Cisco Visual Networking Index: Forecast and Methodology, 2008–2013

This forecast is part of the Cisco® Visual Networking Index, an ongoing initiative to track and forecast the impact of visual networking applications. The purpose of this paper is to lay out the details of Cisco's global IP traffic forecast and the methodology behind it. For a more analytical look at the implications of the data presented below, please refer to the companion article to this paper entitled "Hyperconnectivity and the Approaching Zettabyte Era."

June 9, 2009

Executive Summary

Annual global IP traffic will exceed two-thirds of a zettabyte (667 exabytes) in four years. Last year's forecast anticipated a run rate of 522 exabytes per year in 2012. The economic downturn has only slightly tempered traffic growth, and this year's forecast predicts 510 exabytes per year in 2012, growing to 667 exabytes per year or 56 exabytes per month in 2013.

Global IP traffic will quintuple from 2008 to 2013. Overall, IP traffic will grow at a compound annual growth rate (CAGR) of 40 percent.

Global Internet Highlights

In 2013, the Internet will be nearly four times larger than it is in 2009. By year-end 2013, the equivalent of 10 billion DVDs will cross the Internet each month.

Peer-to-peer (P2P) is growing in volume, but declining as a percentage of overall IP traffic. P2P file-sharing networks are now carrying 3.3 exabytes per month and will continue to grow at a moderate pace with a CAGR of 18 percent from 2008 to 2013. Other means of file sharing, such as one-click file hosting, will grow rapidly at a CAGR of 58 percent and will reach 3.2 exabytes per month in 2013. Despite this growth, P2P as a percentage of

consumer Internet traffic will drop to 20 percent of consumer Internet traffic by 2013, down from 50 percent at the end of 2008.

Global Video Highlights

Internet video is now approximately one-third of all consumer Internet traffic, not including the amount of video exchanged through P2P file sharing.

The sum of all forms of video (TV, video on demand, Internet, and P2P) will account for over 91 percent of global consumer traffic by 2013. Internet video alone will account for over 60 percent of all consumer Internet traffic in 2013.

In 2013, Internet video will be nearly 700 times the U.S. Internet backbone in 2000. It would take well over half a million years to watch all the online video that will cross the network each month in 2013. Internet video will generate over 18 exabytes per month in 2013.

Video communications traffic growth is accelerating. Though still a small fraction of overall Internet traffic, video over instant messaging and video calling are experiencing high growth. Video communications traffic will increase tenfold from 2008 to 2013.

Real-time video is growing in importance. By 2013, Internet TV will be over 4 percent of consumer Internet traffic, and ambient video will be 8 percent of consumer Internet traffic. Live TV has gained substantial ground in the past few years: globally, P2P TV is now slightly over 7 percent of overall P2P traffic at over 200 petabytes per month.

Video-on-demand (VoD) traffic will double every two years through 2013. Consumer IPTV and CATV traffic will grow at a 53 percent CAGR between 2008 and 2013, compared to a CAGR of 40 percent for consumer Internet traffic.

Global Mobile Highlights

Globally, mobile data traffic will double every year through 2013, increasing 66x between 2008 and 2013. Mobile data traffic will grow at a CAGR of 131 percent between 2008 and 2013, reaching over 2 exabytes per month by 2013.

Almost 64 percent of the world's mobile data traffic will be video by 2013. Mobile video will grow at a CAGR of 150 percent between 2008 and 2013.

Mobile broadband handsets with higher than 3G speeds and laptop aircards will drive over 80 percent of global mobile traffic by 2013. A single high-end phone (such as an iPhone or Blackberry) generates more data traffic than 30 basic-feature cell phones. A laptop aircard generates more data traffic than 450 basic-feature cell phones.

Regional Highlights

IP traffic is growing fastest in the Middle East and Africa, followed closely by Latin America. Traffic in Middle East and Africa will grow at a CAGR of 51 percent.

IP traffic in North America will reach 13 exabytes per month by 2013 at a CAGR of 39 percent. Monthly Internet traffic in North America will generate 2.4 billion DVDs worth of traffic, or 10 exabytes per month.

IP traffic in Western Europe will reach 12.5 exabytes per month by 2013 at a CAGR of 37 percent. Monthly Internet traffic in Western Europe will generate 2.2 billion DVDs worth of traffic, or 9 exabytes per month.

IP traffic in Asia Pacific will reach 21 exabytes per month by 2013 at a CAGR of 42 percent. Monthly Internet traffic in Asia Pacific will generate 4.1 billion DVDs worth of traffic, or 16.5 exabytes per month.

IP traffic in Japan will reach 3 exabytes per month by 2013 at a CAGR of 37 percent. Monthly Internet traffic in Japan will generate half a billion DVDs worth of traffic, or 2 exabytes per month.

IP traffic in Latin America will reach 2 exabytes per month by 2013 at a rate of 50 percent. Monthly Internet traffic in Latin America will generate 410 million DVDs worth of traffic, or 1.7 exabytes per month.

IP traffic in Central and Eastern Europe will reach 2 exabytes per month by 2013 at a rate of 49 percent. Monthly Internet traffic in Central and Eastern Europe will generate 340 million DVDs worth of traffic, or 1.4 exabytes per month.

IP traffic in the Middle East and Africa will reach 1 exabyte per month by 2013 at a rate of 51 percent. Monthly Internet traffic in the Middle East and Africa will generate 140 million DVDs worth of traffic, or 550 petabytes per month.

Global Business Highlights

Business IP traffic will grow at a CAGR of 33 percent from 2008 to 2013. Increased adoption of advanced video communications in the enterprise segment will cause business IP traffic to grow by a factor of four between 2008 and 2013.

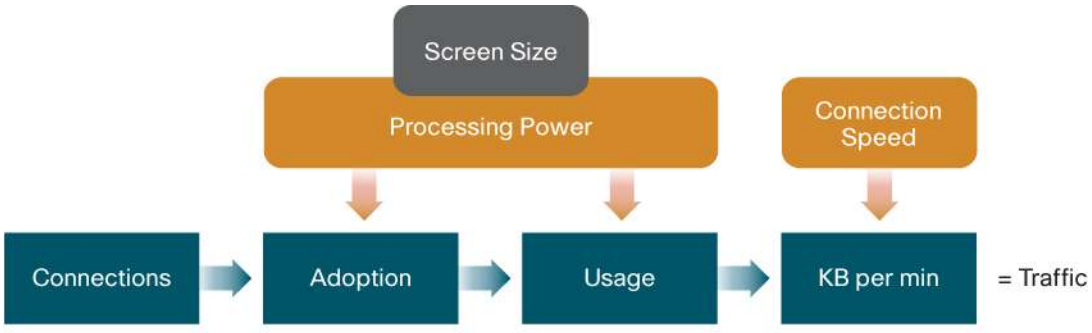
Business IP WAN traffic will grow at a faster pace than business Internet. Today, total business Internet traffic is more than twice the volume of IP WAN. By 2013, however, video will have made its way onto the WAN, and intercompany WANs will have matured, so that IP WAN will grow at a CAGR of 36 percent, compared to a CAGR of 32 percent for business Internet.

Business IP traffic will grow fastest in Latin America. Business IP traffic in Latin America will grow at a CAGR of 43 percent, a substantially faster pace than the global average of 33 percent. North America, Western Europe, and Japan will have slower growth rates. In volume, Asia Pacific will have the largest amount of business IP traffic in 2013 at 4.8 exabytes per month. North America will be a distant second to Asia Pacific at 3.5 exabytes per month.

What's New

The June 2009 update of the Cisco Visual Networking Index Forecast incorporates a number of significant methodology enhancements. Although last year's methodology was primarily based on end-user demand for applications and services, this year's methodology ties end-user demand to fundamental supply-side enablers such as broadband speed and computing speed. Figure 1 shows the updated methodology.

Figure 1. June 2009 Methodology Incorporates Fundamental Enablers of Adoption and Usage



Source: Cisco VNI, 2009

The inclusion of fundamental enablers allows for modeling and estimates to be made when detailed demand-side forecasts are not available. The June 2009 update includes country-level estimates for 14 countries, as well as estimates for emerging applications such as ambient video.

The following minor methodology enhancements are included in the June 2009 forecast update:

- **Incorporation of compression efficiency gains**. The previous forecast included the transition from MPEG-2 to MPEG-4, but no compression efficiency gains were assumed. In this update, we have assumed a 7 percent year-over-year gain in compression efficiency. This estimate is taken from the University of Essex Video Networking Laboratory paper "Future Performance of Video Codecs" published in November 2006.
- **Holistic approach to minutes of use**. With increasing cross-platform portability of content and applications, there is a danger of double-counting traffic between fixed and mobile networks, or between public and private IP networks, especially when using multiple sources for application adoption and usage. To eliminate double-counting, the sum of all minutes of use for all applications and all networks was capped.

Aside from the above methodology enhancements, the core methodology remains unchanged from the last forecast period to help ensure continuity and consistency. The core methodology relies on analyst projections for Internet users, broadband connections, video subscribers, mobile connections, and Internet application adoption. Analyst forecasts come from SNL Kagan, Ovum, Informa Telecoms & Media, Infonetics, IDC, Frost & Sullivan, Gartner, ABI, AMI, Screendigest, Parks Associates, Yankee Group, Dell'Oro, and Synergy. Additional splits of the forecast and details of the methodology for each segment and type can be found in the sections that follow.

Global IP Traffic Growth, 2008–2013

Table 1 shows the top-line forecast. According to this forecast, global IP traffic in 2008 stands at more than 10 exabytes per month, and more than quintuples by 2013, to approach 56 exabytes per month. Consumer IP traffic will exceed 40 exabytes per month, business IP traffic will approach 13 exabytes per month, and mobility traffic will reach 2.2 exabytes per month.

Table 1. Global IP Traffic, 2008–2013

IP Traffic, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Type (PB per month)							
Internet	8,140	11,716	16,701	23,843	31,839	40,428	**38%**
Non-Internet IP	2,001	3,031	4,569	6,647	9,394	12,975	**45%**
Mobile Data	33	85	207	482	1,076	2,184	**131%**
By Segment (PB per month)							
Consumer	7,037	10,488	15,465	22,768	31,211	40,571	**42%**
Business	3,103	4,258	5,805	7,722	10,022	12,833	**32%**
Mobile	33	85	207	482	1,076	2,184	**131%**
By Geography (PB per month)							
North America	2,578	3,666	5,309	7,797	10,498	13,431	**39%**
Western Europe	2,593	3,623	4,995	7,126	9,707	12,593	**37%**
Asia Pacific	3,661	5,503	8,089	11,503	15,877	21,177	**42%**
Japan	644	950	1,355	1,919	2,490	3,107	**37%**
Latin America	308	503	800	1,196	1,690	2,360	**50%**
Central Eastern Europe	280	421	665	1,021	1,441	2,042	**49%**
Middle East and Africa	110	165	264	408	606	877	**51%**
Total (PB per month)							
Total IP traffic	10,174	14,832	21,478	30,972	42,310	55,587	**40%**

Source: Cisco VNI, 2009

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

Non-Internet IP: includes corporate IP WAN traffic, IP transport of TV/VoD

Consumer IP Traffic, 2008–2013

As shown in Table 2, global consumer IP traffic is expected to surpass 40 exabytes per month in 2013. The majority of today's consumer IP traffic is Internet traffic, but consumer IPTV and VoD traffic will grow more rapidly than Internet at a CAGR of 53 percent.

Table 2. Global Consumer IP Traffic, 2008–2013

Consumer IP Traffic, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Type (PB per month)							
Internet	6,034	8,844	12,837	18,762	25,312	32,156	**40%**
Non-Internet IP	1,004	1,644	2,628	4,006	5,899	8,415	**53%**
By Geography (PB per month)							
North America	1,522	2,306	3,522	5,466	7,472	9,563	**44%**
Western Europe	1,979	2,771	3,817	5,512	7,498	9,589	**37%**
Asia Pacific	2,730	4,131	6,097	8,679	11,939	15,661	**42%**
Japan	378	593	880	1,301	1,707	2,129	**41%**
Latin America	202	336	551	840	1,187	1,629	**52%**
Central Eastern Europe	180	283	480	780	1,122	1,602	**55%**
Middle East and Africa	45	69	118	190	285	398	**55%**
Total (PB per month)							
Consumer IP traffic	7,037	10,488	15,465	22,768	31,211	40,571	**42%**

Source: Cisco VNI, 2009

Consumer Internet Traffic, 2008–2013

This category encompasses any IP traffic that crosses the Internet and is not confined to a single service provider's network. P2P traffic, still the largest share of Internet traffic today, will decrease as a percentage of overall Internet traffic. Internet video streaming and downloads are beginning to take a larger share of bandwidth, and will grow to over 60 percent of all consumer Internet traffic in 2013.

Table 3. Global Consumer Internet Traffic, 2008–2013

Consumer Internet Traffic, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Sub-Segment (PB per month)							
Web/Email	1,239	1,595	2,040	2,610	3,377	3,965	**26%**
File Sharing	3,384	4,181	5,192	6,529	8,123	10,127	**25%**
Internet Gaming	47	87	135	166	217	239	**39%**
Internet Voice	103	129	152	174	183	190	**13%**
Internet Video Communications	36	57	94	160	239	354	**58%**
Internet Video to PC	1,087	2,421	4,232	6,794	9,415	12,087	**62%**
Internet Video to TV	29	150	358	1,000	1,679	2,507	**144%**
Ambient Video	110	224	633	1,329	2,079	2,685	**90%**
By Geography (PB per month)							
North America	1,279	1,881	2,807	4,357	5,839	7,213	**41%**
Western Europe	1,636	2,265	3,100	4,494	5,985	7,478	**36%**
Asia Pacific	2,487	3,707	5,382	7,570	10,306	13,311	**40%**
Japan	268	421	614	905	1,172	1,415	**39%**
Latin America	165	270	437	655	921	1,243	**50%**
Central Eastern Europe	163	242	397	619	843	1,153	**48%**
Middle East and Africa	37	57	100	162	246	343	**56%**
Total (PB per month)							
Consumer Internet traffic	6,034	8,844	12,837	18,762	25,312	32,156	**40%**

Source: Cisco VNI, 2009

Definitions

Web, Email, and Data: includes web, email, instant messaging, and other data traffic (excluding file sharing)

P2P: includes peer-to-peer traffic from all recognized P2P systems such as BitTorrent, eDonkey, etc.

Gaming: includes casual online gaming, networked console gaming, and multiplayer virtual world gaming

Video Communications: includes PC-based video calling, webcam viewing, and web-based video monitoring

VoIP: includes traffic from retail VoIP services and PC-based VoIP, but excludes wholesale VoIP transport

Internet Video to PC: free or pay TV or VoD viewed on a PC, excludes P2P video file downloads

Internet Video to TV: free or pay TV or VoD delivered via Internet but viewed on a TV screen using a STB or media gateway

Ambient Video: nannycams, petcams, home security cams, and other persistent video streams

Crosscheck: Japan's Ministry of Internal Affairs and Communications estimates that broadband Internet traffic averaged 946 Gbps, or 307 petabytes per month, as of November 2008. Andrew Odlyzko publishes the most recent data on Japan and other countries on his website at the University of Minnesota. Cisco's estimate for consumer Internet traffic in Japan is 268 petabytes per month, and the estimate for total Internet traffic (business and consumer Internet) in Japan in 2008 is 443 petabytes per month.

Web, Email, and Data

This is a general category that encompasses web browsing, email, instant messaging, data (which includes file transfer using HTTP, FTP, etc.) and other Internet applications. Note that "data" may include the download of video files that are not captured by the "Internet video to PC" forecast. It 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 at home, school, Internet café, or other location outside the context of a business.

Table 4. Global Consumer Web, Email, and Data Traffic, 2008–2013

Consumer Web, Email, and Data Traffic, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Geography (PB per month)							
North America	421	494	599	750	964	1,089	**21%**
Western Europe	363	477	605	772	996	1,103	**25%**
Asia Pacific	285	393	511	649	819	985	**28%**
Japan	40	52	66	85	108	116	**24%**
Latin America	51	78	118	169	239	329	**45%**
Central Eastern Europe	66	83	113	144	186	245	**30%**
Middle East and Africa	13	18	27	41	66	99	**50%**
Total (PB per month)							
Consumer web, data	1,239	1,595	2,040	2,610	3,377	3,965	**26%**

Source: Cisco VNI, 2009

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 (estimated to be approximately 70 to 80 percent of P2P in 2009) in addition to the traffic counted in the "Internet Video to PC" and "Internet Video to TV" categories. Table 5 shows the forecast for consumer P2P traffic from 2008 to 2013. NOTE: 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 5. Global Consumer File-Sharing Traffic, 2008–2013

Consumer File Sharing, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Geography (PB per month)							
North America	555	662	795	956	1,150	1,384	**20%**
Western Europe	1,010	1,223	1,480	1,877	2,247	2,597	**21%**
Asia Pacific	1,520	1,909	2,419	3,071	3,953	5,191	**28%**
Japan	136	167	204	246	294	350	**21%**
Latin America	73	97	133	175	220	288	**32%**
Central Eastern Europe	71	95	124	159	200	252	**29%**
Middle East and Africa	18	26	36	45	59	67	**30%**
Total (PB per month)							
Consumer File Sharing	3,384	4,181	5,192	6,529	8,123	10,127	**25%**

Source: Cisco VNI, 2009

Internet Gaming

The "Internet Gaming" category primarily includes the traffic generated from gameplay. The download of the game is included in "Web, Email, and Data." Table 6 shows the forecast for Internet Gaming from 2008 to 2013.

Table 6. Global Consumer Internet Gaming Traffic, 2008–2013

Consumer Gaming, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Geography (PB per month)							
North America	9	19	50	64	88	92	**59%**
Western Europe	15	26	30	35	49	54	**29%**
Asia Pacific	10	14	18	22	26	32	**25%**
Japan	10	25	32	38	46	52	**38%**
Latin America	1	1	1	2	3	4	**39%**
Central Eastern Europe	1	2	2	3	4	5	**40%**
Middle East and Africa	0	0	0	0	1	1	**42%**
Total (PB per month)							
Consumer gaming	47	87	135	166	217	239	**39%**

Source: Cisco VNI, 2009

Crosscheck: World of Warcraft announced in 2008 that they had reached 10 million active subscribers. Other massive multiplayer online role-playing games (MMORPGs) have a total of approximately 7 million subscribers[1]*. If the average MMORPG gamer plays 80 hours per month*[2] *per game, at 20 MB per hour, the total monthly MMORPG gaming traffic in late 2008 would be 27 PB per month. This would mean our estimate for 2008, which includes casual gaming, first-person shooters, and online console gaming, is approximately two times MMORPG traffic, which is within reason.*

Voice over IP (VoIP)

This category includes phone-based VoIP services direct from a service provider, phone-based VoIP services offered by a third-party but transported by a service provider, and softphone-based Internet VoIP applications such as Skype. Table 7 shows the global forecast for consumer VoIP to 2013.

[1] Source: Woodcock, Bruce Sterling. "An Analysis of MMOG Subscription Growth" MMOGCHART.COM 23.0. April 2008. http://www.mmogchart.com.

[2] According to a survey conduced by Nick Yee at Stanford, MMORPG players spent 22 hours per week in gameplay. Yee, N. (2006). The Demographics, Motivations and Derived Experiences of Users of Massively-Multiuser Online Graphical Environments. PRESENCE: Teleoperators and Virtual Environments, 15, 309-329.

Table 7. Global Consumer VoIP Traffic, 2008–2013

Consumer Voice-over-IP Traffic, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Geography (PB per month)							
North America	18	21	22	23	23	23	**4%**
Western Europe	40	49	56	61	57	52	**6%**
Asia Pacific	18	26	36	47	57	67	**30%**
Japan	21	23	25	25	26	26	**5%**
Latin America	3	4	6	8	10	11	**30%**
Central Eastern Europe	3	4	5	7	7	8	**23%**
Middle East and Africa	1	1	2	3	3	3	**26%**
Total (PB per month)							
Consumer VoIP	103	129	152	174	183	190	**13%**

Source: Cisco VNI, 2009

Video Communications

The “Video Communications” category includes Internet video calling, video instant messaging, video monitoring, and webcam traffic. This segment is relatively small for the forecast period, but is included for tracking purposes, because it is expected to experience substantial long-term growth in the 2013–2018 timeframe.

Table 8. Global Consumer Internet Video Communications, 2008–2013

Consumer Internet Video Communications, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008-2013**
By Geography (PB per month)							
North America	3	6	11	18	24	34	**60%**
Western Europe	8	12	21	45	65	97	**64%**
Asia Pacific	15	24	39	64	102	156	**60%**
Japan	7	10	15	21	27	33	**36%**
Latin America	1	2	3	6	11	18	**81%**
Central Eastern Europe	1	2	4	6	8	13	**62%**
Middle East and Africa	0	0	0	1	2	3	**77%**
Total (PB per month)							
Consumer video communications	36	57	94	160	239	354	**58%**

Source: Cisco VNI, 2009

Internet Video to PC

“Internet Video to PC” refers to online video that is downloaded or streamed for viewing on a PC screen. It excludes peer-to-peer downloads, and is distinct from Internet-delivery of video to a TV screen through a set-top box (STB) or equivalent device. Much of the video viewed on PC is short-form content, and a large part of it is made up of free clips, episodes, and other content offered by traditional content producers such as movie studios and television networks.

Table 9. Global Consumer Internet Video-to-PC Traffic, 2008–2013

Consumer Internet Video to PC, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Geography (PB per month)							
North America	186	317	406	506	635	771	**33%**
Western Europe	167	424	765	1,277	1,892	2,636	**74%**
Asia Pacific	247	528	747	1,073	1,512	2,206	**55%**
Japan	25	36	53	73	100	121	**37%**
Latin America	14	29	50	77	115	161	**64%**
Central Eastern Europe	9	16	30	53	91	138	**74%**
Middle East and Africa	6	9	14	20	28	35	**42%**
Total (PB per month)							
Consumer Internet video to PC	654	1,359	2,064	3,079	4,374	6,069	**56%**

Source: Cisco VNI, 2009

Crosscheck: U.S. YouTube traffic is estimated to have generated approximately 45 petabytes per month at the end of 2008. Our estimate for user-generated content viewing traffic in that year is approximately 90 petabytes per month for North America.

Crosscheck: comScore estimates that in the United States, 14 billion online video streams were initiated in December 2008. If each stream generated 10 megabytes of traffic, the total for the United States would be 140 petabytes for the month of December. Compare this to our North American estimate of 186 petabytes per month of Internet video-to-PC traffic by year-end 2008. Cisco's Internet-video-to-PC category includes a certain amount of traffic that is excluded from the comScore estimates, such as videos from government websites and P2P Internet television applications.

Internet Video to TV

"Internet Video to TV" includes video delivered via Internet to a TV screen, by way of an Internet-enabled set-top box or equivalent device. Examples of devices now available include Microsoft's Xbox 360 and the Roku digital video player, through which users can download film and television content.

Table 10. Global Consumer Internet Video-to-TV Traffic, 2008–2013

Consumer Internet Video to TV, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Geography (PB per month)							
North America	3	56	146	444	789	1,233	**234%**
Western Europe	10	24	63	212	340	466	**116%**
Asia Pacific	5	19	40	101	200	327	**134%**
Japan	9	41	85	183	252	330	**106%**
Latin America	0	1	2	7	16	28	**232%**
Central Eastern Europe	2	9	21	49	75	111	**120%**
Middle East and Africa	0	1	2	5	8	13	**180%**
Total (PB per month)							
Consumer video to TV	14	118	332	736	1,405	2,288	**97%**

Source: Cisco VNI, 2009

Crosscheck: At the end of 2008, there were approximately 10 million Xbox consoles in North America capable of downloading video. If 30 percent of those consoles downloaded 5 hours of content per month, that would generate approximately 30 petabytes per month. Our estimate for Internet-to-TV in North America for 2009 is 56 petabytes, the remainder made up by Internet-enabled STBs and other gaming consoles.

Consumer Non-Internet IP Traffic, 2008–2013

"Non-Internet IP Video" refers to IP traffic generated by traditional commercial TV services. 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, please see "Internet Video to TV" in the previous section.)

Table 11. Global Consumer Non-Internet IP Traffic, 2008–2013

Consumer Non-Internet IP Traffic, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Sub-Segment (PB per month)							
Cable MPEG-2 VoD	804	1,326	2,155	3,332	4,957	7,155	**55%**
Cable MPEG-4 VoD	6	12	20	31	51	77	**66%**
IPTV VoD	193	307	453	643	892	1,182	**44%**
By Geography (PB per month)							
North America	243	424	715	1,109	1,633	2,350	**57%**
Western Europe	343	506	717	1,018	1,513	2,111	**44%**
Asia Pacific	243	424	715	1,109	1,633	2,350	**57%**
Japan	110	172	266	396	536	715	**45%**
Latin America	38	66	114	185	267	385	**59%**
Central Eastern Europe	18	40	83	162	279	449	**91%**
Middle East and Africa	8	12	19	27	39	55	**47%**
Total (PB per month)							
Non-Internet IP video traffic	1,004	1,644	2,628	4,006	5,899	8,415	**53%**

Source: Cisco VNI, 2009

Business IP Traffic

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

Table 12. Business IP Traffic, 2008–2013

Business IP Traffic, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Sub-Segment (PB per month)							
Business IP WAN traffic	997	1,386	1,940	2,641	3,495	4,560	**36%**
Business Internet traffic	2,106	2,872	3,865	5,081	6,527	8,272	**31%**
By Geography (PB per month)							
North America	1,049	1,343	1,746	2,240	2,825	3,471	**27%**
Western Europe	604	826	1,113	1,456	1,868	2,389	**32%**
Asia Pacific	923	1,352	1,942	2,701	3,634	4,815	**39%**
Japan	260	344	445	560	680	812	**26%**
Latin America	105	165	244	343	467	636	**43%**
Central Eastern Europe	99	136	179	226	282	351	**29%**
Middle East and Africa	64	92	136	195	266	359	**41%**
Total (PB per month)							
Business IP Traffic	3,103	4,258	5,805	7,722	10,022	12,833	**33%**

Source: Cisco VNI, 2009

Definitions

Business Internet Traffic: all business traffic that crosses the public Internet

Business IP WAN: all business traffic that is transported over IP but remains within the corporate WAN

Mobile Data and Internet Traffic

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

Table 13. Mobile Data and Internet Traffic, 2008–2013

Mobile Data and Internet Traffic, 2008–2013							
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**CAGR 2008–2013**
By Geography (PB per month)							
North America	6	17	41	91	201	397	**129%**
Western Europe	10	26	65	158	342	615	**129%**
Asia Pacific	8	20	50	123	303	701	**146%**
Japan	6	14	30	59	103	166	**94%**
Latin America	1	2	5	13	36	96	**166%**
Central Eastern Europe	1	2	6	15	37	89	**154%**
Middle East and Africa	2	4	10	24	54	120	**133%**
Total (PB per month)							
Mobile Data and Internet	33	85	207	482	1,076	2,184	**131%**

Source: Cisco VNI, 2009

For More Information

For more information, see the companion paper “Hyperconnectivity and the Approaching Zettabyte Era.” Inquiries can be directed to traffic-inquiries@cisco.com

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