpoint (for example, nonsmartphone, smartphone, tablet, or M2M module). The connection is per device to the cellular network.

**Q.** How do you distinguish between business and consumer traffic?

**A.** We (and our relevant data sources) differentiate between business and consumer mobile data traffic by billing practices or records. Therefore, if a mobile subscription is paid by a business, it is applied to our business traffic segment. All other subscriptions are considered to be consumer subscriptions.

**Q.** What are the top applications promoting the growth of mobile data traffic?

**A.** Video continues to the major application generator for mobile data traffic growth. Video reached a milestone in 2012, accounting for 51 percent of global mobile data traffic, and it will account for 69 percent of global mobile data traffic by 2018.

**Q.** What is the impact of tiered pricing models on mobile usage? Are there any new insights on the top 1 percent of mobile users?

**A.** The top 1 percent of mobile users generate 10 percent of mobile data traffic, down from 52 percent at the beginning of 2010. The top 10 percent of mobile users generate as much traffic as the remaining 90 percent of mobile data traffic. Average consumption per user in an unlimited-pricing plan continues to be higher than that of a tiered-pricing plan user. However, traffic per user has increased 91 percent year over year for tiered-pricing plans compared to 54 percent for unlimited plans, indicating that tiered-pricing users may be seeking to fully maximize their usage plans.

Findings indicate that the top 1 percent of users is different each month. For example, out of 1000 users, there are not only 10 heavy users (1 percent) per month, but 35 users (3.5 percent) that are in the top 1 percent at some time during the course of a year.

**Q.** Why does this forecast include a section on IPv6-capable mobile devices?

**A.** With increasing industry awareness about the shortage of IPv4 addresses and transition to IPv6-capable networks, the Cisco VNI Global Mobile Data Forecast now includes a projection of the number of mobile devices potentially capable of connecting to an IPv6-capable mobile network. A projection of the number of fixed devices potentially capable of connecting to an IPv6-capable fixed network is published as part of the comprehensive VNI report in June.

**Q.** Where can I get historical VNI data?

**A.** Historical IP traffic numbers attributed to the Cisco VNI are listed in Wikipedia at http://en.wikipedia.org/wiki/Internet_traffic.

**Q.** Can I or my organization use or publish Cisco VNI Forecast data?

**A.** Yes. Cisco welcomes and encourages press, analysts, service providers, regulators, and other interested parties (business or academic) to use and cite our research. We do require that proper Cisco attribution be given for any and all Cisco VNI data that is published or shared in private or public print and electronic forms (for example, Source: Cisco Visual Networking Index [or VNI] Global Mobile Data Forecast, 2013–2018).

**Q.** How can I ask questions about the Cisco VNI Global Mobile Data Forecast data?

**A.** Please send any questions to traffic-inquiries@cisco.com. You may also submit questions or comments to our feedback section at www.cisco.com/go/vni.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