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## TACKLING THE ENTERPRISE MARKET THROUGH SDN AND NFV



Service providers from all corners of the industry are now entering the new world of software-defined networking and network function virtualization. By virtualizing their systems and moving to off-the-shelf, software-controlled hardware, network operators can potentially both cut costs and more quickly introduce new services.

And this transition appears to be creating major new opportunities on the enterprise front. Via SDN and NFV, operators are now offering a range of new enterprise-focused services like on-demand bandwidth, SD-WAN, virtualized security and

more. And while many of these software-powered services could cannibalize the revenues that service providers currently generate from enterprise customers, many believe this transition to more flexible services is inevitable.

But this transition won't be flawless, or steady. And it will likely take years.

This Fierce eBrief will dive into this sector by looking first at the operators leading this network evolution, and then at the virtualized enterprise services they're selling.

## SD-WAN MEETS VIRTUALIZATION

### DEPLOY SECURE SD-WAN FASTER WITH GREATER AGILITY

The pace of innovation has grown by leaps and bounds over the past several years, aided by open frameworks and the programmability of the cloud. Until recently, however, the network has not kept pace. The explosion of bandwidth-hogging applications in the cloud; the acceleration of connectivity spurred by new branches and mergers; customized networks that are cost-aligned with applications—each of these trends are forcing businesses to change the way they communicate. SD-WAN is showing promise as a technology that can align with the cloud, allowing users to turn up new offices faster with zero touch provisioning, customize their application policies, and create self-care portals that provide a new level of control over software-defined platforms.

While SD-WAN gives customers hope, its true power is not fully realized until combined with NFV. A typical SD-WAN solution is built using a siloed, proprietary appliance, adding yet another device for the customer to manage and integrate with their existing network.

[Juniper Networks SD-WAN solution](#) leverages the best from both SDN and NFV, delivering next-generation infrastructure using a cloud-based VNF delivery approach that is centrally orchestrated to deliver customized service chains.

With Juniper's SD-WAN solution, both service providers building managed SD-WAN services as well as enterprises seeking flexible SD-WAN solutions can choose between virtual and physical platforms. Applications are intelligently routed through cost- and latency-optimized paths using the Internet, MPLS, or 4G/LTE. Juniper's NFX250 Network Services Platform gives businesses looking to virtualize the edge a high-performance platform that consolidates network services and applications on a universal CPE (uCPE). Combined with a comprehensive

VNF solution based on Juniper's vSRX Virtual Firewall, all WAN (MPLS, IPSec, SD-WAN) and security services are fully integrated, freeing up resources so that additional workloads—such as incremental network services (WAN optimization, WLAN, etc.), application services like unified communication, and enterprise-specific applications—can be shifted onto the same uCPE platform. For cost-conscious locations, Juniper's SRX300 Services Gateways provide integrated routing and security, along with SD-WAN capabilities built on Junos OS.

Deployment is simplified using cloud-based delivery that automates lifecycle management with Juniper's Contrail Service Orchestration, an innovative solution that aligns network service delivery with the same expectations already set by the cloud. SD-WAN, routing, and security are all managed through a single pane of glass, making it easy to control these services while lowering total cost of ownership and simplifying implementation at scale—just to name a few of the benefits. Built with high performance, reliability, and security in mind, customers have the same confidence in SD-WAN as in their traditional CPE.

Leave it to [Juniper's Cloud CPE solution](#) to supercharge your SD-WAN deployment and help you stay ahead of the competition. Juniper helps you leverage the power of both SDN and NFV to transform your network and empower the digital economy. Whether you build a new IoT service in the cloud or innovate with a facial recognition application for augmented reality, the network will support your journey. This is what Juniper's SD-WAN solution delivers. ●

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## THE OPERATOR PATH

By Tara Seals

Service providers—both wireline and wireless—are now leaping into the fray when it comes to software-defined networking (SDN) and network function virtualization (NFV), driven by exponentially increasing bandwidth demand and an ongoing quest to uncover new revenue streams as legacy services decline.

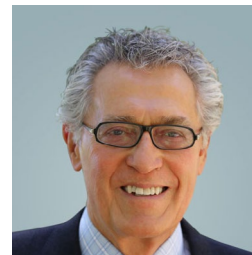
By virtualizing their systems and moving to off-the-shelf, software-controlled hardware, network operators can both cut costs and gain the agility to more quickly introduce differentiating services, like on-demand bandwidth, SD-WAN, virtualized security and more. This transformation is well underway—“The train has certainly left the station,” said Michael Howard, senior director for carrier networks at research firm IHS Markit—but there are plenty of unknowns and challenges to face along the path.

There are about a dozen operators leading the charge on NFV and SDN with commercial service deployments, mostly in the Tier 1 camp. According to Howard, “most of the big guys are head over heels about it, whether they’re speaking about it or not.” He cited AT&T, Verizon, Orange, DT,

Telefonica, BT, NTT, SKT, China Unicom, China Mobile, CenturyLink, Level 3 and Telus as being the primary movers in the space to date. However, “just about every operator of any size is engaged in different projects around this,” he added.

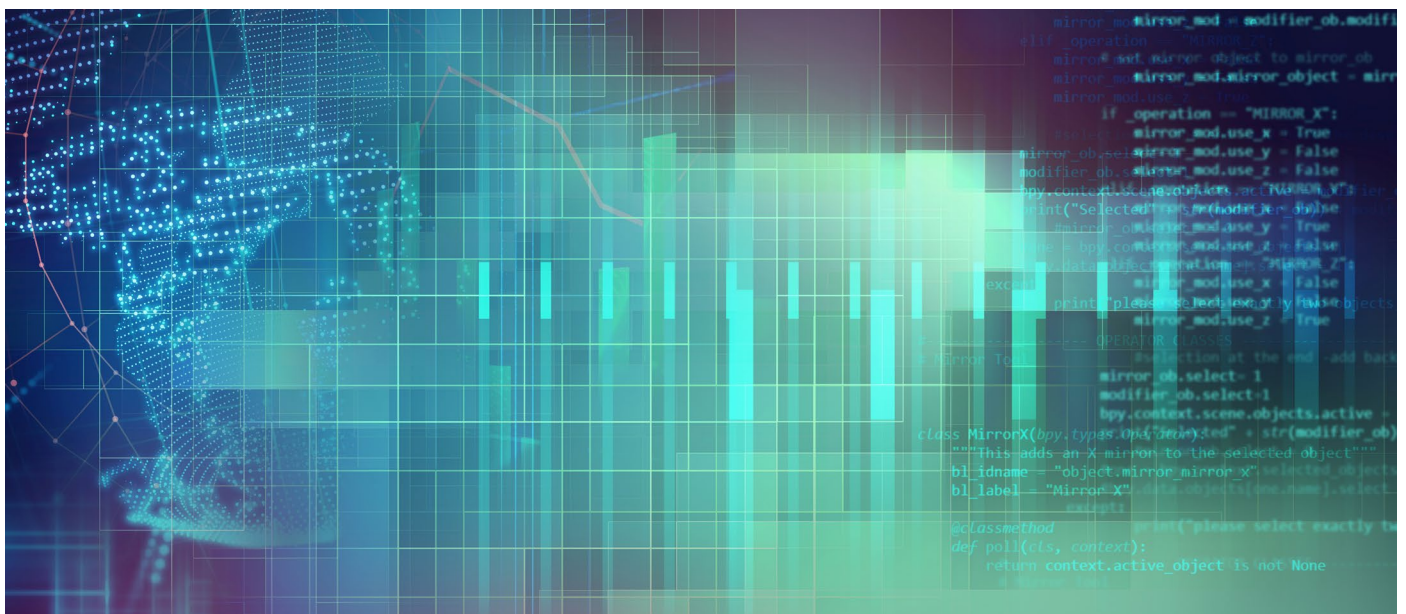
## PROGRESS AND DRIVERS

One of the loudest operators in the transformation choir is AT&T, which has embraced NFV and SDN almost from the beginning – carrier NFV was introduced to the world in an ETSI white paper in 2012. AT&T has already virtualized about 55% of its network functions and expects that to reach 75% by 2020.



“The train has certainly left the station.”

—Michael Howard, senior research director for carrier networks, IHS Markit



“We’re on a multiyear journey to transform our network to a software-centric model,” said Roman Pacewicz, chief products officer at AT&T Business. “Our motivation is a fundamental change around how networks are being used. Networks today handle a wide range of traffic, including chatty packets from internet of things (IoT) deployments and fat packets from video and mobile broadband—and that’s changing the profile of what we do. Think about the fact that the world has seen a 25,000% growth in the last 10 years in data traffic. The traditional network just doesn’t scale well to accommodate this.”

Instead, AT&T recognized the need to move to the web-scale model used by internet companies, which allows exponential growth following Moore’s law.

“It will allow us bandwidth and functionality at a reasonable economic proposition,” said Pacewicz. “Virtualization also opens up the network for innovation. When integrating proprietary network elements, you’re tied to each vendor’s architecture and it costs a tremendous amount of money and time to have them work together. Now we can deploy a common infrastructure, a very healthy cost-effective platform for our business, instead of building a network for each service.”

Apart from the internal need to support more traffic, carriers have an opportunity in moving from static to dynamic networks to offer services on-demand for enterprise agility. Think real-time configuration and orchestration, the ability to change and scale services quickly, and to move bandwidth up and down for users as needed. By delivering virtualization to the edge, operators gain the ability to offer customers control over how they’re transforming their own businesses to become more agile.

That’s a big motivator for CenturyLink, which started with NFV five years ago. Now the carrier, like AT&T, is deep in the throes of transformation.

Bill Walker, director of network and cloud architecture at CenturyLink, noted that the

company has steadily expanded the virtual network functions (VNFs) that it makes available to enterprises, as well as the types of projects that it takes on for customers.

“The benefit of NFV is being able to place elements where you want them dynamically, as opposed to having to redesign and rearchitect your networks for every new service,” Walker said. “Take broadband network gateways (BNGs) for example—do you run them in the core network, or move them closer to the access network under the metro? That decision changes the way you lay out services in your network. With NFV I can place elements where it makes the most sense at that point in time, closer to the customer if necessary, and then simply use SDN to link them together and do the service flows.”

You can’t effectively have one without the other in a carrier network, he added.

“If NFV is sitting down with the architect to design your house, SDN is when they add the drains and plumbing,” Walker said.

The end result? “Foundational network elements are easy to integrate into this cloudy network infrastructure,” he said. “I can create connections from virtual to physical sites and layer, say, a firewall on top—and build a virtual stack for a virtual data center. And because we can adjust services on a real-time basis, they can experiment too. They’re not committing to a black box being on site for the next five years. They can trial things and do proofs of concept, and scrap it if it’s not working for them. It helps with the ‘fail fast’ mentality.”

Incumbents aren’t the only ones embracing change. Masergy Communications, a business market-focused competitive provider, has been offering virtual CPE for about three years, available globally in over 150 countries; and, it offers cloud-based firewalls and bandwidth on-demand. Customers can change their tier level for QoS and even VLANs via a portal.

“SDN/NFV is important to Masergy because it

allows our customers to have increased agility to adapt to changing business conditions,” said Ray Watson, vice president of global technology at Masergy. “This really isn’t about technology for technology’s sake, nor is about pure cost savings. It’s really more about giving our global customers flexibility and the ability to instantly deploy or modify resources.”



“It’s really more about giving our global customers flexibility and the ability to instantly deploy or modify resources.”

—Ray Watson, vice president of global technology, Masergy

He said that Masergy makes investment decisions on a customer-centric basis.

“This is a somewhat controversial opinion, but I think that carriers often focus too much on defining standards and obsessing about reference frameworks, as well as being concerned with migration of legacy services to a virtualized environment,” he said. “We decided to take a different path: We have been offering a customer-controlled network since our inception, and we simply evaluate VNFs based solely on the value it can bring the end user.”

Masergy so far offers VNFs from a range of companies, including Audiocodes, Brocade, Cisco, Certes, Fortinet, Silver Peak and others. Going forward, it’s in trials for additional security VNFs.

The focus on meeting customer requirements seems to be somewhat universal. “There’s no doubt that the biggest driver for this change is that we live in

an on-demand network world, and the expectation these days, because of Apple, Google and Amazon, is to get what we want when we want for however long we want it, and that changes everything,” IHS Markit’s Howard said. “The basic goal for service providers is to be more agile and to get more revenue more quickly, which means offering services that people expect more quickly, on-demand.”

## THE CULTURAL SHIFT

While the overall benefits of SDN and NFV seem self-evident, the devil, as always, is in the details. Big challenges remain, including a lack of mature technology and the cultural impact of the transformation.

Effective automation, for instance, is one hurdle that still needs to be cleared, according to Howard.

“Making everything on-demand requires a level of automation that has not been in carrier networks in the past,” he explained. “You have to take the human out of the process. Automation should extend not just at the top level—you can automate service, sure, but how do you tell the network to put the service in place? You have to get specific about different parts of it. And conforming to SLAs automatically across the network means being aware in real-time of what’s happening at any point in the network where the customer traffic traverses.”

That in turn requires analytics, using machine learning and artificial intelligence that can handle big data sets. “You have to go down deep inside the network and be able to track traffic from the router to the optical network, across access to metro to long haul,” Howard added. “If traffic creeps towards being out of bounds, processes need to be in place that can change the network to accommodate this, dynamically. We’re not there yet.”

Other technology concerns include how to ensure performance for IO-intensive programmability and the massive data sets that come with these advanced, real-time analytics engines. Moving everything to commercial off-the-shelf (COTS) servers and abstracting the underlying hardware layer from



the intelligent software running above has plenty of advantages, but general-purpose servers are not necessarily geared for performance. So, latency concerns remain, and hardware specialization has become an area of focus.

Transitioning to SDN and NFV isn't just about the technology, either. One of the biggest challenges (and costs) lies in managing a broad cultural shift.

"In a software-based environment, the product development cycle becomes much shorter. In the past you had a model where you develop an idea, prototype it, go through endless cycles of lab, field and market testing, and then finally roll it out—and then you take two years to change the OSS, billing and support systems," said Liliane Offredo, principal analyst at ACG Research. "Now, you're changing things every two weeks or every month. This is not only a technology challenge, but a radical shift when it comes to the methods and procedures these companies have embedded."

She added that it's an even more complex endeavor given that virtualization is happening in stages. "You need to rethink your processes as you run the business—that's a cost," said Offredo. "Carriers will have hybrid environments for a long time, because you also have to continue to support the

going concern part of the business, and you're incrementally adding to what you have rather than retesting and rewriting all of your services."

## DIFFERENT SKILL SETS REQUIRED

A virtualized network requires different skill sets than those needed to run traditional telecom networks. Functions are now running as software on a server, so IT skills become key; and software engineers are in more demand than field technicians and hardware specialists. For many service providers, retraining and transitioning staff is as big of a change as the one taking place in the network.

"This workforce shift is a long process with a lot of commitments, and in many cases providers haven't figured out the full cost of this cultural transformation," said Offredo. "It doesn't just take a one-week course to transform someone into a software guru, so there are training costs. Carriers will also need to offer early retirement for some, and they'll hire new talent, which is not easy to find. Those resources are expensive because they're rare."

Changing the mindset is top-of-mind at CenturyLink.

"Dealing with people with 20 years of telecom experience and trying to get them to embrace new



skills is difficult at best,” said Walker. “It’s so easy to fall back into that 20-year-old mindset very easily—‘we do it this way because we’ve always done it this way.’ As an example, we can’t take six to nine months to qualify a new network element anymore. Now, we’re fixing bugs as we find them, so as we finish one test cycle we can immediately start a new one. We’ve had to implement agile testing and continuous integration in a network world.”

To encourage existing employees to think differently, the incumbent has implemented a series of initiatives around knowledge transfer and information-sharing. These include basic lunch-and-learns as well as “standing meetings,” where groups from different areas of the business are invited to speak for 15 or 20 minutes.

“We’ve really tried to create a culture where people know they’re allowed to think outside the box and do something different,” Walker said. “Part of what we do at CenturyLink is turn on the turn signal and merge into new lanes. Asking a question of someone in a separate workstream is nontraditional, but we’re focused on breaking down those barriers and having 15-minute crazy idea meetings between different stakeholders.”

For its part, AT&T is taking what Offredo calls a “drastic” approach in prepping its workforce for virtualization. Aside from in-depth training, AT&T is offering incentives like badges, so that when workers gain needed skills in areas like big data or VNFs, they’re recognized for being specialists. It has also established relationships with universities, including Georgia Tech, to roll out master’s degrees in software design, electrical engineering and other fields, and has established a collaborative innovation community where employees are encouraged to provide ideas by interacting with other members. It also funds projects on an incubator basis.

“Pivoting AT&T’s culture is one of the biggest challenges we face,” Pacewicz said. “We want to



“We want to become a software company, but we have 260,000 employees. You can’t just take those resources and replace them; you need to transform the skill sets of your employees.”

—Roman Pacewicz, chief products officer, AT&T

become a software company, but we have 260,000 employees. You can’t just take those resources and replace them; you need to transform the skill sets of your employees. This affects everyone, from the hands-on technician to the C-suite.”

## WHAT’S NEXT

Going forward, operators will continue to deploy SDN and NFV incrementally, while testing new services and exploring architecture choices. It won’t be a rapid process, but it should be steady.

“The challenge for the bigger operators in particular is the fact that when they change their technology or service mix, they run the risk of disturbing revenue,” Howard said. “That’s why they’re famous for moving slowly. And, as we get deeper into this huge transformation, and we deploy real services in a real network, other issues will pop up because networks are so complex. But there is no turning back at this point. It’s an ongoing process, but I think we’re on track.” ●



## VALIDATING SD-WAN DEPLOYMENTS

### SD-WAN ARCHITECTURE DRIVING NEED FOR NEW TEST METHODS

SD-WANs are characterized by significant enhancements to the WAN architecture, new use cases, and functional components. Vendors, Cloud Service Providers and/or Enterprises need to thoroughly validate SD-WAN implementations before deployment:

1. SD-WANs use a central controller to enforce routing and security policies and route application flows over the appropriate links. The Controller's southbound interactions and its ability to enforce policies need to be tested, prior to deployment
2. SD-WANs provide differentiated QoS to the various application flows. Their ability to throttle Facebook or YouTube traffic while providing guaranteed QoS to voice calls or Office 365 traffic must be validated. The ability of the Controller to dynamically route around congested or failed paths also needs testing
3. As enterprises add new branches, the application performance or reliability in existing branches should not suffer during turnup.

The successful validation of any SD-WAN implementation will ensure the support for increased scale at lower cost, ensure the plugging of security holes and allow enterprises to focus on their core competencies, instead of worrying about branch connectivity.

### SD-WAN TESTING METHODOLOGIES

Testing methodologies that are critically important for the validation of an SD-WAN implementation are described below. Spirent's test functions can be physical (Spirent TestCenter chassis or Avalanche appliance) or virtual (STCv or AVv that may reside in the same host as the Branch or Cloud vCPE):

1. Spirent's test functions validate SD-WAN policies and accurate southbound programming of SD-WAN forwarders. Spirent reads SD-WAN policy databases,

via REST API calls, emulates end hosts (for e.g. end users in a branch) and originates test traffic that is representative of real-world traffic. On the terminating end, Spirent inspects the traffic that is received from the SD-WAN forwarders and ensures that the SD-WAN policies are exercised and adhered to. Connectivity should be refused to forbidden websites. Connectivity should be allowed to approved websites. Branch to HQ communication is validated.

2. Spirent emulates hosts inside a branch office and originates high scale application traffic. Spirent's test functions ensure that the appropriate priority and QoS is provided to the applications. For example, ensuring that intra company file transfers, voice calls and emails are forwarded within strict QoS guidelines. Spirent also verifies that high priority traffic traverse over the expensive MPLS links whereas lower priority traffic is sent over Internet broadband connections.

3. Spirent impairment generators are placed in the network and programmed to selectively drop, delay or miss-order packets in certain flows. Under such circumstances, Spirent's traffic functions ensure that high priority traffic is routed around failed links, including the use of Internet links for voice calls and intra company emails if needed, while also ensuring that the lower priority Facebook or YouTube traffic is dropped.

Tests should be performed during the turn-up of one branch when there are 10s or even 100s of other branches that are already operational. Spirent validates that the application performance within existing branches does not suffer during the addition of a new branch.

According to Rajesh Rajamani, Director of Product Management at Spirent, SD-WAN brings exciting improvements to the traditional WAN, making them higher performing and simultaneously cost-effective. However, new SD-WAN implementations also need enhanced testing prior to deployment, to ensure that end users don't suffer from lack of reliability and QoE.



## THE ENTERPRISE ANGLE

By Brian Santo

There are few brand-spanking-new communications products or services that are now suddenly possible because of software defined networking (SDN) or network function virtualization (NFV). The key difference with virtualized networking so far isn't the *what*, it's the *how*—less what the products and services are than how they work.

Software-defined wide area networks (SD-WANs), for example, provide pretty much the same functionality as WANs; the difference is that the former are far more flexible than the latter. Enterprise customers are jazzed about SD-WANs not because they're different from traditional WANs, but because they can optimize their SD-WANs quickly in terms of both operations and budget.

AT&T and Verizon are both among the earliest adopters of SDN and NFV technologies. Thus, their experiences will be emblematic. So what are

they offering, what's different about those offerings, and what are the business consequences of such a dramatic evolution in technology?

### AT&T

AT&T has been particularly enthusiastic about virtualizing, vowing to have 75% of its core network software-enabled by 2020.

"A software-centric network lets us extend to customers different value propositions. The customer has more control, and services are much more on demand, where they can be provisioned quickly, where bandwidth can be increased or decreased quickly by the customer through a portal. All that is enabled by a software-centric network versus an appliance-based network," said Roman Pacewicz, chief products officer at AT&T Business.

AT&T offered its first software-defined product, AT&T switched Ethernet on Demand, 2½ years



ago. Customers could provision their own service in days, rather than weeks (or longer). Schools, for example, could decrease the amount of their bandwidth over the summer, and bring it back up again in the fall, Pacewicz said.

Bandwidth is bandwidth—the *what* changes not at all. But the *how*? Before, a customer looking for more bandwidth would have to call their communications provider, which would then have to direct technicians to reset or perhaps even reconfigure the network—a process that might take days or weeks. With SDN, customers can go online and increase or decrease their bandwidth, and it will be done automatically in as little as hours, Pacewicz said.

Two years ago, AT&T rolled out a dedicated on-demand internet product. The difference, Pacewicz said, was that there was no longer a requirement for a big-iron router; the routing function is virtualized in a cloud center. Customers can increase or decrease their bandwidth automatically. Firewalls no longer have to be on-premise either; that too is virtualized in the cloud center. (The routing software is from Vyatta, which AT&T bought from Brocade earlier this summer.)

AT&T expanded its SDN-based products with Netbond, essentially a service for connecting cloud providers like Amazon AWS and Microsoft Azure with a growing number of software-as-a-service (SaaS) companies. That was followed by Collaborate, a unified communications service launched about a year ago.

The other major product AT&T introduced thus far is Flexware, which Pacewicz described as a platform that extends the cloud into the customer premise. The company has a growing library of functions – like routing, WAN acceleration and security – that can be hosted on-premise in virtual CPE, typically an x86-based box. One of those functions will be SD-WAN from Velocloud, to be introduced later this year (AT&T so far has been providing an appliance-based version of Velocloud).

## VERIZON

Verizon, meanwhile, started in 2015 with SD-WAN on a service model, both as a managed service based on Cisco gear, and also as a pay-as-you-go service based on technology from Viptela. Midway through 2016, the company introduced virtual network services delivered by universal CPE, putting a software stack on what Verizon refers to as a “gray box” (a Juniper NFX250) with a set of services including SD-WAN, virtual iWAN (from Cisco), security from several vendors, and WAN acceleration from multiple vendors, according to Verizon’s Shawn Hakl, VP of product and new business innovation.

Hakl said Verizon customers were clear that they wanted an off-the-shelf approach (rather than using the Juniper gray box), so earlier this year Verizon began delivering all of the same services it had been offering on what Hakl called “true” commercial off-the-shelf (COTS) servers, also referred to as white boxes.

In June, the company launched hosted network services, basically taking everything it had been offering and virtualizing it, “so that you can spin up a virtual router, a virtual firewall, virtual WAN optimization in our network in an OpenStack node at a near edge location—within 10- to 25 milliseconds of your location. And that also comes with an orchestration engine that is capable of doing complex service chaining, and we continue to release complex service chains every couple of weeks. The obvious one was router plus firewall, but also router plus WAN optimization, security plus WAN op, and others. And different use cases—SD-WAN across our cloud interconnect feature, mixing and matching with our bandwidth on demand features that we have both on the edge and in the cloud. They’re basically policy use cases.”

## THE RESULTS

The transition to virtualized networks is an investment, so there is an initial outlay, but once in place, a virtual network is supposed to be easier and less expensive to manage, which is expected

to ultimately lead to cost savings for network operators, which presumably might eventually pass those savings along to customers.

That's the theory, anyway. Only three years or so into the SDN/NFV era, it might be too soon for network operators to see opex savings starting to accrue.

When asked if AT&T has evaluated the effects of virtualization on its own operations so far, Pacewicz responded: "We feel this is a good balance between value for the customer and value for the firm. Our strategy is to move forward with what our customers need instead of, quite frankly, protecting revenue we may already have. We really want to serve our customers; we think that will benefit us and our customers better."

Hakl's response was to talk about business opportunities that are opening up. It used to be, for example, that when a customer came to Verizon looking for some customized service, it might take 300 days or so to develop it, at which point the customer's needs might have changed. Now Verizon can respond in a few weeks. "Now you can have a meaningful conversation about priorities," he said. "I don't have to guess what my customers want. We can build and deliver things in a reasonable and meaningful time frame."

Pacewicz, meanwhile, noted that not only does virtualization open the possibility of selling more transport, there's also a new opportunity to sell services on other companies' transport as well. Virtualization, he explained, is remaking the market global, opening opportunities companies never had before. This is where being an early adopter can most certainly be an advantage.

Pacewicz and Hakl were both clearer on the customer advantage. Pacewicz observed that customers no longer have to provision for peak service requirements. Virtualizing the equipment that used to sit on their premises saves money, and not having to manage that equipment saves money. These and other considerations lead to opex savings that Pacewicz variably described as "considerable"



"I don't have to guess what my customers want. We can build and deliver things in a reasonable and meaningful time frame."

—Shawn Hakl, VP of product and new business innovation, Verizon

and "significant" for enterprises.

Hakl said, "Because you can control the routing, you can say every time you get an application like this, you can set it up so that you always enforce this virtual security policy as well—you can make sure the link you select has this security on it. I'm tying enforcement of network policy and security policy together. That ability comes not because I have SD-WAN alone or because I have virtual security alone, but when I combine them with the software brains I get with orchestration. I can make much more sophisticated policy decisions, and I'm doing it on a dynamic basis rather than something I put in a routing table."

"On the crudest level, these things are just software versions of what you could do already," Hakl continued, "but because you have a software interface, because you have a centralized controller, because you have real-time access to information, you can start making more sophisticated automation decisions. It lets us build sophistication into the applications."

## TOO EARLY TO REALIZE SAVINGS?

Three years into the SDN/NFV era, with traffic still rising at incredible rates, with prices of communications services stable or falling, and with investments in virtualization still ongoing, maybe it is just too early for all the theoretical benefits of virtualization to materialize.



Joel Stradling, research director for global managed and hosted IT services at consulting firm GlobalData, said, “I am not seeing much evidence of lower opex being passed onto the enterprise end-user—despite claims from the carrier community that they can pass savings down to the client. The service provider industry is mostly struggling to shore up dwindling legacy data connectivity revenues, so rather than selling cheaper connectivity, which means overall they get a smaller share of the IT and network wallet from the client, the players are trying to add value to the contract with cross-sell and upsell of higher margin value-added services on top of the connectivity piece such as managed security, IaaS [internet as a service], unified communications and collaboration and so on. This is also driving stickiness.”

Stradling seems to agree though with AT&T and Verizon’s assessment of where the industry is today. “Where clients can benefit from cost-savings would be from not having to throw additional costly MPLS capacity at enterprise circuits each month to help support massive cloud adoption. Instead, software-defined WANs—and indeed internet/hybrid VPNs—allow traffic to be passed over lower cost-based internet, but still with corporate attributes in terms of security, applications performance, and visibility/service management.



“I am not seeing much evidence of lower OPEX being passed onto the enterprise end-user—despite claims from the carrier community

that they can pass savings down to the client.”

—Joel Stradling, research director for global managed and hosted IT services, GlobalData

SDN/NFV investments by the operators should help customers realize those types of savings.”

So, of course, it’s too early to expect to see SDN/NFV having any major effect on revenues, let alone profits, but those benefits should still come. “I think that enterprise services revenues are either dropping, flat, or in some rare cases growing slightly. I think in terms of investments, carriers that invest in SDN/NFV should eventually lower their operating costs which means they should be more profitable,” he said. ●



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