The New Network Podcast
Getting Up To Speed: Bandwidth Planning Tales, Tips and Tools

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Part 1

Today we’ll be talking about network bandwidth and why it’s a big deal for your business. We’ll look at trends and applications that are driving bandwidth demand, and we’ll meet some companies that have right-sized their network connections for success. And then we’ll help you do the same by tapping into expert advice for calculating the unique bandwidth needs of your business.

These days, more than three out of four companies say their business is network dependent.1 That means network and Internet connectivity performance directly drives the bottom line. With enough network bandwidth, a videoconference with an important customer is crystal clear. File transfers are drag-and-drop rather than click-and-wait, and your cloud applications run smoothly. But when your network is overloaded, business can slow to a crawl.

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.2 And in a Computer World survey, more than half of IT executives say they will need bandwidth added to keep pace.3

So what’s driving bandwidth demand? In short, it’s the skyrocketing number of devices and applications connecting to the network, and in particular, the use of video, online collaboration and cloud services. More than six out of ten companies now use videoconferencing.4 And a single high-definition videoconference can eat up as much as 4 megabits per second of bandwidth per user.

Seven out of ten companies say they’ll be moving more applications to the cloud over the next two years, and this has big implications. Rather than running software installed on a local computer hard drive, key applications are accessed through the Internet. That translates into extra bandwidth needed to connect with cloud service providers.

Another big bandwidth driver is mobile devices. Looking at your own personal mobile account, you know how quickly gigabytes of usage can add up in a month. Now, think about the impact of dozens or hundreds of employees each connecting smartphones and tablets to the company network.

Here’s a stunning example of mobile device support from the education sector. The Oxnard Union High School District serves more than 16,000 students at 8 schools northwest of Los Angeles. In the past, Oxnard was struggling with overloaded T1 connections. Oxnard selected Time Warner Cable Business Class to scale its network and today runs 10-gigabit-per-second
Ethernet private line circuits to each of its 8 schools—that’s a total of 80 gigabits per second of bandwidth. Through the power of its network, Oxnard is now offering bring-your-own-device, or BYOD, Wi-Fi access for all of its students and staff, enabling anytime, anywhere teaching and learning on any device. Oxnard is also helping teachers access voice, video, data and multimedia learning applications in the classroom to drive student success. Oxnard is also moving ahead with a secure BYOD connectivity initiative.

If you want to understand the impact of streaming video on bandwidth, look at Stealth Monitoring. This cutting-edge family-owned business handles remote video surveillance for hundreds of customers across North America to prevent and deter crime. With real-time video streams flowing into their operations center from more than 6,000 cameras, having enough bandwidth is critical. Stealth Monitoring recently upgraded to a 1-gigabit-per-second Internet connection from Time Warner Cable Business Class. With a powerful network, they are able to differentiate their service from competitors; and to help ensure Business Continuity for preventing and deterring crime, their solution also features geographically diverse redundant fiber links into their facility.

Part 2

So how can you calculate a bandwidth forecast for your organization? Well, if you have a friend who’s a world-class network engineer, you could invite them out for coffee and ask for help. That’s what we’re going to do now, but you’ll have to make your own coffee. I’m going to conference in Dr. Michael Kennedy of ACG Research. Michael has more than 30 years’ experience in the networking industry and holds 3 degrees in electrical engineering, including a master’s degree from MIT and a Ph.D. from New York University.

Q: Michael Kennedy thanks for being with us. We’ve been talking about why bandwidth is a big deal for businesses. So can you help explain how an organization goes about calculating their unique bandwidth needs?

A: I think the first thing you need to do is recognize that when you’re calculating bandwidth needs, this is a shared resource. It’s not what one individual user in an office is using. The bandwidth that you require is the bandwidth that everyone in the office needs.

So the second thing we have to do is keep in mind that we want to design our capacity requirement, our bandwidth requirement, for the busiest part of the day. In most 9-to-5-type office settings, that’s usually 10 to 11 in the morning, once everybody’s gotten to work. And then there’s another busy period, 2 to 3 in the afternoon, which is once everybody’s gotten back from lunch, and is also all that work at the same time. So what we’re going to do is figure out the total bandwidth requirement used by everyone simultaneously during these busy periods.

I’d suggest that this is analogous to what a highway designer does if he’s trying to figure out how many lanes are needed on the highway. He looks at rush hour, and we’re going to do the same thing. We’re going to look at rush hour for data packets.

Q: Okay. So how does a business go about figuring out how big the rush hour is and how much capacity is enough?
A: Like I said, rush hour to me corresponds to the midmorning and the midafternoon peaks during the day. But if your business doesn’t run that way, you just have to, I would say, use common sense, and see when everybody’s at work running their various devices.

Q: So how does a business know when they don’t have enough capacity?

A: I think there are two typical applications that are probably the most important in our business. One of them is videoconferencing. If you’re doing a videoconference with multiple people and your images are breaking up or your audio is of bad quality, that’s a sign that you don’t have enough bandwidth.

Another one that is fundamental to our businesses today, especially now that we’re using a lot of cloud-based services, is: how fast do our web pages refresh? And that’s gotten worse in recent years rather than better because we’re now using mash-ups where you have multiple web links on one web page. A rule of thumb is that people will only wait two-and-a-half seconds at most before going somewhere else on the web. You do not have enough bandwidth if you’re not getting your web pages in under two-and-a-half seconds.

Q: How about an IP voice call or conference call like this one? How much are you able to tell if something’s going wrong with your bandwidth capacity?

A: The kind of things you hear, and I hear it frequently, is: first, just muddy or poor voice quality. Sometimes there’s a gap. Sometimes you get some echoes. It’s like somebody once said: you’ll know it when you hear it.

Q: So in addition to some of those quality issues you mentioned, what are some of the potential business consequences of inadequate bandwidth?

A: I think the obvious one is poor productivity. I think this is especially true in the cloud services where we’re running our business in the cloud. If every employee, let’s say call-center people, are waiting long periods of time while their web pages refresh, their screens refresh on their workstations, it’s going to slow up the whole customer-service business. You’re going to lose the productivity of the call-center agents, for example. You’re also going to create a really bad impression and probably lose some customers.

Q: Let’s get down to the numbers. Can you walk us through the process of estimating peak bandwidth needs for a business? How do you go about doing that?

A: So the first step is to gather the data you need. I’ve already hinted at the direction for this. We have to know what’s going on from every user, every application in the workplace during this busy period. Sometimes we talk in terms of the busy hour.

So what do you need to know? First of all, you need to know how much bandwidth each application requires. For example, a really high-quality video call may need 4 megabits per second. On the other hand, a simple web page you could do very well with 250 kilobits per second. So you have to assign a data rate to each type of application you’re using. So that’s the first piece of information you need.
Secondly, you need to know how many applications are running simultaneously during the busy period. And again, one way you could do that is just look around the office and see what everybody’s working on.

The third piece of information you need is to know what is the actual active duration of an application. I can give you a couple of very simple examples. A classic from the telephone industry is that the average telephone call lasts three minutes. So if you’re using SIP in your office, you configure, on average, three minutes a phone call. On the other hand, we’re doing a lot of videoconferencing today; a lot of us work around a block of one-hour meetings. So for videoconference calls, you might use an hour for your active duration.

So if you have the answers to those three questions: how much bandwidth do my applications use, how many applications are running simultaneously, and how long do we use each application in the busy period, now you’re set to compute the bandwidth requirement.

Q: Okay, that makes sense. So let’s talk a little bit about numbers. I read an independent analysis in the healthcare sector that found even a small doctor’s office needs at least 10 megabits per second of bandwidth, while a larger medical practice will need 25 megabits per second or more. A hospital is forecast to require a minimum of 100 megabits per second of bandwidth, while a larger medical center will need at least 1 gigabit per second of bandwidth.

And with these kinds of numbers in mind, let me share an example of what one healthcare company is doing. St. Joseph’s Imaging operates eight offices in the Syracuse, New York, area and their teams run nearly a thousand imaging exams each day. And the challenge for them is that these CT scans, ultrasounds, X-rays and mammograms create huge digital files that need to be transferred fast for doctors and patients to get the test results. So St. Joseph’s Imaging calculated their peak bandwidth requirements, and they installed a high-capacity network with Time Warner Cable Business Class. They now have a 700-megabit-per-second connection at their main office and 100-megabit-per-second links out to the remote sites. And because of this, radiologists can read the imaging files in real time and doctors can share the results with patients before they leave the office for their testing exam.

So Michael, can you share some more details about how an organization goes about crunching the numbers for bandwidth?

A: I can give you a simple formula in words on how you crunch the numbers. Then I’ll talk about a way that you can get some assistance in doing this. So first of all, you use the information I discussed a minute ago; and again, this calculation is done for the busy period. We want to plan for peak capacity.

So the starting point is for each active application that each user is running. We need to multiply that application by its required bandwidth times its length of use in seconds.

You do that for every application that’s running at the same time during the busy period. Once you’ve multiplied the length of the application’s use in seconds times its bandwidth requirement,
you add that up for all active applications that are running simultaneously. Then you divide by the number of seconds in the busy period. This is your bandwidth requirement. For example, it might be 45 megabits per second. Of course, before you’re finished, I might do just as I do in cooking and I might add a little extra as a safety margin.

Q: Trying to digest all of the math during a podcast can be a little tricky. Are there any resources available that can help businesses make these calculations for their unique organization?

A: Yes, there is. Time Warner Cable Business Class has an online bandwidth calculator to help you do this. It takes you through the steps that I just described.

That sounds great. The URL for the web tool- It’s at bandwidth.network-needs.com. And this is very cool. You just input different indicators for your business like the size of company, number of locations, and the kinds of applications you use and you get a specific speed recommendation for your organization. It doesn’t get any easier than that.

Thanks for being with us today, Michael Kennedy. It’s not every day that folks get to learn from an engineer with your kind of experience about how to calculate the unique bandwidth needs for their business.

The takeaway is that, in today’s connected business world, bandwidth drives the bottom line. With the increasing number of mobile devices on the network, plus the growing importance of business cloud applications, video streaming, collaboration, conferencing and larger file transfers, bandwidth requirements are climbing. Be sure to check out the Time Warner Cable Business Class bandwidth calculator to find out how much capacity your organization needs to succeed.

Thanks for listening. For Time Warner Cable Business Class, I’m Michael Harris.

1 Mid-Market Businesses Upgrading Network–Voices from the Field, Techaisle, March 2013
2 InformationWeek 2014 Next-Generation WAN Survey
3 Computerworld Forecast 2014
4 Seventh Annual State of the Network, Network Instruments, (May 2014)

Try the Bandwidth Calculator at: http://bandwidth.network-needs.com/