

Network Evolution



GOT NETWORK SECURITY? GO PHISH

Enterprise networks face increasing threats and need to pull together IT and security teams to prevent them.

EDITOR'S DESK

Come Together ...
Right Now, Over IT

UCC TOOLS

Talk About
Complicated

NETWORK INNOVATION AWARD

Ixia CloudLens Public

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INFOGRAPHICS

Data Mine

HARDWARE

Network Hardware
Is Not Dead (Yet)

THE SUBNET

The Business
of Networking



EDITOR'S DESK | JEAN DERGURAHIAN

Come Together ... Right Now, Over IT

Don't be short-sighted: Align IT goals with your business. It can't wait.

ONE OF THE very first telephone networks to exist in the United States connected 19th century farmers and homesteads with barbed wire.

The barbed wire telephone system had its challenges, not least of which was stampeding cattle knocking it down. But the people who built it understood that the technology must support their business need, in this case, to bring people together.

In this issue of *Network Evolution*, the theme of aligning IT with business needs runs throughout. We focus on three areas: [hardware management](#), enabling unified communications (UC) and the integration of [network management and security](#).

Networking hardware has come a long way from barbed wire. Today, for example, more organizations are putting applications and network functions in the cloud. But deciding what stays on-premises and what goes to the cloud requires communication and aligning IT with business units.

The call for alignment is not new. The concept of IT as a business enabler took root well before the UC market took off. And yet, IT managers still don't always know which [UC applications](#) are on the network, and enterprise users are unsure which collaboration tools work best.

Security could very well be the most important area where aligning IT with business needs is critical. As network attacks continue to increase, network and security teams must possess a singular vision to protect the system, users and information.

Education is one way for network professionals to understand the importance of aligning IT with business. In this month's [Subnet](#), one network specialist explains why his journey of continuing education never stops. ■

JEAN DERGURAHIAN
Features and E-zine Editor, Networking Media Group

Security

Defend and Protect

BY DAVID GEER

→ Networks are strongest when security is built in from the beginning. Network and security pros are teaming up more to make that happen.

POWERFUL FORCES ARE driving networking and security professionals together. And it's about time.

Cybercrime damages will cost the world \$6 trillion annually by 2021, up from \$3 trillion in 2015, according to market research firm Cybersecurity Ventures in Menlo Park, Calif. In particular, cyber-crime that specifically targets enterprise networks is growing. It's clear that networking and security professionals must work together to focus more on enterprise network management and security to combat those threats.

The awareness is already there. Global spending on cybersecurity products and services will exceed \$1 trillion cumulatively from 2017 through 2021,

Security threats of most concern



VULNERABILITIES

- Broken authentication and session management
- Buffer overflows
- Data exposure
- Injection vulnerabilities
- Security misconfiguration

ACTORS AND TACTICS

- Cyberterrorism
- Data exfiltration
- Insider threat
- Organized crime
- Social engineering
- Proliferation of internet of things

EXPLOITS

- Backdoors
- Botnets
- Denial of service/Distributed denial of service
- Malware
- Ransomware

SOURCE: "2017 GLOBAL INFORMATION SECURITY WORKFORCE STUDY," CENTER FOR CYBER SAFETY AND EDUCATION AND ISC², FEBRUARY 2017.

according to Steve Morgan, Cybersecurity Ventures' founder and editor in chief. "Network security, and in particular, [next-generation firewalls](#), will be a big chunk of that."

Still, many fear that despite the growth in spending, security continues to be bolted onto the network after the fact.

"We have to build [networks with security in mind](#), and network and security groups will have to work together to accomplish it," said Frank Dickson, research director at IDC, a research firm in Framingham, Mass. "Security is not native to the network."

While spending on security increases, a shortage of trained security professionals for enterprise network management and security looms, according to [ISC²](#), the standards organization

that certifies more than 125,000 cyber, information, software and infrastructure security professionals worldwide. By 2022, ISC² forecasts a security workforce gap of 1.8 million, making it more important for enterprises to consider how best to integrate security into the network from the beginning.

To architect IT with fundamental security improvements organizations should have a three- to five-year plan, Dickson said.

COMMUNICATION, COORDINATION ARE KEY

Coordinated communication is key for network management and security. A cohesive networking and security team policy, known as [SecOps](#), significantly lowers the likelihood of failure in security controls and processes—as well as any negative impact to the business—said Tina Price, associate vice president of IT security and governance at York Risk Services Group, which is affiliated with CareWorks Tech, a consulting company in Dublin, Ohio, that provides IT and security strategy development services to its customers.

As networking pros' duties grow to include security, they come to understand the roles played by

their colleagues in the security group, Price said.

CareWorks staff uses [ServiceNow's](#) software that helps companies analyze and respond to network threats. "It brings greater visibility and coordination to security incidents and vulnerabilities," Price said, adding that the networking and security teams worked together to implement the tool.

CareWorks networking and security professionals provided significant input into building the SecOps business policies and procedures and workflow. "Now, both teams share information regarding security vulnerabilities and can work together to determine a cohesive response," Price said, adding that both teams need to coordinate a response to security events as they happen.

The ServiceNow tool assigns security incidents to the most appropriate networking or security professionals based on their areas of expertise. Representatives from the two teams can then review the status of security incidents and craft a service-level agreement to ensure timely resolutions. The SecOps system overcomes the communications challenges that stem from the geographical

separation of CareWorks' networking and security teams, Price said.

THE NETWORK-SECURITY PROFESSIONAL

To help overcome communications challenges and strengthen enterprise network management and security, network and security professionals should have the same training, IT professionals say.

To start with, network managers can make sure they are hiring networking professionals who already possess some security skills, as well as take the time to offer additional security training as needed, according to R.V. Raghu, who sits on the board of directors of ISACA, a global standards and credentialing organization for IT professionals.

"Network managers need to evolve to become security professionals," Raghu said.

Having dual skill sets will enable network pros to shape the natively secure network of the future, he added. "Networking professionals who become skilled in security can begin to embed security into the network and its components by design, making [security a layer in the network](#).

"This new networking and security professional

\$1T

**Expected global spending
on cybersecurity products
and services through 2021**

SOURCE: "CYBERSECURITY MARKET REPORT,"
CYBERSECURITY VENTURES, 2Q 2017.

can design and implement security with an emphasis on allowing secure access to everything that is the network, irrespective of how broadly we define it,” Raghu said.

IT career guides suggest even more education around enterprise network management and security. Budding network administrators can acquire certifications in networking and security like the [CCSP](#) and other Cisco exams, CompTIA Network+ and Security+ certifications, for example. IT staff members should consider potential networking employees with existing security training and experience.

DEFINE NETWORK SECURITY POLICIES

Focusing staff integration efforts around a particular initiative is another good place for enterprises to coalesce their networking and security efforts.

A case in point is configuration and patch management, which can unify networking and security teams, according to Jerry Irvine, CIO of Prescient Solutions, a Chicago-based cloud services firm.

These tools help enterprises address known vulnerabilities within their networks, a gap that hackers [continue to exploit](#).

“Configuration management policies, processes and systems set the requirements for networking and security groups to work together to assure that you implement systems with the appropriate level of accessibility, resiliency and security,” he said.

Agencies like the Department of Defense, for example, are required by federal regulations to use configuration and patch management for industrial control systems like [supervisory control and data acquisition](#). Private companies are not required by regulation to use these specific security management technologies. But by using them, networking and security pros can share real-time security data and see the challenges each group faces and the responsibilities they each have, Irvine said.

Ensuring that networking and security teams are working toward a common goal isn’t an easy task. But enterprises are also beginning to understand that the success of their business depends on making that goal a reality. ■

Data Mine

⌚ Time to work

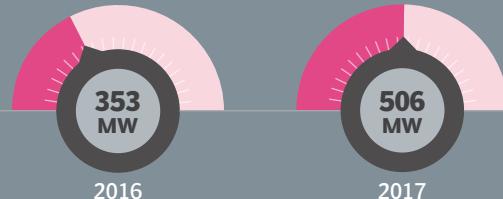
People spend this much time each day on these tasks (in minutes)

80	Reading and replying to email
71	Face-to-face meetings
49	Desk phone
46	Mobile phone
42	Conferencing
39	Collaboration (screen and document sharing)
36	Chat/text/IM



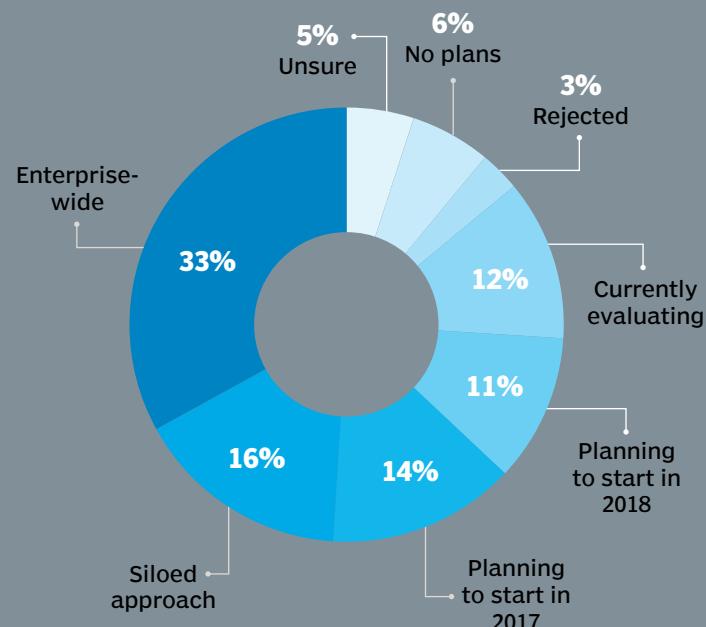
SOURCE: "2017 WORKPLACE PRODUCTIVITY AND COMMUNICATIONS TECHNOLOGY REPORT," WEBTUTORIALS, MARCH 2017. N=906. CREDIT: INUENG/GETTY IMAGES

⚡ Amp up New data centers to increase energy capacity (in megawatts)



SOURCE: "SHIFTING CLOUDS, SURGING M&A, DATA CENTER OUTLOOK," NORTH AMERICA, JLL RESEARCH, 2017

⌚ Digital transformation state of deployment



SOURCE: "2017-18 DIGITAL TRANSFORMATION BENCHMARK," NEMERTES RESEARCH, 2017.

UCC Tools

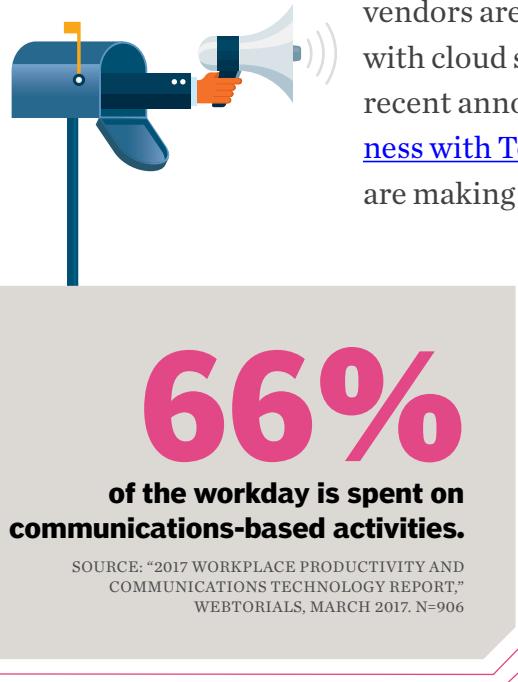
Talk About Complicated

BY JEAN DERGURAHIAN

→ UC and collaboration tools are more sophisticated than ever. But enterprises still want the basics.

EVEN THOUGH PEOPLE are often facedown in a phone, tablet or laptop, plenty of pure talk still goes on in the business world. And as enterprises move toward using more unified communications and collaboration tools, networking pros often start trying to integrate UCC technologies as a way to manage one old-fashioned thing: the telephone.

That's what happened to Eric Prosser, IT officer for the Santa Clara County Fire Department in Santa Clara, Calif. "The original intention we had was strictly taking care of telephones," Prosser said. But the department recently integrated the Glip platform from RingCentral, based in Belmont, Calif., to go along with the company's [VoIP](#) service. Using Glip, the firefighters and business staff can now communicate via fax, email, text, chat and



conference calls—all from the RingCentral application on the Glip platform.

Voice service is one component of an expanding suite of unified communications and collaboration tools that vendors aim to offer in a single application or environment. So yes, unified communications—talk, text, instant message and conferencing—has been around long enough to be considered a mature market. But new collaboration tools, including document and screen sharing, are recent additions, and vendors are working to enhance those applications with cloud services and new features. Microsoft's recent announcement to [replace Skype for Business with Teams](#) demonstrated the push vendors are making to create a single hub for all workplace communications.

Whether enterprises will buy into that level of integrated UCC remains to be seen.

Unified communications and collaboration applications are a critical element for enterprises to explore since people spend about 69% of their workday on communication and collaboration tasks—from talking on

the phone to sharing screens—according to a March 2017 Webtorials workplace productivity study.

Right now, “very few vendors can offer true unified collaboration,” said Zeus Kerravala, founder and principal analyst of ZK Research in Boston. “It’s become such a broad term. And with so many vendors participating, I think it makes it difficult for buyers to build any type of strategy around it.”

The Santa Clara County Fire Department has close to a full suite of UCC tools that streamline work communications. But Prosser’s department doesn’t have full integration yet. The firefighters use native iPhone apps, not RingCentral, while on duty. But business office employees go through the RingCentral application to communicate in a variety of ways.

“It’s a little harder [to achieve full UCC integration] when you’re dealing with a fire department,” Prosser said. “If I had a business, I’d say absolutely, as much as possible because you could technically eliminate desk phones and run everything from a cellphone or laptop.”

UNIFIED STRATEGY STRUGGLES

Part of the UCC struggle is defining what the enterprise means by [unified communications and](#)

[collaboration](#), according to Kerravala. Enterprises go into UC with different ideas and needs.

RingCentral's set of unified tools offers some of the best options for users because it's fast and easy to deploy, Kerravala said. Microsoft's plan to integrate Teams with Office 365 is a step in the same direction, but the move initially creates some confusion for enterprises that might not be sure which products to use or even how to use them. Cisco Spark also has the potential to offer a full unified suite of applications. But Spark is cloud-based, and large organizations still prefer on-premises services, he added.

But as these technologies and unified platforms mature, new tools are created, and that's where enterprises can start seeing benefits to implementing fully integrated unified communications and collaboration, Kerravala added.

For example, web conferencing itself is a mature tool, but team collaboration is an emerging area. Imagine if users could record and move a whole conference into a Cisco Spark or Microsoft Teams room. Enterprises then would have something entirely new and helpful for their workflows, he said.

Enterprises have two major areas to consider when determining their need for UCC: telephony

and meetings, according to Bern Elliot, a vice president and analyst with Gartner Research.

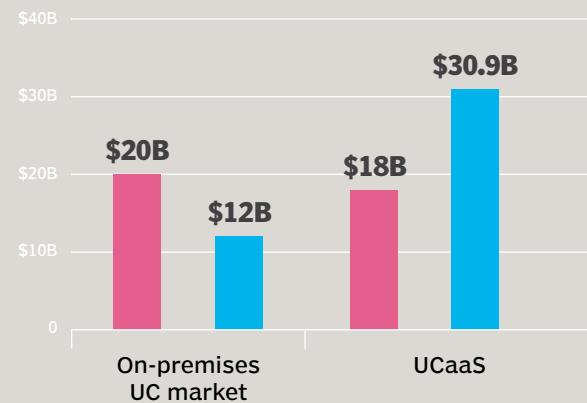
Products in the telephony area include phone, text, chat and conferencing technologies. Meetings can include anything from two people grabbing time for a quick chat to a routine, scheduled large group event. The meeting area is emerging to include more collaboration, he added.

According to Elliot, users are looking for persistent meeting environments that fit into the work-stream. These applications will allow groups of any size to conduct meetings, transcribe what is being said and allow participants to view tasks and complete action items. More and more, UC providers see collaboration tools as something they need to integrate into their offerings, Elliot said.

CONSIDER THE BUSINESS NEED

At the Santa Clara County Fire Department, Prosser said he found himself on the UCC journey almost by accident after implementing VoIP for the fire department's phones. A lot of different apps will accomplish the business need; RingCentral just happened to do it in a single app and now brings the

UCaaS* market gains over on-premises UC in the next five years



*UCaaS INCLUDES VOICE, VOICEMAIL, IM AND PRESENCE, WEB AND VIDEO CONFERENCING AND MOBILE CLIENTS.

SOURCE: "FORECAST: UNIFIED COMMUNICATIONS, WORLDWIDE, 2014-2021," GARTNER, 2Q 2017.

Glip collaboration piece with it too, he said, which worked well for the fire department. But for other enterprises trying to decide what's best, the journey can be a challenge.

"Other businesses may run email, scheduling, drive/collaboration space and messaging," Prosser said. "Everybody uses a piece of this, that and the other thing. And [vendors] are throwing in their 2 cents on how they go about [UCC]," Prosser said. "You have so many choices, you don't know how to choose. How do you pick?"

For Raytown Quality Schools in Kansas City, Mo., the choice came down to integrating and adopting new tools when the lifecycle of an older technology ended.

Just like the Santa Clara County Fire Department, Raytown needed to improve its telephone service.

The school district, with 9,000 students and 1,400 employees across 25 sites, needed to upgrade and replace its aging telephone system. It ultimately decided on Ottawa-based UC provider Mitel Networks Corp. to install 1,400 handsets across the classrooms and school business office, according to Melissa Tebbenkamp, Raytown director of institutional technology.

The Mitel offer included a desktop client and [virtualized](#) infrastructure in Raytown's data center, so users would be able to use their cellphones and devices off site. This was key to supporting advanced functionalities like paging and reliability that staff needed, Tebbenkamp said.

For the school system, flexibility in making phone calls and being able to chat internally have had the most significant impact among staff since Mitel voice and chat services were integrated, said Raytown's Jon Coleman, assistant director of technology operations. It's simplified the networking, too, he added. "Everything was a fairly simple switch over to the digital phones."

Raytown is looking at integrating other features,

but for now, the school is satisfied with the tools it's using, Tebbenkamp said. Just because features are available doesn't mean they should be integrated immediately.

"Tools have to improve [users'] ability to do their jobs. Sometimes giving them too much becomes an obstacle," she said. "Not all of our users will use all the bells and whistles."

If the school decides to integrate more UCC tools, it will start with looking at the business need. Enterprises and their IT departments must work together when it comes to integrating new technology, Tebbenkamp added. "As long as you know your culture, and you know how your users use technology, then I think you can find the tool that's the right fit."

CLOUD ON THE HORIZON

As UCC tools continue to emerge, so do their delivery methods. Unified communications as a service

([UCaaS](#)), delivered via the cloud, is a growing market, Gartner's Elliot said. Particularly as networks phase out old systems, they'd rather replace them with cloud-based services that allow them to then focus on core business processes. In that situation, products like UCaaS and [SaaS](#) become attractive, he said.

On-premises UC still accounts for about 70% of products to large organizations, according to Gartner's 2017 Magic Quadrant for UCaaS, which pointed to vendors like RingCentral, Microsoft, Verizon, 8x8, Fuze and Mitel as having strong UCaaS offerings.

Whether UCC is delivered on-premises or through the cloud, enterprises still must determine which tools and applications fit their business needs and how they get integrated. Successful IT shops will study how their users talk and communicate before implementing a wide range of potentially unnecessary tools. ■

Network Innovation Award

Ixia CloudLens Public

WHAT IT IS

Cloud visibility software

WHAT IT DOES

The software allows companies to see into their providers' data centers and use tools to quickly diagnose performance problems.

HOW IT WORKS

CloudLens Public relies on a combination of containers and a software-as-a-service interface to monitor endpoints and manage server policies.

WHY WE LIKE IT

Ixia's cloud-agnostic approach offers enterprise network managers security and monitoring capabilities across a range of public cloud service providers.

CloudLens
Visibility Platform for Public, Private and Hybrid Cloud

PLATFORMS

PRIVATE CLOUD
VMware, Microsoft, OpenStack

HYBRID CLOUD

PUBLIC CLOUD
AWS, Azure, IBM Bluemix, Google Cloud Platform

CAPTURE RELEVANT DATA

FILTER DATA WITH INTELLIGENT VISIBILITY

L2-L4 Filtering or BPF Filtering, Load Balancing	NetStack
Deduplication, NetFlow, Timestamping, etc.	PacketStack
Application Identification and Filtering, IxFlow, Geolocation & Tagging, Real-time Dashboard	AppStack
Data Masking Plus	SecureStack



To learn more about why Ixia CloudLens is our latest Network Innovation Award winner, read the whole story on [SearchNetworking](#).



Hardware

Network Hardware Is Not Dead (Yet)

BY SANDRA GITTLEN

→ The trend to outsource hardware management to service providers is growing, but IT departments are keeping key functions on-premises.

THE FORMER CIO of the Federal Communications Commission, David Bray, is proud to say his IT team is increasingly spending less of its time on network hardware and more on delivering mission results. His proof is an empty server room in Washington, D.C., that used to house 70 racks filled to the brim with servers, storage, switches, cabling and other network infrastructure.

The FCC, like many organizations, has adopted cloud and [software-driven strategies](#) that reduce the need for floor-to-ceiling racks and rows of networking gear in their own data centers. Where once Bray's team was responsible for the "day-to-day care and feeding" of physical network hardware

boxes, today, it's a different story. A service provider now manages the FCC's network hardware components—minus a few high-capacity switches for internet access—and the agency subscribes, where possible, to software as a service.

The transfer of functions from on-premises hardware to server farms housed in external data centers

Workload cloud migration process, major points to consider:

-  **APPLICATION ARCHITECTURE**—Is the app well-suited to running in the cloud vs. on-premises data center?
-  **RISK ASSESSMENTS**—If the application fails, what exposure is there to the organization?
-  **STORAGE COST**—How much data does the app generate and how will it be stored?
-  **APPLICATION PERFORMANCE**—Will different hosting services help or hinder app performance?

SOURCE: "CLOUD MIGRATION REALITIES," NEMERTE'S RESEARCH, AUG. 2017.

comes as businesses look for ways to cut costs and streamline operations. At the same time, technological innovations in hardware and chip design have made it possible for service providers to pack more differentiated services in a single box, which reduces the need to maintain a large number of devices for different purposes. The result is a networking environment in which enterprises can entrust more of their hardware management to the hands of service providers, allowing IT managers to align their departments more closely with business needs and keep only selected networking hardware in their own data centers.

While on-premises network hardware components will never disappear completely, "What you can expect to see is fewer physical boxes hosting more differentiated [virtualized network functions](#)," said John Burke, CIO and principal research analyst at Nemertes Research. Gone will be the separate appliances to handle load balancing, firewalls and WAN optimization. And if forecasts are correct, a growing percentage of that functionality will be software-driven within high-availability gear, located in racks operated by service providers.

In its research of IT organizations, Nemertes has

found that more than 40% of work is being done outside [enterprise data centers](#) already. Enterprises are showing a greater willingness to put services in the cloud, and Nemertes expects them to follow suit with vital network functions eventually, as well.

That said, shifting the reliance from on-site hardware to third-party providers will take many months to unfold. Nemertes expects it will be another six to seven years before the percentage of enterprise workloads managed by cloud providers eclipses 70%. Some services will simply stay housed in boxes on site, Burke said.

"A large enterprise might have 10,000 custom applications running inside, and some of them are absolutely business-critical, written in COBOL and running on a mainframe. There is no impetus to develop them on a modern platform," Burke said.

At the FCC, being in sync with the business has meant a move to [virtual desktop infrastructure](#) (VDI), wiping out the need for IT to manage a data center. More than three-quarters of

the FCC's workforce uses VDI in-house, and 100% use it on the road. A small percentage of employees require PCs with more processing power to handle computational and graphical applications.

Bray, who became executive director of the People-Centered Internet coalition to promote global internet access in October, acknowledged that the network hardware components didn't disappear overnight. For years at the FCC, IT stopped refreshing hardware that was end of life and consolidated what was left. "We rationalized our application portfolio, looking at redundancies, converging them and virtualizing where possible," he said. The fewer apps, the less hardware and the easier it was to migrate to a cloud environment or SaaS. Also, he was able to shrink the staff required for IT because he no longer needed contractors to be on site, managing and maintaining the physical gear.

50%

of organizations are using infrastructure as a service in production environments.

SOURCE: "2017-18 CLOUD AND NETWORK BENCHMARK," NEMERTE RESEARCH, AUGUST 2017.

CITY OF ANGELS DEPLOYED (MOSTLY) IN CLOUD

In Los Angeles, the city is in the midst of determining which applications and services will remain on-premises and which will migrate to the cloud, according to the city's CIO, Ted Ross.

"The idea of 100% cloud can be very compelling. But if you own a data center and have an investment in on-premises equipment, there is a lot to be said for optimizing the balance between on premises and cloud," Ross said.

Already, the city has reduced the use of physical stand-alone servers and has virtualized 93% of its server load. "That's quite high, especially for government," he said. At the same time, the city is reducing its physical storage footprint as well, despite increasing storage requirements, by using cloud-based storage. Ross can also repurpose hardware to testing and development environments or to other enterprise applications.

Two metrics of success in reducing networking hardware components, he said, are power consumption, which has decreased 30%, and data center uninterruptible power supply utilization, which is just under 20%. "So we're increasing total capacity, but decreasing power usage," Ross said.

**[I]f you own a data center, ...
there is a lot to be said for
optimizing the balance between
on premises and cloud."**

—Ted Ross, City of Los Angeles

He anticipates certain sensitive workloads such as the police department's applications and storage and other data-intensive workloads will remain on premises and, therefore, require a certain amount of infrastructure.

VIRTUALIZED NETWORK REALITY

Melissa Handy, technology director at a K-12 school system in the western U.S.—that did not want to be identified—said being 100% hardware-free just isn't realistic, even in her smaller environment. She is trying to get close, however, especially since she has only two full-time employees dedicated to network support for more than 800 students—each with multiple devices, including school-provided laptops.

"Just the networking stuff—hardware, security cameras, firewalls, audio and visual—was taking up so much of our time," she said. "It was impossible to have an internal team with the skill set to stay on top of that and manage all the switches, do firmware upgrades and make sure the security on the servers is in good shape, let alone rip and replace equipment."

Like the FCC, the school spent time plotting what hardware in the network could be managed in the

cloud and what had to stay on premises. Space limitations, wet weather and an aging power grid in the region also factored in the decision of what to move off-site and what to bring back in-house. For example, the school had moved to hosted VoIP a few years earlier, but Handy found that regional power outages necessitated an on-premises VoIP system that would allow for classroom-to-classroom calls even if the internet was down.

For other school resources, however, the cloud offered a more stable platform, including the learning management system, which was moved to SaaS, and email, which was moved to Gmail. Print jobs are handled through a software client that sends information over local data lines, instead of back and forth from the cloud server across the VPN. That approach saves bandwidth, particularly during print jobs that could be thousands of graphics-heavy pages.

Her main hardware responsibility now is overseeing a fleet of Extreme Networks' B5 edge series switches, S-Series switches in the core and wireless AP3825 access points.

To accommodate the transfer of applications and services to the cloud, Handy boosted the district's internet capacity from 100 Mbps to 500 Mbps, with

the possibility to expand to 1 Gbps when needed. The main campus uses a dedicated fiber line, with branch locations connecting via a VPN. "I'm paying much less to manage the network now that it's right-sized, but as a trade-off, we needed a bigger pipe to the internet," she said, adding the \$70,000 that used to be allotted to capital expenses now can be used on operational expenses.

ALIGNING BUSINESS AND NETWORKING NEEDS

The popularity of cloud hosting and cloud-based applications has pushed enterprises to re-evaluate their approach to hardware, according to Andre Kindness, a principal analyst at Forrester Research. This is proving difficult because most have no long-term strategy, he said.

"Infrastructure operations and networking are usually so short-sighted, working project by project and disconnected from the organization's five-year plan," he said. "The first step in reducing hardware and moving to the cloud should be for IT to align networking—not just applications—with the business."

With the business roadmap in mind, IT can

conduct better cost justifications for keeping or removing network hardware components. For instance, IT could set aside a server cluster retired from an application that goes to SaaS for an upcoming internet of things project rather than losing the investment altogether. “The network strategy should be fully in sync with the business,” Kindness said.

That strategy has paid dividends at the FCC, where IT’s profile has risen even as the amount of networking hardware it manages has decreased.

“Historically, somewhere along the line, IT became resigned to the role of geeks in the basement and CIOs as chief infrastructure officers,” the FCC’s

Bray said. “With hardware out the picture, CIOs can be what they should be—dual-hatted chief information officers and chief innovation officers talking about new capabilities for the business that align to the mission.”

Hardware will never disappear from enterprise networking. But there’s no slowing down the trend that sees service providers and companies finding new ways to move more functions to the cloud. There’s a lot to be said about balancing on-premises and cloud services. As a result, IT managers and network professionals will find themselves spending more time on business functions and less time on network plumbing. ■



THE SUBNET | Q&A | JEAN DERGURAHIAN

The Business of Networking

- [Jedadiah Casey](#)
- [Network Engineer](#)
- [Rotech Healthcare](#)
- [Orlando, Fla.](#)

THE FIRST STRIKING thing about Jedadiah Casey is his passion for learning. It's a good thing he has such a passion, because his journey to becoming an expert-level network specialist, as he explains, requires extensive reading and learning.

Starting as a PC technician, it wasn't until he was in his 30s that Casey explored a network specialist career. As he's studied, become certified and built his experience, Casey said he sees a [breadth and depth to networking](#) that he's eager to tackle. "My background taught me that knowing networking was simply adjacent to systems administration, which, of course, is not true," he said.

A network engineer for Rotech Healthcare Inc., a home medical equipment and respiratory treatment supplier in Orlando, Fla., Casey manages connections to several critical rural health settings. Maintaining reliable network services is vital to make sure health services are delivered on time.

We chatted with Casey about his work and got his insights into what it takes to develop a network specialist career.

Editor's note: *This interview was edited for clarity and length.*

You came to networking in your 30s. What have you learned that others who start earlier might not?

I believe that many people who become technologists early on have a lack of appreciation for the business side of things. At some level, all technology is designed and developed to serve a particular business purpose. I believe this is easier to understand and appreciate as you get older.

Another thing that is more difficult to see when you're younger is just how important it is to learn the fundamentals and the way knowledge builds on itself over time. When you're younger, the process

of knowledge acquisition can sometimes feel like an eternity. As you get older, you learn to recognize and appreciate various learning and experience milestones, and your path may become clearer.

I've had a very strong interest in computer networking since the first time I dialed into a bulletin board system in the early 1990s with my Intel 386-based PC. Specifically, wide area networking and the technologies used by service providers have always been wondrous to me. In retrospect, I should have pursued work within a service provider environment earlier in my career.

I like the idea of working where the network *is* the business rather than a cost center, as many enterprises view it. I intend to take my career in the service provider direction eventually; however, working from the enterprise side has given me an opportunity to see where service providers are lacking with regard to customer relationships.

Tell me about a project you're tackling currently.

I am helping to evaluate different [SD-WAN](#) [software-defined WAN] options for my company, now that the market and various products have had some time to mature. SD-WAN has come to mean many

different things, so just like with any other part of network architecture and design, it comes down to determining the underlying business requirements and working within constraints. We are still determining what SD-WAN will mean for us and which particular aspects will be the most beneficial.

Cost is always a consideration, but transport availability can also be a major limiting factor. The essence of SD-WAN is intelligent path control over multiple connectivity points. My company has many rural locations where a T1 connection is the best and sometimes only option available. This creates challenges with regard to bandwidth usage, especially as [software as a service](#) becomes more frequently delivered over the internet.

Why does your company want to implement SD-WAN across rural settings?

Potential cost savings, but perhaps more important is site resiliency through path diversity, as well as increased bandwidth. Each site is being evaluated individually for current connectivity options, as well as the need for resiliency in terms of potential lost revenue due to temporary loss of connectivity.

Some of our larger sites are also our most rural,

and if multiple commodity circuits like cable and DSL are available, SD-WAN can help lower the price versus having dedicated circuits like a T1 or T3. A single dedicated circuit may have a [service-level agreement] associated with it, but it has been our experience that, in general, copper-based dedicated circuits are not more reliable than commodity circuits, where two commodity circuits may be cheaper than a single dedicated circuit. The SD-WAN portion can intelligently prioritize traffic between the multiple connections.

What's a past project you're proud of?

I am very proud of the work I did participating in the relocation and decommissioning of my company's old data center. During the migration, we upgraded from an older [Cisco Catalyst 6500](#) platform to a new [Cisco Nexus-based core](#). The migration included a temporary point-to-point [Metro Ethernet](#) circuit that allowed for a seamless transition.

We were able to move the networking services from the old data center to the new one without interruption. As equipment was installed in the new data center, services were migrated from the old data center and then decommissioned. With the

exception of planned maintenance windows, the effect of the move was largely invisible to the rest of the company.

This was also my first exposure to the Cisco NX-OS operating system. NX-OS is interesting because it is similar to the traditional Cisco IOS, but there are many little differences in the configuration and implementation. When moving between platforms, it becomes very important to understand the fundamentals of how the various protocols actually work.

For example, with the traditional Cisco IOS, all licensed features are immediately available for configuration, whereas with NX-OS, many features must be activated before they can be configured. Another example I believe most people will encounter early on is that when configuring Cisco's [Hot Standby Router Protocol](#) technology: IOS uses standby commands, whereas NX-OS uses HSRP commands, which is more intuitive in my opinion.

How do you think what you learned will translate to the next project?

The experience taught me to more fully analyze different aspects of requests being made, including both requirements and constraints. To those

outside of networking, the network typically resembles plumbing, where you simply connect, and it just works. It is our job as network professionals to realize the different caveats and to ask the questions that nobody else thinks to ask. It is our job to determine what is ultimately trying to be accomplished with regard to the network and provide the solution within the various constraints.

What advice would you give to young networking professionals just beginning their careers?

Let your passion drive your learning, be responsible for your own [career development](#), and remember that even small sessions of learning add up to a greater whole over time. Most important, if you truly wish to be an expert in this field, realize that you are committing to lifelong learning. Expert-level networking requires virtually endless reading of technical topics.

I've been doing this long enough now that I've seen a few fads come and go, but what always remains is fundamental knowledge. When you're first starting out, it is very easy to be overwhelmed with how deep the world of networking goes. Learning takes time, and learning at the expert network

specialist level can take many years. In my blog I describe that a [life-changing study method](#) for me was learning to create repeatable flash cards in question and answer format instead of taking notes.

Why did you create your blog?

Having recently passed Cisco's [CCIE Routing and Switching](#) written exam, it's very interesting to look back five years ago when I acquired the CCNA certification and transitioned from a general sys admin mindset to one that is more network-oriented. I know that over the course of my journey, I've had various thoughts and feelings that I felt were important to express—to let others know that they are probably not alone.

What's next on your reading list and why?

Last year, Nicholas Russo released a wonderful book, *CCIE Service Provider Version 4 Written and Lab Exam Comprehensive Guide*. While this book is geared toward Cisco's expert-level service provider certification, it provides a wealth of information for the Cisco CCIE Routing and Switching certification as well. I highly recommend this book to anyone who wants to dig deeper into networking. ■

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