



Staying Ahead of the Business Bandwidth Curve

Michael Harris
Kinetic Strategies



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42 Mbps

average end-user broadband connection speed by 2018

“Cloud services are the number-one application class driving an increase in Internet traffic.”

The success of every business is driven by the quality of its connections, whether with customers, employees, investors, suppliers, manufacturers or other key stakeholders. Increasingly, these relationships are measured through data-driven analytics, enhanced through video communication, and empowered through cloud computing and collaboration. As the volume of data grows, so do bandwidth requirements.

Bandwidth and Business Growth

In a survey by *InformationWeek*, two out of three IT leaders said they expect demand for bandwidth will increase at their company over the next year.¹ And in a *Computerworld* survey, more than half of IT executives say they will need to add bandwidth to keep pace.²

One company that has ramped up bandwidth to drive business growth is Dallas-based Stealth Monitoring. This family-owned business provides remote video surveillance services to prevent and deter crime for hundreds of customers across North America. Over the past five years, Stealth Monitoring has topped 50-percent year-over-year growth. Today, real-time video streams flow into their operations center from more than 7,000 security cameras. Since 2011, the company has partnered with Time Warner Cable Business Class (TWCBC is now Spectrum Enterprise) to scale its network. Stealth Monitoring recently upgraded from 500 Mbps to a 1 Gbps Internet connection.

With a powerful network, Stealth Monitoring is able to differentiate its service from the competition's. “Our Internet service level with Time Warner Cable Business Class* has been phenomenal,” explains Stealth Monitoring's President David Charney. He says his company views its network provider as a strategic partner “to make sure we have the correct Internet, connectivity and networking gear behind the scenes to support our growing business.”

Traffic Ahead

Cisco Systems forecasts IP traffic will grow at a compound annual growth rate of 21 percent through 2018. By that time, it is expected that the average broadband end user in North America will rely on a 42-Mbps Internet connection.³ To thrive in the face of surging bandwidth requirements, businesses need network service providers that can rapidly provision and support cost-effective, reliable, high-capacity IP access solutions. A closer look at the applications driving business bandwidth growth follows.

Cloud Business Applications: To capture cost savings, accelerate speed to market and simplify operations, businesses are increasingly shifting their IT spending to the cloud. Eight out of ten businesses report using at least one cloud service.⁴ While storage, social networking, email, collaboration, customer relationship management (CRM) and sales force automation are cited as the top cloud application categories,⁵ businesses are also moving mission-critical applications to the cloud.⁶

Collaboration and Conferencing: Leapfrogging the limitations and expense of the legacy public switched telephone network (PSTN), IP voice and video communications enable rich and cost-effective collaboration among employees, customers and suppliers. More than six out of ten businesses currently use videoconferencing,⁷ while seven out of ten use or plan to use Unified Communications (UC) solutions. Understanding the importance of network performance, businesses cite a lack of bandwidth as the most pressing concern for supporting UC.⁸

“Nine out of ten IT pros expect BYOD to have a major network impact.”

Browsing and Streaming: In addition to web access, social media and streaming video are becoming essential business tools. For example, research finds that seven out of ten businesses produce videos to communicate internally with employees.⁹ However, video can devour network resources. A recent traffic analysis found that video applications alone accounted for 18 percent of an average company’s total bandwidth.¹⁰

BYOD Access: More than 70 percent of U.S. consumers now own a smartphone or tablet,¹¹ which they bring to work to access business email, cloud applications and company file servers. Highlighting the trend, nearly three out of four companies say they currently support, or plan to support, bring-your-own-device (BYOD) access.¹² The implication: nine out of ten IT pros expect the trend to have a major network impact.¹³

File Transfer, Storage and Backup: Bandwidth needs are escalating for businesses that work with large digital files to transfer. With a 1.5 Mbps connection, transferring a single 300 MB file can take nearly 30 minutes. With a 100-Mbps connection, that same file can be transferred in less than 30 seconds. For a company that regularly transfers large digital files, having enough bandwidth can help save hours of file transfer time every workday.¹⁴ (See Figure 1: File Download Times by Connection Speed.)

Figure 1

File Download Times by Connection Speed

File Type	File Size	1.5 Mbps	25 Mbps	100 Mbps
Video Clip	10 MB	00:58	00:03	00:01
PowerPoint	30 MB	02:56	00:10	00:02
Photoshop	300 MB	29:20	01:45	00:26
eTextbook	500 MB	48:53	02:56	00:44
Cloud Data	1 GB	1:40:07	06:00	01:30
Raw Video	8 GB	13:21:07	48:03	12:00

Understanding Application Bandwidth

Web browsing and streaming, collaboration and conferencing, and cloud applications can consume significant bandwidth. Benchmarks from ACG Research and Cisco Systems estimate typical cloud applications can each require download speeds of 750 kbps to more than 2.5 Mbps per user. Web browsing and streaming need 300 kbps to more than 2.5 Mbps, while collaboration and conferencing applications may each require 640 kbps to more than 2.5 Mbps per user. (See Figure 2: Estimated Ranges for Bandwidth-Intensive Applications.)

Figure 2

Estimated Ranges for Bandwidth-Intensive Applications

	Low	Mid	High	Highest
Cloud applications	Up to 750 kbps	1.2 Mbps	2.5 Mbps	>2.5 Mbps
Web browsing and streaming	300 kbps	700 kbps	1.2 Mbps	>2.5 Mbps
Collaboration and videoconferencing	640 kbps	1.2 Mbps	2.5 Mbps	>2.5 Mbps

Source: ACG Research, Cisco Systems

For business video applications, device screen size, frame rate per second (fps) and display resolution in pixels (p) are important factors in determining bandwidth throughput needs. Faster frame rates (e.g. 15 fps, 30 fps, 60 fps) and higher display resolutions (e.g. 360p, 480p, 720p, 1080p) boost bandwidth requirements. To offer a crisper picture, bigger screens (such as a desktop monitor) require higher resolution than small screens (such as a smartphone). Finding a balance between resolution, frame rate and end-user connection speed are key for streaming video and videoconferencing quality.

High-definition (HD) video streaming and videoconferencing have among the biggest bandwidth requirements, estimated at 4.5 Mbps and 6 Mbps, respectively. Standard-definition (SD) video streaming and cloud-based collaboration may each require 1.5 Mbps per user.

Cloud backup and storage applications can also consume significant bandwidth during file transfer sessions. For example, an independent test of cloud storage file transfers through a high-speed Internet connection found average downstream bandwidth clocked in at over 12 Mbps; upload speeds at more than 2 Mbps.¹⁵

In a recent survey businesses reported cloud services as the number-one application class driving an increase in their Internet traffic.¹⁶ An analysis by Cisco Systems helps explain why by sharing download and upload speed guidelines for common basic, intermediate, and advanced cloud applications.¹⁷ (See Figure 3: Cloud Application Performance Requirements.)

Figure 3

Cloud Application Performance Requirements

	Basic	Intermediate	Advanced
Download speed	Up to 750 kbps	750 kbps-2.5 Mbps	>2.5 Mbps
Upload speed	Up to 250 kbps	250 kbps-1 Mbps	>1 Mbps
Application Examples	VoIP Basic streaming Conferencing Email and messaging	ERP and CRM SD video streaming SD videoconferencing Electronic health records (EHR)	HD video streaming HD videoconferencing Telemedicine Virtual office High-frequency stock trading

Source: Cisco Systems

Getting Ready for Rush Hour

The mix of applications used by a business, as well as the number of employees and devices connecting to the network, drive bandwidth usage. Rightsizing the connection is essential: once available bandwidth becomes congested, not only do access speeds slow for employees, so do application performance and business productivity.

When deciding how many lanes to add to a highway, civil engineers build to accommodate peak rush-hour traffic periods. Likewise, because network bandwidth is shared at a business location, it is important that users, devices and applications have enough bandwidth during busy-hour peaks. Research finds that busy-hour Internet traffic is growing rapidly. Indeed, through 2018 busy-hour traffic is forecast to grow 21 percent faster than IP traffic as a whole.¹⁸ Businesses need to plan accordingly.

“Busy-hour traffic is forecast to grow 21 percent faster than IP traffic as a whole.”

In a typical office setting with 9-to-5 working hours, there are two common peak periods—10am to 11am and 2pm to 3pm. To estimate busy-hour bandwidth requirements, start by taking inventory of applications in use and the bandwidth each consumes. Next, determine the number of users to estimate the number of applications running simultaneously during busy periods. Then, calculate the length of time (in seconds) each application is active during the busy period. For example, looking up contact information in a cloud-based CRM system may take ten seconds, while a videoconference could run for an hour. Finally, after multiplying the number of applications, users, bandwidth and usage time, divide this total by the number of seconds in the busy period.

An Online Bandwidth Calculator is available from Spectrum Enterprise to estimate the unique bandwidth requirements for your business <http://bandwidth.network-needs.net/>

Busy Hour Bandwidth =

$$\left(\begin{array}{l} \text{Applications} \times \text{Users} \times \text{Bandwidth per app} \\ \times \text{Seconds of use during busy period} \end{array} \right) / \left(\text{Number of seconds in busy period} \right)$$



Within three years metro networks will transport 62 percent of total IP traffic.

Besides bolstering their connections to the Internet, companies are also focused on increasing available bandwidth among branch and headquarters offices to improve access to mission-critical network servers and applications. The trend tracks with research highlighting the importance of metropolitan Wide Area Network (WAN) connections. Within three years it is expected that metro networks will transport 62 percent of total IP traffic.²⁰

As an example of this trend, OhioHealth operates 11 hospitals and more than 50 clinical locations across the Buckeye State. The nationally recognized, not-for-profit healthcare organization tapped Spectrum Enterprise for fiber-optic 100-Mbps Ethernet Private Line WAN circuits to link its distributed care sites, complementing its 300-Mbps Fiber Internet Access (FIA) connection.

The New Normal

To thrive in today's networked economy, businesses need to stay ahead of the bandwidth curve. When a company's connections slow, so does productivity. The rise of cloud computing, videoconferencing, collaboration and mobile devices in the workplace are creating a "new normal" for bandwidth usage. For many businesses, more capacity will be needed to keep up with traffic growth, particularly during busy-hour peaks. To maintain their edge, not only are companies upgrading their connections to the public Internet—they are also adding capacity to the links among their headquarters and branch office sites. Service providers that can cost effectively meet today's network requirements and seamlessly scale to deliver tomorrow's are essential to business success.

About the Author

Michael Harris is principal consultant at Kinetic Strategies. Applying more than 15 years of experience as a strategist, research analyst and journalist, Michael consults with select clients in the networking, Internet and telecommunications industries.

About Spectrum Enterprise

Spectrum Enterprise, a division of Charter Communications, is a national provider of scalable, fiber-based technology solutions serving many of America's largest businesses and communications service providers. The broad Spectrum Enterprise portfolio includes Internet access, Ethernet access and networks, Voice and TV solutions extending to Managed IT solutions, including Application, Cloud Infrastructure and Managed Hosting Services offered by its affiliate, Navisite®. Our industry-leading team of experts works closely with clients to achieve greater business success by providing these right fit solutions designed to meet their evolving needs.

For more information, visit <http://enterprise.spectrum.com>.

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¹ *InformationWeek* 2014 Next-Generation WAN Survey

² *Computerworld* Forecast 2014

³ Cisco Visual Networking Index, June 2014

⁴ "Cloud of Dreams—Adoption of the Cloud in 2014," *Evolve IP*, June 2014

⁵ "Rise in Cloud App Data Sharing," *Netskope*, July 2014

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⁷ "Seventh Annual State of the Network Global Study," *Network Instruments*, May 2014

⁸ *InformationWeek* 2014 Unified Communications Survey

⁹ "Engaging Employees with Video," *Ignite/Ragan*, 2013

¹⁰ "Application Usage and Threat Report," *Palo Alto Networks*, June 2014

¹¹ 2014 RJI Mobile Media Research Report

¹² Tech Pro Research, January 2015

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¹⁴ Data calculation by Kinetic Strategies

¹⁵ "Amazon Cloud Drive vs Dropbox: Head-To-Head Comparison," *Backup Review*, July 2015

¹⁶ "The 2014 State of the WAN Report," *Ashton, Metzler & Associates*, February 2014

¹⁷ Cisco Global Cloud Index, October 2015

¹⁸ Cisco Visual Networking Index, June 2014

¹⁹ The State of LTE February 2014, *OpenSignal*

²⁰ Cisco Visual Networking Index, June 2014