

Cisco Visual Networking Index: Forecast and Methodology, 2014–2019



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This forecast is part of the Cisco Visual Networking Index™ (Cisco VNI™), an ongoing initiative to track and forecast the impact of visual networking applications. This document presents the details of the Cisco VNI global IP traffic forecast and the methodology behind it. For a more analytical look at the implications of the data presented in this paper, refer to the companion document, [The Zettabyte Era—Trends and Analysis](#), or the [VNI Forecast Highlights tool](#).

Executive Summary

Annual global IP traffic will surpass the zettabyte (1000 exabytes) threshold in 2016, and the two zettabyte threshold in 2019. Global IP traffic will reach 1.1 zettabytes per year or 88.4 exabytes (one billion gigabytes) per month in 2016. By 2019, global IP traffic will pass a new milestone figure of 2.0 zettabytes per year, or 168.0 exabytes per month.

Global IP traffic has increased more than fivefold in the past 5 years, and will increase nearly threefold over the next 5 years. Overall, IP traffic will grow at a compound annual growth rate (CAGR) of 23 percent from 2014 to 2019.

Busy-hour Internet traffic is growing more rapidly than average Internet traffic. Busy-hour (or the busiest 60-minute period in a day) Internet traffic increased 34 percent in 2014, compared with 26 percent growth in average traffic. Busy-hour Internet traffic will increase by a factor of 3.4 between 2014 and 2019, while average Internet traffic will increase 2.8-fold. Busy-hour Internet traffic will reach 1.7 petabits per second (Pbps) by 2019.

Metro traffic will surpass long-haul traffic in 2015, and will account for 66 percent of total IP traffic by 2019.

Globally, metro traffic will grow nearly twice as fast as long-haul traffic from 2014 to 2019. The higher growth in metro networks is due in part to the increasingly significant role of content delivery networks, which bypass long-haul links and deliver traffic to metro and regional backbones.

Content delivery networks will carry over half of Internet traffic by 2019. Globally, Sixty-two percent of all Internet traffic will cross content delivery networks by 2019 globally, up from 39 percent in 2014.

Over half of all IP traffic will originate with non-PC devices by 2019. In 2014, only 40 percent of total IP traffic originated with non-PC devices, but by 2019 the non-PC share of total IP traffic will grow to 67 percent. PC-originated traffic will grow at a CAGR of 9 percent, while TVs, tablets, smartphones, and machine-to-machine (M2M) modules will have traffic growth rates of 17 percent, 65 percent, 62 percent, and 71 percent, respectively.

Traffic from wireless and mobile devices will exceed traffic from wired devices by 2019. By 2019, wired devices will account for 33 percent of IP traffic, while Wi-Fi and mobile devices will account for 66 percent of IP traffic. In 2014, wired devices accounted for the majority of IP traffic at 54 percent.

Global Internet traffic in 2019 will be equivalent to 64 times the volume of the entire global Internet in 2005. Globally, Internet traffic will reach 18 gigabytes (GB) per capita by 2019, up from 6 GB per capita in 2014.

The number of devices connected to IP networks will be three times as high as the global population in 2019. There will be three networked devices per capita by 2019, up from nearly two networked devices per capita in 2014. Accelerated in part by the increase in devices and the capabilities of those devices, IP traffic per capita will reach 22 GB per capita by 2019, up from 8 GB per capita in 2014.

Broadband speeds will double by 2019. By 2019, global fixed broadband speeds will reach 43 Mbps, up from 20 Mbps in 2014.

Video Highlights

It would take an individual over 5 million years to watch the amount of video that will cross global IP networks each month in 2019. Every second, nearly a million minutes of video content will cross the network by 2019.

Globally, consumer internet video traffic will be 80 percent of all consumer Internet traffic in 2019, up from 64 percent in 2014. This percentage does not include video exchanged through peer-to-peer (P2P) file sharing. The sum of all forms of video (TV, video on demand [VoD], Internet, and P2P) will be in the range of 80 to 90 percent of global consumer traffic by 2019.

Internet video to TV doubled in 2014. Internet video to TV will continue to grow at a rapid pace, increasing fourfold by 2019. Internet video to TV traffic will be 17 percent of consumer Internet video traffic by 2019, up from 16 percent in 2014.

Consumer VoD traffic will double by 2019. HD will be 70 percent of IP VOD traffic in 2019, up from 59 percent in 2014.

Content delivery network traffic will deliver over half of all internet video traffic by 2019. By 2019, 72 percent of all Internet video traffic will cross content delivery networks, up from 57 percent in 2014.

Mobile Highlights

Globally, mobile data traffic will increase 11-fold between 2014 and 2019. Mobile data traffic will grow at a CAGR of 61 percent between 2014 and 2019, reaching 15.9 exabytes per month by 2019.

Global mobile data traffic will grow three times faster than fixed IP traffic from 2014 to 2019. Global mobile data traffic was 4 percent of total IP traffic in 2014, and will be 14 percent of total IP traffic by 2019.

Regional Highlights

IP traffic is growing fastest in the Middle East and Africa, followed by Asia Pacific. Traffic in the Middle East and Africa will grow at a CAGR of 44 percent between 2014 and 2019.

IP traffic in North America will reach 49.7 exabytes per month by 2019, at a CAGR of 20 percent. Monthly Internet traffic in North America will generate 9 billion DVDs' worth of traffic, or 35.4 exabytes per month.

IP traffic in Western Europe will reach 24.7 exabytes per month by 2019, at a CAGR of 21 percent. Monthly Internet traffic in Western Europe will generate 5 billion DVDs' worth of traffic, or 20.8 exabytes per month.

IP traffic in Asia Pacific will reach 54.4 exabytes per month by 2019, at a CAGR of 21 percent. Monthly Internet traffic in Asia Pacific will generate 11 billion DVDs' worth of traffic, or 44.1 exabytes per month.

IP traffic in Latin America will reach 12.9 exabytes per month by 2019, at a CAGR of 25 percent. Monthly Internet traffic in Latin America will generate 3 billion DVDs' worth of traffic, or 11.3 exabytes per month.

IP traffic in Central and Eastern Europe will reach 16.9 exabytes per month by 2019, at a CAGR of 33 percent. Monthly Internet traffic in Central and Eastern Europe will generate 4 billion DVDs' worth of traffic, or 15.8 exabytes per month.

IP traffic in the Middle East and Africa will reach 9.4 exabytes per month by 2019, at a CAGR of 44 percent. Monthly Internet traffic in the Middle East and Africa will generate 2 billion DVDs' worth of traffic, or 8.8 exabytes per month.

Global Business Highlights

Business IP traffic will grow at a CAGR of 20 percent from 2014 to 2019. Increased adoption of advanced video communications in the enterprise segment will cause business IP traffic to grow by a factor of two between 2014 and 2019.

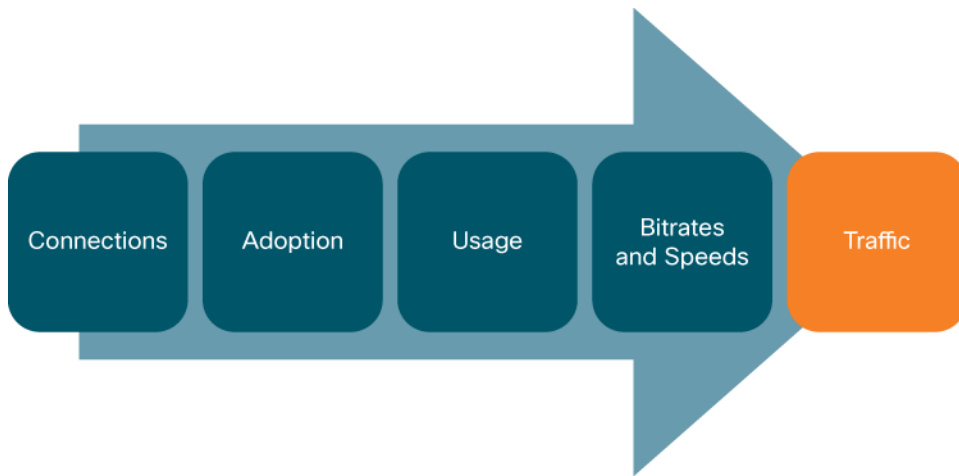
Business Internet traffic will grow at a faster pace than IP WAN. IP WAN will grow at a CAGR of 23 percent, compared with a CAGR of 20 percent for fixed business Internet and 51 percent for mobile business Internet.

Business IP traffic will grow fastest in the Middle East and Africa. Business IP traffic in the Middle East and Africa will grow at a CAGR of 26 percent, a faster pace than the global average of 20 percent. In volume, Asia Pacific will have the largest amount of business IP traffic in 2019, at 9.6 exabytes per month. North America will be the second at 8.0 exabytes per month.

Overview of VNI Methodology

The Cisco Visual Networking Index Forecast methodology has been developed based on a combination of analyst projections, in-house estimates and forecasts, and direct data collection. The analyst projections for broadband connections, video subscribers, mobile connections, and Internet application adoption come from SNL Kagan, Ovum, Informa Telecoms & Media, Infonetics, IDC, Gartner, AMI, Arbitron Mobile, Ookla Speedtest.net, Strategy Analytics, Screen Digest, Dell'Oro Group, Synergy, comScore, Nielsen, and others. Upon this foundation are layered Cisco's own estimates for application adoption, minutes of use, and kilobytes per minute. The adoption, usage, and bitrate assumptions are tied to fundamental enablers such as broadband speed and computing speed. All usage and traffic results are then validated using data shared with Cisco from service providers. Figure 1 shows the forecast methodology.

Figure 1. Cisco VNI Forecast Methodology Incorporates Fundamental Enablers of Adoption and Usage



Following the methodology through each step for a single application category (in this case, Internet video) illustrates the estimation process.

Step 1: Number of Users

The forecast for Internet video begins with estimations of the number of consumer fixed Internet users. Even such a basic measure as consumer fixed Internet users can be difficult to assess, because few analyst firms segment the number of users by both segment (consumer versus business) and network (mobile versus fixed). This year, the number of consumer fixed Internet users was not taken directly from an analyst source but was estimated from analyst forecasts for consumer broadband connections, data on hotspot users from a variety of government sources, and population forecasts by age segment. The number of Internet video users was collected and estimated from a variety of sources, and the numbers were then reconciled with the estimate of overall Internet users.

Step 2: Application Adoption

After the number of Internet video users has been established, the number of users for each video subsegment must be estimated. It was assumed that all Internet video users view short-form video in addition to other forms of video they may watch. The Internet video users that watch long form video (based partially on comScore Video Metrix figures for video sites whose average viewing time is longer than 5 minutes), live video, ambient video and Internet personal video recorder (PVR) is estimated.

Step 3. Minutes of Use

For each application subsegment, minutes of use (MOU) are estimated. Multiple sources are used to determine MOU: the Cisco VNI Usage data collection program provides a minute-per-subscriber baseline for many applications, the Cisco Connected Life Market Watch survey provides MOU for markets that are not covered by the Usage program, and comScore Video Metrix provides PC-based MOU for online video. Special care is taken to help ensure that the total number of Internet video minutes is well within the total number of video minutes (including television broadcast) for each user. For example, if the average individual watches a total of 4 hours of video content per day, the sum of Internet, managed IP, and mobile video hours should be a relatively small portion of the total 4 hours.

Step 4. Bitrates

After MOU have been estimated for each subsegment of video, the next step is to apply kilobytes (KB) per minute. To calculate KB per minute, first the regional and country average broadband speeds are estimated for the years 2014 through 2019. For each application category, a representative bitrate is established, and this representative bitrate grows at approximately the same pace as the broadband speed. For video categories, a 7-percent annual compression gain is applied to the bitrate. Local bitrates are then calculated based on how much the average broadband speed in the country differs from the global average, digital screen size in the country, and the computing power of the average device in the country. Combining these factors yields bitrates that are then applied to the MOU.

Step 5: Rollup

The next step in the methodology is to multiply the bitrates, MOU, and users together to get average petabytes per month.

Step 6: Traffic Migration Assessment

The next step is to reconcile the Internet, managed IP, and mobile segments of the forecast. The portion of mobile data traffic that has migrated from the fixed network is subtracted from the fixed forecast, and the amount of mobile data traffic offloaded onto the fixed network through dual-mode devices and femtocells is added back to the fixed forecast.

The sections that follow present quantitative results of the forecast and details of the methodology for each segment and type.

Global IP Traffic Growth, 2014–2019

Table 1 shows the top-line forecast. According to this forecast, global IP traffic in 2014 stands at 59.9 exabytes per month and will nearly triple by 2019, to reach 168.4 exabytes per month. Consumer IP traffic will reach 138 exabytes per month and business IP traffic will surpass 29.6 exabytes per month.

Table 1. Global IP Traffic, 2014–2019

IP Traffic, 2014–2019							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Type (Petabytes [PB] per Month)							
Fixed Internet	39,912	47,811	58,321	72,261	90,090	111,894	23%
Managed IP	17,424	20,460	23,371	26,087	29,274	31,858	13%
Mobile data	2,514	4,163	6,751	10,650	16,124	24,221	57%
By Segment (PB per Month)							
Consumer	47,743	58,145	71,470	88,740	111,019	138,410	24%
Business	12,108	14,289	16,973	20,258	24,469	29,563	20%
By Geography (PB per Month)							
Asia Pacific	20,729	24,819	29,965	36,605	44,217	54,423	21%
North America	19,630	23,557	28,228	33,649	41,465	49,725	20%
Western Europe	9,604	11,237	13,516	16,407	20,058	24,691	21%
Central and Eastern Europe	4,085	5,269	6,894	9,381	12,596	16,855	33%
Latin America	4,297	5,373	6,663	8,299	10,356	12,870	25%
Middle East and Africa	1,505	2,179	3,177	4,658	6,797	9,409	44%

Total (PB per Month)							
Total IP traffic	59,851	72,434	88,443	108,999	135,489	167,973	23%

Source: Cisco VNI, 2015

Definitions

- **Consumer:** Includes fixed IP traffic generated by households, university populations, and Internet cafés
- **Business:** Includes fixed IP WAN or Internet traffic generated by businesses and governments
- **Mobile:** Includes mobile data and Internet traffic generated by handsets, notebook cards, and mobile broadband gateways
- **Internet:** Denotes all IP traffic that crosses an Internet backbone
- **Managed IP:** Includes corporate IP WAN traffic and IP transport of TV and VoD

The following tables show cross-tabulations of end-user segment and network type for the final year of the forecast period (2019). Consumer Internet remains the primary generator of IP traffic, but mobile data has the highest growth rate and begins to generate significant traffic by 2019 (Table 2).

Table 2. Exabytes per Month as of Year End 2019

	Consumer	Business	Total
Internet	91	21	112
Managed IP	27	5	32
Mobile data	21	4	24
Total	139	30	168

Source: Cisco VNI, 2015

Table 3 shows the same data as Table 2, but in terms of annual traffic run rates. These run rates are based on the monthly traffic at the end of 2019.

Table 3. Exabytes per Year as of Year End 2019

	Consumer	Business	Total
Internet	1,097	251	1,348
Managed IP	322	60	382
Mobile data	247	44	291
Total	1,666	356	2,021

Source: Cisco VNI, 2015

Consumer and business traffic are both dominated by Internet traffic, although business traffic is more evenly distributed across public Internet and managed IP (Table 4).

Table 4. Traffic Share by End-User Segment as of Year End 2019

	Consumer	Business
Internet	66%	71%
Managed IP	19%	17%
Mobile data	15%	12%
Total	100%	100%

Source: Cisco VNI, 2015

Consumer traffic accounts for the majority of IP traffic in every network type segment. Consumer traffic will be 81 percent of all fixed Internet traffic, 84 percent of all of managed IP traffic, and 85 percent of all mobile data traffic (Table 5).

Table 5. Traffic Share by Network Type as of Year End 2019

	Consumer	Business	Total
Internet	81%	19%	100%
Managed IP	84%	16%	100%
Mobile Internet	85%	15%	100%
Total	82%	18%	100%

Source: Cisco VNI, 2015

Consumer Internet traffic will represent over half of all IP traffic, followed by consumer managed IP (VoD), which represents 16 percent of traffic (Table 6).

Table 6. Overall Traffic Share as of Year End 2019

	Consumer	Business	Total
Internet	54%	12%	67%
Managed IP	16%	3%	19%
Mobile data	12%	2%	14%
Total	82%	18%	100%

Source: Cisco VNI, 2015

Metro and Long-Haul Traffic, 2014–2019

Metro-only traffic (traffic that traverses only the metro and bypasses long-haul traffic links) surpasses long-haul traffic in 2014, and will account for 62 percent of total IP traffic by 2019. Metro-only traffic will grow nearly twice as fast as long-haul traffic from 2014 to 2019 (Table 7).

Table 7. Metro and Long-Haul Traffic, 2014–2019

Metro and Long-Haul Traffic, 2014–2019							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
Metro-Only (PB per Month)							
North America	14,860	18,402	22,778	28,061	36,048	45,012	25%
Asia Pacific	8,459	10,903	14,129	18,389	23,365	30,524	29%
Western Europe	5,517	6,920	8,934	11,569	15,043	19,700	29%
Central and Eastern Europe	896	1,381	2,148	3,376	5,115	7,766	54%
Latin America	917	1,389	2,033	2,856	3,923	5,286	42%
Middle East and Africa	215	384	668	1,127	1,845	2,838	67%
Long-Haul (PB per Month)							
Asia Pacific	12,270	13,916	15,836	18,217	20,852	23,900	14%
Central and Eastern Europe	3,189	3,887	4,746	6,005	7,480	9,090	23%
Latin America	3,380	3,984	4,630	5,443	6,432	7,584	18%

Middle East and Africa	1,289	1,795	2,509	3,531	4,952	6,570	38%
Western Europe	4,088	4,316	4,582	4,838	5,015	4,991	4%
North America	4,771	5,154	5,450	5,588	5,417	4,713	0%
Total (PB per Month)							
Total IP traffic	59,933	72,583	88,508	109,085	135,695	168,427	23%

Source: Cisco VNI, 2015

Content Delivery Network Traffic, 2014–2019

With the emergence of popular video-streaming services that deliver Internet video to the TV and other device endpoints, content delivery networks have prevailed as a dominant method to deliver such content. Globally, 62 percent of all Internet traffic will cross content delivery networks by 2019, up from 39 percent in 2014. Globally, 72 percent of all Internet video traffic will cross content delivery networks by 2019, up from 57 percent in 2014 (Table 8).

Table 8. Global Content Delivery Network Internet Traffic, 2014–2019

CDN Traffic, 2014–2019							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Geography (PB per Month)							
North America	7,162	9,518	12,951	17,603	23,922	31,920	35%
Asia Pacific	4,218	5,740	7,988	11,181	15,636	22,029	39%
Western Europe	3,842	4,972	6,690	9,043	12,250	16,683	34%
Central and Eastern Europe	660	1,064	1,742	2,839	4,529	7,079	61%
Latin America	657	967	1,400	2,005	2,832	3,961	43%
Middle East and Africa	179	322	574	998	1,676	2,629	71%
Total (PB per Month)							
CDN Internet traffic	16,719	22,582	31,345	43,670	60,845	84,301	38%

Source: Cisco VNI, 2015

Consumer IP Traffic, 2014–2019

As shown in Table 9, global consumer IP traffic is expected to reach 139 exabytes per month in 2019. Most of today's consumer IP traffic is Internet traffic.

Table 9. Global Consumer IP Traffic, 2014–2019

Consumer IP Traffic, 2014–2019							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Type (PB per Month)							
Internet	31,548	37,916	46,527	58,125	72,938	91,043	24%
Managed IP	14,145	16,799	19,344	21,709	24,495	26,824	14%
Mobile data	2,050	3,430	5,599	8,906	13,587	20,544	59%
By Geography (PB per Month)							
Asia Pacific	16,433	19,735	24,012	29,678	36,104	44,885	22%
North America	16,611	19,976	23,922	28,409	35,019	41,712	20%
Western Europe	7,509	8,813	10,644	13,006	16,012	19,796	21%
Central and Eastern Europe	2,830	3,824	5,179	7,279	9,943	13,571	37%

Latin America	3,412	4,338	5,456	6,877	8,649	10,839	26%
Middle East and Africa	948	1,459	2,258	3,491	5,293	7,607	52%
Total (PB per Month)							
Consumer IP traffic	47,743	58,145	71,470	88,740	111,019	138,410	24%

Source: Cisco VNI, 2015

Consumer Internet Traffic, 2014–2019

This category encompasses any IP traffic that crosses the Internet and is not confined to a single service provider's network. Internet video streaming and downloads are beginning to take a larger share of bandwidth and will grow to more than 80 percent of all consumer Internet traffic by 2019 (Table 10).

Table 10. Global Consumer Internet Traffic, 2014–2019

Consumer Internet Traffic, 2014–2019							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Network (PB per Month)							
Fixed	31,548	37,916	46,527	58,125	72,938	91,043	24%
Mobile	2,050	3,430	5,599	8,906	13,587	20,544	59%
By Subsegment (PB per Month)							
Internet video	21,624	27,466	36,456	49,068	66,179	89,319	33%
Web, email, and data	5,853	7,694	9,476	11,707	14,002	16,092	22%
File sharing	6,090	6,146	6,130	6,168	6,231	6,038	0%
Online gaming	30	41	64	88	113	138	36%
By Geography (PB per Month)							
Asia Pacific	12,193	14,571	17,871	22,470	28,374	36,391	24%
North America	8,913	11,091	14,095	17,951	22,893	28,621	26%
Western Europe	5,834	6,865	8,400	10,480	13,219	16,780	24%
Central and Eastern Europe	2,594	3,507	4,773	6,742	9,356	12,885	38%
Latin America	3,152	3,915	4,823	6,026	7,558	9,514	25%
Middle East and Africa	912	1,396	2,164	3,363	5,123	7,397	52%
Total (PB per Month)							
Consumer Internet traffic	33,598	41,346	52,126	67,032	86,524	111,587	27%

Source: Cisco VNI, 2015

Definitions

- **Web, email, and data:** Includes web, email, instant messaging, and other data traffic (excludes file sharing)
- **File sharing:** Includes peer-to-peer traffic from all recognized P2P systems such as BitTorrent and eDonkey, as well as traffic from web-based file-sharing systems
- **Gaming:** Includes casual online gaming, networked console gaming, and multiplayer virtual-world gaming
- **Internet video:** Includes short-form Internet video (for example, YouTube), long-form Internet video (for example, Hulu), live Internet video, Internet-video-to-TV (for example, Netflix through Roku), online video purchases and rentals, webcam viewing, and web-based video monitoring (excludes P2P video file downloads)

Web, Email, and Data

This general category encompasses web browsing, email, instant messaging, data (which includes file transfer using HTTP and FTP), and other Internet applications (Table 11). Note that data may include the download of video files that are not captured by the Internet video to PC forecast. This category includes traffic generated by all individual Internet users. An Internet user is here defined as someone who accesses the Internet through a desktop or laptop computer at home, school, Internet café, or other location outside the context of a business.

Table 11. Global Consumer Web, Email, and Data Traffic, 2014–2019

Consumer Web, Email, and Data Traffic, 2014–2019							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Network (PB per Month)							
Fixed web and data	5,018	6,382	7,500	8,820	10,019	10,763	16%
Mobile web and data	865	1,352	2,040	2,976	4,096	5,467	45%
By Geography (PB per Month)							
Asia Pacific	2,088	2,706	3,283	3,986	4,769	5,567	22%
North America	1,581	2,027	2,450	2,923	3,305	3,623	18%
Western Europe	1,105	1,301	1,482	1,694	1,907	2,007	13%
Central and Eastern Europe	396	681	1,014	1,488	1,972	2,489	44%
Latin America	500	655	748	872	1,000	1,102	17%
Middle East and Africa	213	364	563	833	1,162	1,443	47%
Total (PB per Month)							
Consumer web, email, and data	5,883	7,734	9,540	11,796	14,115	16,230	23%

Source: Cisco VNI, 2015

File Sharing

This category includes traffic from P2P applications such as BitTorrent and eDonkey, as well as web-based file sharing. Note that a large portion of P2P traffic is due to the exchange of video files, so a total view of the impact of video on the network should count P2P video traffic in addition to the traffic counted in the Internet video to PC and Internet video to TV categories. Table 12 shows the forecast for consumer P2P traffic from 2014 to 2019. Note that the P2P category is limited to traditional file exchange and does not include commercial video-streaming applications that are delivered through P2P, such as PPStream or PPLive.

Table 12. Global Consumer File-Sharing Traffic, 2014–2019

Consumer File Sharing, 2014–2019							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Network (PB per Month)							
Fixed	6,044	6,081	6,046	6,080	6,147	5,961	0%
Mobile	46	64	84	89	84	78	11%
By Subsegment (PB per Month)							
P2P file transfer	5,103	4,954	4,714	4,476	4,212	3,728	-6%
Other file transfer	987	1,192	1,416	1,692	2,019	2,310	19%
By Geography (PB per Month)							
Asia Pacific	2,526	2,499	2,438	2,445	2,421	2,354	-1%
North America	797	858	932	1,019	1,145	1,204	9%

Western Europe	1,179	1,142	1,111	1,089	1,074	1,007	-3%
Central and Eastern Europe	839	870	865	856	878	820	0%
Latin America	629	660	677	671	653	604	-1%
Middle East and Africa	120	117	107	87	60	50	-16%
Total (PB per Month)							
Consumer file sharing	6,090	6,146	6,130	6,168	6,231	6,038	0%

Source: Cisco VNI, 2015

Internet Video

With the exception of the Internet video to TV subcategory, all of the Internet video subcategories consist of online video that is downloaded or streamed for viewing on a PC screen (Table 13). Internet video to TV is Internet delivery of video to a TV screen through a set-top box (STB) or equivalent device. Much of the video streamed or downloaded through the Internet consists of free clips, episodes, and other content offered by traditional content producers such as movie studios and television networks.

Table 13. Global Consumer Internet Video, 2014–2019

Consumer Internet Video 2014–2019							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Network (PB per Month)							
Fixed	20,485	25,452	32,981	43,226	56,771	74,319	29%
Mobile	1,139	2,014	3,475	5,842	9,407	14,999	67%
By Category (PB per Month)							
Video	18,437	22,940	30,242	40,907	55,931	76,771	33%
Internet video to TV	3,188	4,526	6,214	8,160	10,248	12,548	32%
By Geography (PB per Month)							
Asia Pacific	7,579	9,366	12,150	16,039	21,184	28,469	30%
North America	6,535	8,207	10,712	14,009	18,443	23,794	29%
Western Europe	3,550	4,422	5,807	7,696	10,239	13,766	31%
Central and Eastern Europe	1,359	1,956	2,894	4,398	6,506	9,577	48%
Latin America	2,022	2,600	3,399	4,483	5,905	7,808	31%
Middle East and Africa	579	915	1,495	2,443	3,902	5,905	59%
Total (PB per Month)							
Consumer Internet video	21,624	27,466	36,456	49,068	66,179	89,319	33%

Source: Cisco VNI, 2015

Definitions

- **Internet video to TV:** Video delivered through the Internet to a TV screen by way of an Internet-enabled set-top box (for example, Roku) or equivalent device (for example, Microsoft Xbox 360), Internet-enabled TV, or PC-to-TV connection
- **Video:** Video includes the following underlying categories:
 - **Short form:** User-generated video and other video clips generally less than 7 minutes in length
 - **Video calling:** Video messages or calling delivered on fixed Internet initiated by smartphones, non-smartphones, and tablets
 - **Long form:** Video content generally greater than 7 minutes in length

- **Live Internet TV:** Peer-to-peer TV (excluding P2P video downloads) and live television streaming over the Internet
- **Internet PVR:** Recording of live TV content for later viewing
- **Ambient video:** Nannycams, petcams, home security cams, and other persistent video streams
- **Mobile video:** All video that travels over a second-generation (2G), 3G, or 4G network

Consumer Managed IP Traffic, 2014–2019

Managed IP video is IP traffic generated by traditional commercial TV services (Table 14). This traffic remains within the footprint of a single service provider, so it is not considered Internet traffic. (For Internet video delivered to the set-top box, see Internet video to TV in the previous section.)

Table 14. Global Consumer Managed IP Traffic, 2014–2019

Consumer Managed IP Traffic, 2014–2019							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Network (PB per Month)							
Fixed	14,145	16,799	19,344	21,709	24,495	26,824	14%
By Geography (PB per Month)							
North America	7,698	8,884	9,827	10,458	12,126	13,092	11%
Asia Pacific	4,240	5,164	6,141	7,208	7,730	8,495	15%
Western Europe	1,675	1,948	2,244	2,526	2,793	3,017	12%
Latin America	260	423	632	851	1,091	1,325	38%
Central and Eastern Europe	236	318	406	537	587	686	24%
Middle East and Africa	36	62	93	128	169	209	42%
Total (PB per Month)							
Managed IP video traffic	14,145	16,799	19,344	21,709	24,495	26,824	14%

Source: Cisco VNI, 2015

Business IP Traffic

The enterprise forecast is based on the number of network-connected computers worldwide. In our experience, this basis provides the most accurate measure of enterprise data usage. An average business user might generate 4 GB per month of Internet and WAN traffic. A large-enterprise user would generate significantly more traffic, 8–10 GB per month (Table 15).

Table 15. Business IP Traffic, 2014–2019

Business IP Traffic, 2013–2018							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Network Type (PB per Month)							
Business Internet traffic	8,377	9,919	11,800	14,144	17,176	20,915	20%
Business managed IP traffic	3,279	3,661	4,028	4,378	4,779	5,034	9%
Business mobile data	464	733	1,152	1,744	2,537	3,677	51%
By Geography (PB per Month)							
Asia Pacific	4,309	5,108	5,959	6,935	8,137	9,602	17%
North America	3,019	3,581	4,307	5,240	6,446	8,012	22%
Western Europe	2,096	2,423	2,872	3,401	4,046	4,895	18%

Central and Eastern Europe	1,255	1,445	1,715	2,102	2,652	3,284	21%
Latin America	885	1,035	1,207	1,422	1,707	2,031	18%
Middle East and Africa	557	720	919	1,166	1,505	1,802	26%
Total (PB per Month)							
Business IP traffic	12,121	14,313	16,980	20,266	24,492	29,627	20%

Source: Cisco VNI, 2015

Definitions

- **Business Internet traffic:** All business traffic that crosses the public Internet
- **Business managed IP traffic:** All business traffic that is transported over IP but remains within the corporate WAN
- **Business mobile data traffic:** All business traffic that crosses a mobile access point

Mobile Data Traffic

Mobile data traffic includes handset-based data traffic, such as text messaging, multimedia messaging, and handset video services (Table 16). Mobile Internet traffic is generated by wireless cards for portable computers and handset-based mobile Internet usage.

Table 16. Mobile Data and Internet Traffic, 2014–2019

Mobile Data and Internet Traffic, 2013–2018							
	2014	2015	2016	2017	2018	2019	CAGR 2014–2019
By Geography (PB per Month)							
Asia Pacific	977	1,622	2,616	4,114	6,245	9,503	58%
North America	563	849	1,287	1,897	2,704	3,823	47%
Central and Eastern Europe	242	464	832	1,409	2,231	3,496	71%
Middle East and Africa	199	383	690	1,194	1,927	3,043	72%
Western Europe	341	504	760	1,137	1,653	2,414	48%
Latin America	201	354	581	915	1,380	2,035	59%
Total (PB per Month)							
Mobile data and Internet	2,524	4,176	6,765	10,666	16,140	24,314	57%

Source: Cisco VNI, 2015

For More Information

For more information, refer to the companion document [The Zettabyte Era—Trends and Analysis](#). Inquiries can be directed to traffic-inquiries@cisco.com.



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