Skinny Wire

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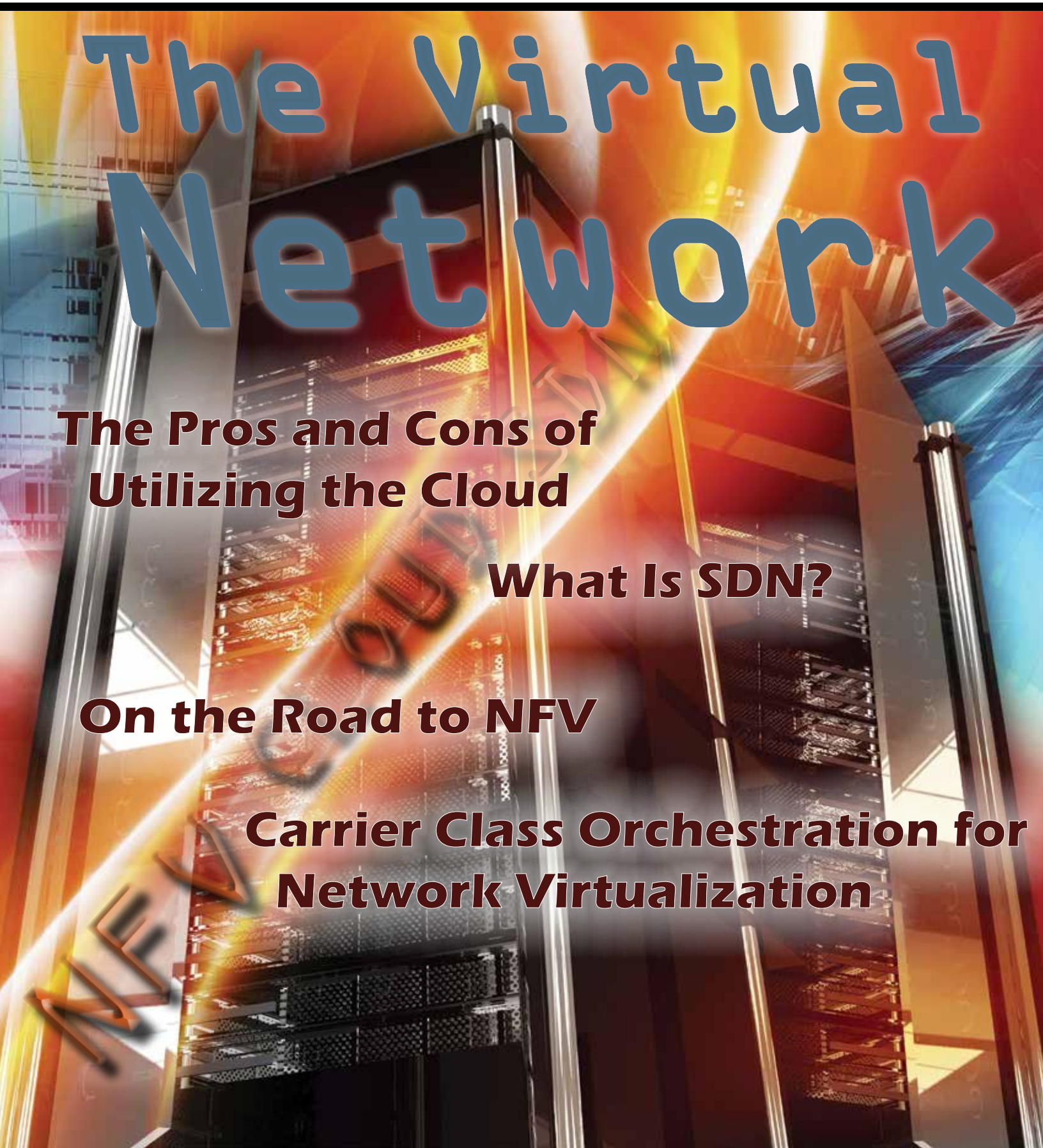

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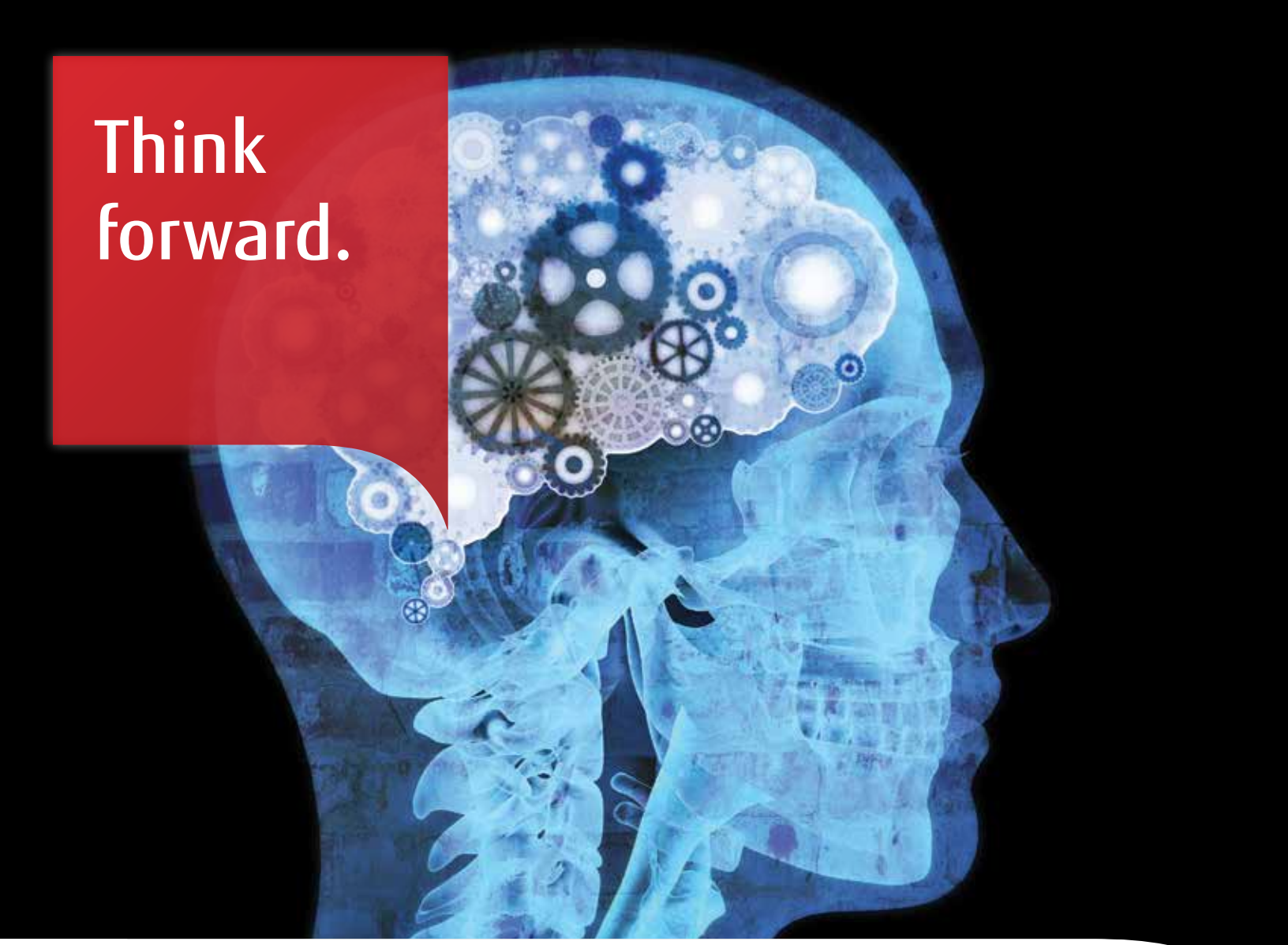

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Editor's Letter

In his 1995 national bestseller ***Being Digital***, Nicholas Negroponte made a great deal of the distinction between atoms and bits. His premise was a precursor to the seismic shift away from our value of only physical products to what we now know as a data driven society and economy.

The telecom industry has evolved from simply a business of connecting people by voice calls to a myriad of business models that digitally provide news, educational resources, social connections, entertainment, commerce, government services, health and human services, banking and financial services and more. We are fully engaged in the race to become even more digital. Negroponte said it well - "It is almost genetic in its nature, in that each generation will become more digital than the preceding one."

This concept is most apparent today in the discussions around the primary topic of this issue of Skinny Wire, network virtualization. Whether referring to software defined networking (SDN), or network functions virtualization (NFV), the race is on to create an even more data driven network that relies less on the physical footprint and more on the ability to control its effectiveness. Perhaps driven by noble causes such as reducing carbon footprints and improving customer outcomes, the virtual network is quickly becoming the focus of manufacturers and thought leaders around the world. One need only review the list of keynote addresses and workshop titles at upcoming industry conferences to understand how big the conversation really is.

Showcasing topics of NFV and SDN came easy for contributors in this issue. Their work in cloud networking represents industry leaders who are paving the way for new methods of delivering network functions. For carriers, data center operators, utilities and more, their work in this arena is changing the model for how we all do business.

We also called on industry association leaders to weigh in on these topics. Joining favorites such as Grant Seiffert from TIA and Steven Berry from CCA is the new CEO of COMPTEL, Chip Pickering. We are pleased to welcome him as a first time contributor in Skinny Wire, and look forward to working with him in his new role.

And finally, we always enjoy showing off one of our customers who is able to pull together the resources required to deliver even more for their customers. Valley Telephone Cooperative, also known as VTX1, tells of their success early this decade with a BTOP project, a public/private venture now serving the needs of their customers in the Rio Grande Valley. It is easy to understand their success when you talk with them and hear of their passion for their communities. It is a true honor working with them on an ongoing basis.

We invite you to connect with us digitally on social media, or perhaps by something as old fashioned as email. What is your take on the whole virtualization topic? We look forward to hearing from you.

Randy Turner

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SDN - The New Disruptive Technology

By Rodney Wise
Director of Technology Selection
Walker and Associates

In terms of efficiency and network evolution, the move in the 1980s and 1990s from Channel Associated Signaling (CAS) to Common Channel Signaling System 7 (CCSS7) seems to have had as much impact as Software-Defined Networking (SDN) implementation will in coming years. Prior to SS7, 64kb voice channels were nailed up along each path of the call in anticipation of the call being established. If the called party wasn't home or already on a call, the 64 kb channel was wasted throughout the entire network during the time it took to recognize the called party was busy.

As Director of Technology for Walker and Associates, Rodney Wise confronts a variety of technical questions on a daily basis. His broad background provides him a real-world perspective of challenges and opportunities telecom engineers and project planners face in the field. The Wise Guy is a regular feature in The Skinny Wire.

After SS7 implementation, out of band signaling determined the availability of the called party and prepared all network elements along the route for the call prior to establishing the 64 kb channel throughout the network, therefore saving tremendous bandwidth in the entire network. Now, SDN similarly provides network control separated from the data forwarding plane, making a more dynamic and flexible network. Software- Defined Networking is transforming network architecture, and proving to be disruptive in its applications.

In the SDN architecture, the control and data planes are decoupled, network intelligence is centralized, and applications are removed from the network infrastructure. As a result, the network gains much needed configurability and control. This allows network administrators and engineers to configure flexible networks that can quickly adapt to new service requirements. Cloud services, virtualization, and accelerating mobile device growth are driving these new service requirements and leading the re-architecture of the network. When properly designed and implemented, the SDN architecture provides centralized management and control of multi-vendor networks, improved automation through advanced provisioning, delivery of new services without the need to configure each network element, and simplified configurability through a common user environment.

When a packet arrives at a switch in a conventional network, the switch's firmware has been preconfigured to know where to forward the packet. The switch sends every packet going to the same destination down the same route and treats all the packets the exact same way. Usually, this conventional network is built in hierarchical tiers that behave in a high level view similar to telephone exchanges. Making changes to this fixed network requires an in-depth knowledge of each network element technology and existing configuration. In addition, network engineering time is required to manage fixed network changes, adding to expenses. SDN provides a much more dynamic network capable of rapid configuration changes for new revenue-generating services.

SDN moves control from individual network elements into special SDN controllers. These SDN controllers provide complete visibility and control over the network. Since these controllers are the configuration tools, they can ensure that access control, traffic engineering, quality of service, security, and other policies are enforced consistently across the network infrastructure. Network operators benefit from reduced operational expenses, more dynamic configuration capabilities, fewer errors, and consistent configuration and policy enforcement.

In conclusion, anything as a service, in addition to virtualization and mobile device growth, has created a need for network evolution. SDN provides the architecture to rapidly respond to new service demands on the network. SDN offers the intelligence to allocate resources on demand, scalability, and support for more virtualization. In the area of efficiency and network evolution, SDN is creating an equivalent technology disruption that SS7 implementation did two decades ago And, SDN is just the beginning of a more software driven network that will create even faster innovation and more frequent network transformations.

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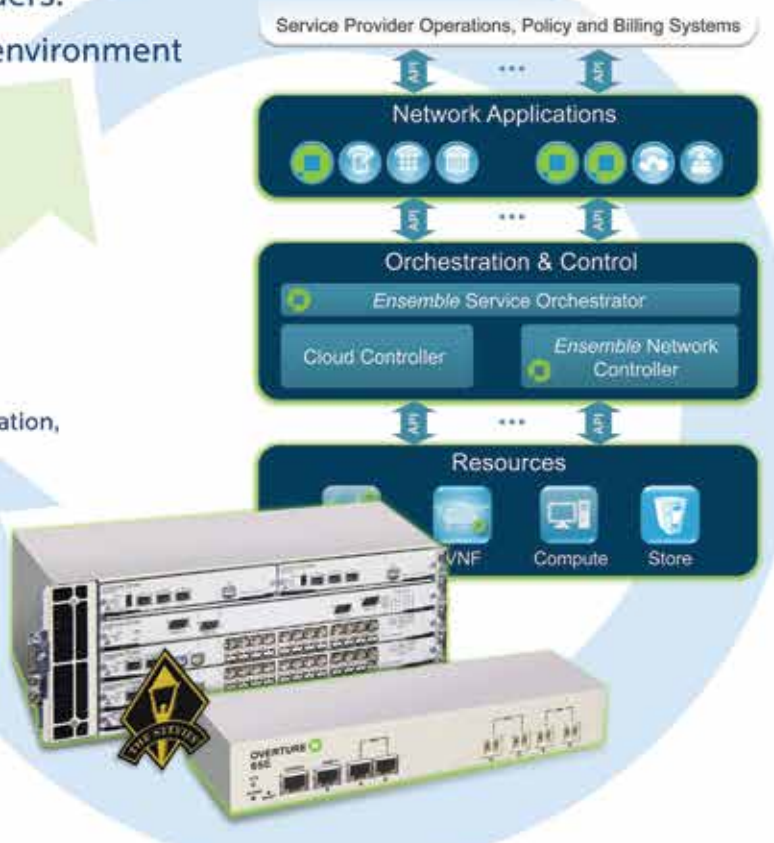

What is SDN?

By Dave Jameson
Principal Architect
Network Management Solutions
Fujitsu Network Communications, Inc.

Dave has more than 20 years experience working in the telecommunications industry, most of which has been spent working on network management solutions. Dave joined Fujitsu Network Communications in February of 2001 as a product planner for NETSMART® 1500, Fujitsu's network management tool and has also served as its product manager. He currently works as a solutions architect specializing in network management.

Prior to working for Fujitsu, Dave ran a network operations center for a local exchange carrier in the north eastern United States that deployed cutting edge data services. Dave attended Cedarville University and holds a US patent related to network management.

The term SDN, or Software-defined Networking, has become very popular in technology circles. So what exactly is SDN? Although it has changed over time, the core concept behind SDN is that of decoupling a network's control layer from its data layer, centralizing the network management and separating the control messages from the actual network traffic.

The control layer manages network devices by means of signaling. Although the original intent of SDN focused primarily on services, all aspects of device management can be done at this layer, including end-to-end provisioning, capacity management, and performance and SLA management.

The data layer, of course, is the layer where the actual traffic flows. By separating the two layers, the control layer can use a different distribution model than the data layer. Relief from the burden of managing things like path computation also means that network devices can more efficiently focus on the job of transporting traffic. The goal of SDN is to centralize network management applications on platforms that are more powerful rather than distributing or embedding them across multiple networking devices to improve network operator response times while making the network more efficient.

The Power of Abstraction

The real power of SDN comes down to a single word: abstraction. At first glance, using abstraction to generalize the device-specific management code needed to communicate with various network elements may seem like an odd concept, but it is a something we already put to use. An excellent example is that of printers. Whenever you print a document there are unique commands that go from the PCs to the actual printer and every brand and model has its own unique way of printing. In the computer's Operating System (OS), regardless of whether it is Windows, Apple, Linux, or something else, a set of drivers know how to send the correct set of messages to each respective printer. In this example, your computer's OS sends the generalized message to the driver and that driver translates it to the specific messages (code) required to print out the document. From the users' perspective, they simply hit the print button. This is the power of abstraction.

With SDN, concepts are abstracted and users make requests of the network in a similar fashion to hitting the print button from an application. Instead of the application sending print commands, these requests can be link up/down or bandwidth commands, or requests to pull detailed reports on different aspects of a network. Just as with computers when printing from an application (like a word proces-

sor) which runs on top of the OS; with SDN, there are applications that run on top of the SDN network controller.

One can write various applications and plug them into an SDN network controller. Then, by using an interface such as Representational State Transfer (REST), applications can make requests through the SDN controller, which will return results. REST provides a simple way to organize interactions between independent systems. It is the SDN controller's job to understand the construction of the network and communicate requests down to the various network elements connected to it, in a similar manner to a print driver communicating with printer. For example, an SDN application developed specifically to provision end-to-end services could query the resources through the controller to verify if a path is available and if so, send the activation commands to the appropriate network devices. Many other SDN applications are possible; another example could be one to create reports about existing service paths.

Why do Carriers Need SDN?

Before you consider migrating your existing network management systems to SDN, it is important to understand how your business objectives align with SDN goals and objectives.

The first goal of SDN is to simplify software implementations and consequently improve service delivery times. The second goal is to improve the use of networking resources. These two major objectives will reduce both OpEx and CapEx costs and increase revenues. Whatever system you put in place, it must deliver these key business benefits.

Keeping this in mind, telecom networks have traditionally been as monolithic as the servers that administrators are actively virtualizing today. As an example of how SDN can change network provisioning, consider what it takes today to modify network bandwidth. If you have an existing 100 Mb Ethernet connection from a data center and now you need that connection to be 150 Mb, a coordinated effort by several teams would be required to accomplish this. In most environments today, a transport team would be engaged to increase bandwidth on the NEs; and yet another team would reconfigure the routers and switches in the data center.

In today's carrier networks, teams like these are highly trained and skilled experts in device-specific management code. For example, those working on transport gear will often launch a terminal and type TL1 commands, while the other team in the data center would likely use a CLI interface to control the routers or switches. In effect, these technicians function as "printer drivers" for the network. Imagine if, every time you wanted to print a document, you had to take it to an employee and ask them to type the specific commands to your printer. This, of course, would be ridiculous, yet every communications network company in the world functions by this model today.
SDN serves as a middleware layer that allows users to write applications that "speak" generalized language northbound, and device-specific code southbound to networking devices. SDN leverages the same abstraction concept that the computer world has already been using for many years. This means communications networks can transition from the technician-provisioned model to that more analogous to Web 2.0 programmable networks.

In short, network adds, moves, and changes are currently time-consuming and burdensome in an ever-changing world where dynamic bandwidth needs are no longer negotiable. Operators are looking for ways to respond to these demands in real time. An SDN-enabled infrastructure will enable operators to move at a pace that is closer to the one-click world that in which we live.

The Truth about the IP Transition

By Chip Pickering
CEO
COMPTEL

Chip Pickering is the CEO of COMPTEL and a former Congressman from Mississippi. Prior to his election, Pickering worked for Sen. Trent Lott (R-Miss.) and served as a staff member on the Senate Commerce Committee, where he helped shape the Telecommunications Act of 1996. Because of his role in drafting the 1996 Act, he became well known as a Congressional leader on telecommunications issues.

As the PSTN Evolves, Last Mile Access and Interconnection Remain Vital to Bringing Competitive Alternatives to Consumers

For competitive carriers, Internet protocol (IP) technology is nothing new. For more than a decade, new entrants have been delivering innovative and cost efficient services over their networks using IP technology. Now some large, legacy carriers have begun to more fully embrace the benefits of IP technology in their own networks, but they are using this technological innovation to attempt to circumvent the fundamental, pro-competitive principles of our nation's telecom laws upon which competition relies. These largest incumbent local exchange carriers (ILECs) seek to dismantle competitive policies and escape from oversight by both federal and state policymakers, claiming that they can be trusted to play fair with competitors. But this is not the case. The large ILECs still have all the inherent advantages of incumbency, such as bottleneck control over the only viable broadband connection to most of the commercial buildings in the country. As a result, the large ILECs have the incentive and opportunity to stifle innovation and competition, which will have a detrimental effect on consumers, particularly businesses.

As the Federal Communications Commission (FCC) addresses legal and policy questions surrounding the transition, it is critical for the agency to protect the fundamental tenets of the Communications Act – wholesale last mile access and interconnection obligations. These tenets remain vital if the Commission intends to continue fostering a competitive environment and delivering the benefits that result from it.

Why Competition Matters?

During the past three decades, competitive policies have driven the communications revolution and brought us into the Information Age. Competition fosters innovation; gives small and mid-sized businesses, as well as residential consumers, access to new services and applications; drives economic growth and job creation; and encourages investment.

Competitors have been at the forefront of innovation and investment, introducing IP-based networks and delivering managed VoIP services to customers for the past decade. In fact, according to the FCC, in the business market alone, competitors have nearly 10 times the number of VoIP lines as incumbent telcos. Competitors are leading, too, in deploying cloud services, Ethernet offerings, commercial DSL and unified communications solutions. On the investment front, non-ILEC investment in 2012 was 43 percent of total wireline expenditures, according to a 2013 report on the broadband market. And COMPTEL members report spending between 12 percent and 25 percent of revenue on capex in the first three quarters of 2013.

Access & Interconnection: The Two Pillars of Competition

There are two necessary elements required to enable continued growth of competition and benefits to end users: last mile access and interconnection.

The FCC's National Broadband Plan noted that the "nation's regulatory policies for wholesale access affect the competitiveness of markets for retail broadband services provided to small businesses, mobile customers and enterprise customers." However, as the FCC acknowledged, its current approach is a "hodgepodge of wholesale access rights and pricing mechanisms that were developed without the benefit of a consistent rigorous analytical framework."

While the Telecom Act takes a technology-neutral approach to competition policy, the FCC's implementation of last-mile access provisions have not. The FCC's

competition policies generally only apply to the old technology, so that a simple change from older technologies to IP allows ILECs to escape oversight. And this, simply stated, puts competition at risk. The FCC's access rules should not vary by whether the facility or service operates using circuit or packet-switched mode or if the underlying infrastructure is copper or fiber. As the industry transitions from TDM to IP, consumers will be negatively impacted by the FCC relieving the ILECs of their obligations that ensure reasonably priced non-TDM based packet-switched and optical broadband services. Similarly, the FCC has altered critical aspects of unbundling obligations adopted by Congress, allowing ILECs to retire copper loops and not requiring them to offer functionally and similarly priced alternative wholesale products.

By eliminating these ILEC obligations to provide wholesale access to critical last mile facilities and services, the FCC is putting competition in jeopardy. Regardless of the network infrastructure being used, the last mile continues to be vital to competitive providers for reaching their customers. The evolution to IP technology does not allow competitors to bypass the large ILEC last-mile bottleneck, where it is not economically viable to overbuild that network. Despite the rhetoric that the IP transition is resulting in a "new network," the fact is that IP is just a software protocol – not a new physical network – that can run over copper, fiber or wireless facilities, in the same way TDM has done for decades. Thus, the advantages of incumbency still persist for large incumbents in terms of access to capital, rights-of-way, a large base of end users, an extensive ubiquitous network footprint and the economic advantages that come with that level of economies of scale and scope.

Moreover, the IP transition does not eliminate the need for all carriers to be able to interconnect their networks in a manner that ensures all voice calls can seamlessly reach their intended parties. Nor does it eliminate the inherent advantages of incumbency in negotiating IP interconnections agreements. Efficient IP interconnection for voice services on an IP basis -– between incumbents and competitors alike -– on just and reasonable terms, will drive cost efficiencies and spur even more development of innovative services.

Based on our members' experience operating IP networks, there are very few technical challenges to being able to interconnect IP networks. The hold-up is getting good-faith interconnection negotiations with the largest ILECs. During the IP transition and beyond, the FCC must reaffirm the Telecom Act principle, which requires incumbent providers – such as AT&T and Verizon – to interconnect with requesting carriers at any technically feasible point in their network, on rates terms and conditions that are just, reasonable and nondiscriminatory. Once a reasonable IP interconnection agreement has been formed with the ILEC, that agreement should be made public so that all interested carriers seeking interconnection can opt in to those agreements.

As it proceeds with its examination of the IP transition, the FCC must keep at the forefront the importance of wholesale last mile access and interconnection, regardless of technology. Without these two fundamental tenets, the Commission will be unable to further its goals of ensuring end users can have competitive options for new, innovative services and that our country will continue to benefit from higher economic growth and job creation.

Based in Washington, D.C., COMPTEL is the leading industry association representing competitive communications service providers and their supplier partners. COMPTEL members are entrepreneurial companies driving technological innovation and creating economic growth through competitive voice, video, and data offerings, as well as the development and deployment of next-generation IP-based networks and advanced services utilizing fiber, copper and wireless facilities. COMPTEL advances its members' interests through trade shows, networking, education, and policy advocacy before Congress, the Federal Communications Commission, and the courts. COMPTEL works to ensure that competitive communications providers can continue to offer value pricing, better service, and greater innovation to consumers. COMPTEL's members create economic growth and improve the quality of life of all Americans through technological innovation, new services and affordable prices so customers have a choice.

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THE COMPETITIVE COMMUNICATIONS ASSOCIATION

SDN Has Arrived

Chris Koeneman
Vice President, Bluesocket Business Group
ADTRAN

Acquired by ADTRAN in 2011, Bluesocket brings the power of virtualization to the WLAN. Bluesocket was a pioneer in the development of network virtualization and now forms a business group in ADTRAN. As Vice President of Worldwide Sales and Marketing, Chris is responsible for all market-facing functions including global sales, marketing, customer service, and business development. Chris joined Bluesocket from Datacom Systems where he served as Vice President of Sales and Marketing. Chris brings over twenty years of experience with leading technology and networking companies. For the past ten years, Chris has held global leadership positions with a number of innovative technology companies including Avici Systems, Colubris Networks, and Redline Communications. Chris began his career with AT&T before joining Cisco Systems where he served as Director of Sales in EMEA.

Chris can be contacted by email at chris.koeneman@ADTRAN.com.

There's Nothing New Under The Sun

When it comes to technology, have you ever noticed how the new stuff often times looks like a retread of something old? Hang around long enough, and it is déjà vu all over again. Take cloud computing. The idea of cloud computing is you have lots of processing power that can support a multitude of applications all accessible over a network. This pretty much describes a System 36 mainframe computer on an SNA network. Usually an innovation becomes new and relevant not so much because of the capabilities of the innovation per se, but rather because of changes in the complementary and surrounding technology. What made cloud computing relevant was the drop in storage cost and computing power in the data center coupled with the lower cost of high-speed Internet access.

We are witnessing another technology rebirth: SDN. You don't remember the original? Way back in the early 90s, AT&T made a transition from offering lower long distance rates via a dedicated facility (WATS lines) to offering a lower rate using standard access facilities from the LEC. The service was defined by software at the AT&T POP. The name of the service? SDN. Apart from me and a few bell heads, I don't know if anyone remembers AT&T SDN. If you do, send me an email.

Telco and Enterprise Convergence

SDN today represents an interesting convergence. Network virtualization is making telecommunications feel a lot more like enterprise services. The other key proto-development for SDN is the separation of control plane from the data plane. By separating the control plane (information about the user and the service) from the data session, the control information can operate on a platform other than the device handling the data plane.

Along with separating the control plane, SDN implementations usually support a rich set of APIs through which applications can be supported. In traditional networking, services are defined by programming a switch or router. You have to wait for your switch/router vendor to develop the service in the software. With SDN, applications can be written by third parties as well as the manufacturer of the control plane software.

With this openness, service definition will evolve and feel more like an enterprise application and less like an exercise in networking RFCs (Request for Comments). Defining a service will be less esoteric and more straight forward. You won't need a CCIE (Cisco Certified Internetwork Expert) to define a service for a set of users. The service definition will come from the data center rather than a network management tool. SDN will push the center of the networking universe toward the data center and networking applications will become ensconced in broader enterprise applications. This is the convergence of telco and enterprise.

From a cost perspective, SDN is about saving opex. The time involved in defining and rejiggering services will be minimal because your IT staff will be interacting with software that has an interface and set of tools akin to other enterprise applications. The other opex savings lies in the nature of the person making the service changes. The hands on the dials will be general IT staff as opposed to expensive networking experts.

What Comes First?

Okay, SDN sounds interesting and potentially beneficial but where do you start? ADTRAN® thought about this and started at the access layer of the network. It is at the access network where services are defined and users are recognized; the hallmark of SDN. There are different types of access networks and ADTRAN's first substantiation of SDN is with Wi-Fi access. Services are defined and users are controlled through a software application that resides at a data center on a hypervisor rather than single-purpose device. The control software supports APIs through which third parties can create applications.

What's Next?

The benefits of SDN are very real. These benefits are far reaching and will touch a number of areas. Here are two examples. With the separation of the control function, devices that handle the data sessions will evolve. Unburdened from the control plane, these devices will be optimized for packet forwarding. Another example of the change SDN is bringing is in the competitive landscape. Companies with expertise in enterprise applications (but not known for networking) will leverage their position to introduce SDN products. Companies like VMware and Oracle will become networking companies through the introduction of SDN products. These new entrants into networking will bring innovation and vigorous competition.

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The Pros and Cons of Utilizing the Cloud

By Steven K. Berry
President & CEO
CCA – The Competitive Carriers Association

Steven K. Berry serves as President and CEO of the Competitive Carriers Association (CCA), the voice of competitive wireless telecommunications providers. With over 100 carrier and over 160 vendor/supplier members serving more than 95 percent of the U.S. and its territories, CCA speaks with a strong, united voice on issues that impact those providing wireless communications in regional, remote, and hard-to-reach areas and the communities they serve.

Berry began his government career as Associate Counsel on the House Agriculture Committee, and later became Chief of Staff to the Ranking Member of the Agriculture Committee. He went on to serve in many key positions - both on and off Capitol Hill - during his government career, including as Republican Counsel for the House Permanent Select Committee on Intelligence, Republican Chief of Staff for the House Foreign Affairs Committee, Assistant Secretary of State for Legislative Affairs for the U.S. Department of State, and Chief Counsel and Director of International Operations and European Affairs for the Senate Foreign Relations Committee.

Berry, a member of the Virginia bar, holds a bachelor's degree from Emory and Henry College, and a juris doctorate from George Mason University Law School.

You can reach Steve at (800) 722-1872 or president@cca-usa.org.

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On a recent flight back to Washington, DC, I was gazing out the window of my cramped airplane seat and noticed a mass of clouds just beyond the wing. As I pulled out my laptop and patiently waited for the plane's Wi-Fi connection to load, I began to think about the incredible impact "the cloud" has made on the wireless industry in recent years.

"The cloud," also known as a "virtualized network," allows a user to maximize the effectiveness of shared resources. This structure may provide numerous benefits (such as reduced infrastructure costs), and many companies have already begun utilizing virtual desktops, servers and storage solutions. While it makes perfect sense to manage most, if not all, of your network in the cloud, it may not be so simple for wireless operators. Mobile operators must evaluate the "Pros" and "Cons" of full integration into the cloud, and there are several factors that should be considered when deciding whether or not to "go to the cloud." (or make that transition.)

First is hardware costs. If you have ten servers in your network, each costing $5,000, a virtual solution may result in significant savings. The upfront cost of a virtual machine is required, but once implemented, the savings will be substantial (think around $20k, rather than $50k). While this sounds simple, if you are operating a mobile phone network, it may not be. What about the radio network? Is it possible to virtualize? Several CCA members are doing just that - whether it is software defined radio or deploying hosted network elements, many solutions exist for MNOs (Mobile Network Operators). Hardware costs = Pro.

Next, energy costs. Assuming a normal load on the network equipment, deploying a virtualized network will help reduce costs of your traditional network element loads. Put another check in the "Pro" column as a virtual network goes a long way to reduce energy costs.

Another factor to consider is recoverability and reliability. Have you ever spilled coffee on your laptop and panicked that you may have lost days or weeks of work? You are not alone. In a virtual environment, all data is saved to the cloud, so your information is never lost, even if your device crashes. Of course, the cloud is not yet perfect and there are failures there too, but the loss of your data is much less likely, increasing reliability. Recoverability and reliability = Pro.

What about natural disasters? Disaster recovery often is an over-looked aspect of many networks. Sure, we all have a worst-case scenario plan, but if your employees are evacuated and the damage is wide-spread, chances are that the back-up systems will be out of commission. Having your data and network elements in the cloud makes your Disaster Recovery Plan much easier to execute. Practice still makes perfect, so make sure you are ready. Disaster recovery = Pro.

You are also in a much better position to reconfigure a virtual network—for example, deploying LTE instead of 2G and upgrading software to enhance network speeds. Not having to use a forklift to spruce up the place is quite attractive. Reconfigurability = Pro.

Now, while it may look like there are no drawbacks to utilizing the cloud, there are downsides. One is tradition. I once read that the seven deadly words in business are, "That's how we have always done it," but for a network operator this is very true. Thinking about moving the most critical network elements to a remote hosting facility may create too much anxiety for a COO. You also risk fragmentation of the wireless access technologies, but being able to properly plan for performance, and scalability, while making it cost effective, may be very challenging when utilizing the cloud. Tradition = Con.

While it is up to each individual network operator to move to the cloud, I will close with the suggestion that this may not be the year of network virtualization, but it certainly is not far off. LTE convergence could take center stage this year – as data usage continues to skyrocket, operators will need to provide a network capable of handling the demand. Using new techniques to provide better service is a must, and wireless service providers will find that the skies are only "partly cloudy" for the time being. Looking to the future and knowing the "Pros" and "Cons," carriers will have to choose the timing carefully!

The Network and the Cloud – A Mismatch Needing Resolution

By Grant Seiffert
President
Telecommunications Industry Association (TIA)

As president of DC-based TIA, Grant Seiffert oversees all facets of the leading international association representing the manufacturers and suppliers of global networks.

Seiffert joined TIA in 1996 as director of government relations. His main priority was the representation of the equipment industry's interests, particularly regarding competitive issues during implementation of the Telecommunications Act of 1996 by the Federal Communications Commission (FCC). He was promoted to vice president in 1998, directing domestic and global policy to help the association's supplier members gain marketing opportunities around the world. In that role, he oversaw policy, including interaction with the U.S. Congress, the FCC and the Administration, as well as with international regulatory bodies and government leaders and fulfilling the senior management role for association membership and TIA tradeshows.

Seiffert serves on the Executive Committee of Connected Nation, the American National Standards Institute's (ANSI) CEO Advisory Committee, and the Board of Directors of the Sustainable Technology Environments Program (STEP).

He holds a Bachelor of Science degree in political science from Radford University. He and his wife, daughter and two sons reside in Mt. Vernon, Virginia.

For the last 50 years, the information and communications technology (ICT) industry – TIA members included – has built and worked to perfect the network. Now, the network has become the fundamental delivery mechanism for the ICT industry's prevailing product -- applications served via the cloud.

As this situation evolves, it is clear that the network is not robust enough to cope with the dynamic nature of the cloud. A further complication is that cyber threats have increased ten-fold along with the cloud revolution. As more content migrates to the cloud, complexity, security and limited bandwidth are increasingly challenging operators, service providers, solutions providers and customers.

With advances in cloud-based services, a mismatch between the network and the demands of the cloud has emerged, and it must be addressed. The good news is that the advent of software defined networking (SDN) is a revolutionary force that is helping to make the network more dynamic.

Both SDN and network function virtualization (NFV) are gaining traction. They are different but complementary. At TIA's 2013 Future of the Network Conference an analogy was presented by one expert: SDN is like smart plumbing – moving from the old style of pipes being in the walls to the new flexible style, in which walls do not need to be broken for fixes and changes to be made. In the case of NFV, the analogy can be made to installing management appliances with one click as opposed to going to the store to buy and install them.

Service providers look to NFV technology for inward-looking improvements – however, to date not many are focused on outward looking benefits for the consumer. It is the intersection of SDN and NFV that is the objective of agile networks. Both are needed for an end-to-end solution, provid-

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ing both CAPEX and OPEX savings as well as service delivery agility.

To address the mismatch in developing a more dynamic network, take a look at how enterprises view their need to grow and thrive in the cloud environment.

In many cases it is the enterprise customer pushing the industry toward transformation in cloud deployments. Driven by the need for speed and agility, enterprises are moving from experimentation in cloud deployment to a broader implementation strategy. Their next step is to transform the IT center from a cost center to a profit driver – a step that ICT companies must be ready to support.
Enterprises are adopting a phased approach to moving to the cloud:

- Build new apps in the cloud;
- Augment on-premise capacity with cloud;
- Migrate existing apps to the cloud;
- Have all services in the cloud.

For these enterprise customers, the challenges are daunting. They are tasked with speedily managing complex migrations, often using multiple vendors and systems integrators, in a holistic manner. In most cases they must invest in experts, whether in-house or 3rd party, using limited budgets, and they must ensure reliability and security of both the applications and the customer data, in a cloud environment over which they have less control than on private networks.

For such migrations a new mindset must be adopted – understanding that change is not only technological but cultural, requiring retooling of the entire enterprise. On the other hand, success for service providers and ICT services companies will depend on seizing opportunity through:

- Provision of network-based applications;
- Effectively managing ever-increasing traffic demands;
- Enabling profit-making capabilities within the enterprise;
- Partnering with software companies and developers for increased agility, and;
- Above all, assuring a high degree of confidence in security measures.

For SDN and NFV to be universally adopted, open standards, interoperability and security are critical. As the trend in cloud and data centers moves toward virtualizing the network function, industry is pushing for open data center standards for both equipment – building data centers that will support next-gen standards – and for services – effectively migrating from one set of services to another.

Open standards are desirable because they enable enterprises to avoid being locked into specific technologies while expediting adoption. Importantly, open standards are not the complete answer to differentiating and innovating – again, success in differentiating still relies on how a company is run.

Interoperability of controllers is one of the biggest issues surrounding SDN systems. Using established protocols such as Border Gateway Protocol (BGP), a well-known core Internet routing protocol, can simplify operations by reducing network complexity and integrating SDN with existing business logic and processes.

Security needs to be everywhere within a software-defined network – from building it into the architecture, to delivering a service that protects the availability, integrity and privacy of all connected resources and information. Within the architecture, access to the controller, which is the centralized decision point, needs to be tightly controlled and protected, both physically and within a robust policy framework of checks and balances. But beyond the architecture itself, competing approaches include embedding security in the network vs. in servers, storage and other devices. Regardless of the approach used, solutions must be designed to create an environment that is scalable, efficient and secure.

TIA's Action Report captured important takeaways from the recent TIA 2013: Future of the Network Conference. Among them is the focus on developing the right type of alliances:

Suggested Action for Service Providers and Systems Integrators

Work with developers and software companies to offer enterprise and end-user customers integrated services and network-based applications, while at the same time ensuring that complexities are kept behind the curtain and pricing is competitive.

A seemingly reasonable and important objective, though the methods and business models required to achieve it are still largely forming. For those who have best practices and experience working to integrate these agile, software-based services in a seamless fashion, TIA wants to hear from you. Your story can offer tremendously useful models and guidelines for others to apply. At TIA's next conference, TIA 2014: The Network of the Future, being held June 3-5 in Dallas, Texas, TIA will be highlighting such examples, so please join us.

After all, industry collaboration and cohesion are a constant when it comes to planning out an optimally functioning, agile, secure and scalable global network – one that matches the extraordinary innovation taking place in the cloud.

DECODING SDN

Compiled by The Juniper Networks SDN Team

For the past year, software-defined networking (SDN) has been the buzz of the networking world. But in many ways, networking has always been defined by software. Software is pervasive within all of the technology that impacts our lives and networking is no different. However, networks have been constrained by the way software has been configured, delivered and managed - literally within a box, updated monolithically, managed through command lines that are throw-back to the days of mini-computers and DOS in the 1980's.

THE CHALLENGES WITH NETWORKING SOFTWARE

In the service provider world, carriers struggle to configure and manage their networks. Like Google, they too have built operational support systems to configure their networks but these systems are often 20+ years old and they are crumbling from the burden placed upon them by networking software. For a service provider, the network is their business, so they must look to networking vendors to introduce new capabilities in order to enable new business opportunities. Here again, networking software is failing the industry - it is developed as a monolithic, embedded system and there is no concept of an application. Every new capability requires an update of the entire software stack. Imagine needing to update the OS on your smartphone every time you load a new application. Yet that is what the networking industry imposes on its customers. What's worse is that each update often comes with many other changes - and these changes sometimes introduce new problems. So service providers must carefully and exhaustively test each and every update before they introduce it into their networks.

WHAT IS SDN?

Service providers are seeking solutions to their networking challenges. They want their networks to adjust and respond dynamically, based on their business policy. They want those policies to be automated so that they can reduce the manual work and personnel cost of running their networks. They want to quickly deploy and run new applications within and on top of their networks so that they can deliver business results. And they want to do this in a way that allows them to introduce these new capabilities without disrupting their business. This is a tall order but SDN has the promise to deliver solutions to these challenges. How can SDN do this? To decode and understand SDN, we must look inside networking software. From this understanding, we can derive the principles for fixing the problems. This is what SDN is all about.

Here are six principles of SDN with corresponding customer benefits:

1. Cleanly separate networking software into four layers (planes): Management, Services, Control, and Forwarding - providing the architectural underpinning to optimize each plane within the network.
2. Centralize the appropriate aspects of the Management, Services and Control planes to simplify network design and lower operating costs.
3. Use the Cloud for elastic scale and flexible deployment, enabling usage-based pricing to reduce time to service and correlate cost based on value.
4. Create a platform for network applications, services, and integration into management systems, enabling new business solutions.
5. Standardize protocols for interoperable, heterogeneous support across vendors, providing choice and lowering cost.
6. Broadly apply SDN principles to all networking and network services including security - from the data center and enterprise campus to the mobile and wireline networks used by service providers.

Blurred Lines:
Reinventing in the Rural Market

By Cami Zimmer
Director of Communications
and Marketing
NewCore Wireless

Little more than a decade ago service providers had a justifiable pre-occupation with mobile airtime rates and packages. With a surge in consumer adoption of mobile devices and the dynamics of a highly competitive marketplace, the goals then were largely to increase subscribers and grow ARPU.

It wasn't entirely a painless process but in retrospect it seems simple - add some features, optimize pricing and drive costs out of the business. By comparison, today's environment doesn't seem quite so simple. In a 2013 Nielsen report, smartphone penetration in the US has now reached 64%. With the growing shift in consumer preference toward smartphones and tablets has come a new set of challenges and opportunities for service providers.

Today, one of the industry's most talked about challenges, whether by wireless or wireline operators, is over-the-top (OTT) services. The addition of players like Skype and Netflix requires service providers to develop a radical strategy re-think. "The digital world changes all of the rules of the game. Barriers to entry are much lower, fast moving markets are truly global, while competition is fierce and only a click away," says Keith Willetts, Chairman of TM Forum.

But fast moving markets aren't restricted to only large urban environments. With cheap and plentiful bandwidth and cloud-based solutions, competitors from half a continent away or even the other side of the world can easily enter and compete in markets of any size and anywhere.

So how do smaller service providers protect and grow markets in the digital world that Willetts speaks of? The answer is to leverage consumer loyalty and to focus on customer experience. That's something that many smaller and less urban operators have frequently excelled at because of their intimate connections to and understanding of the communities they serve. It also requires that they become responsive to rapidly changing consumer needs.

The phenomenal growth of consumer smartphones and tablets has also given rise to a challenge for businesses and an opportunity for operators of any market. According to a 2012 survey by Harris Interactive, 81% of employed adults use at least one personal device for business. Bring-your-own-device (BYOD) users are no longer just the "super users" of enterprises or tier one carriers; they're also small business owners and employees, and they live and work in less urban and more rural areas.

Initially enterprises were hesitant to embrace BYOD users. The concept of supporting more than one type of mobile

Blurred Lines continued on page 35

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TEXAS RIO GRANDE VALLEY'S MEDICAL-EDUCATIONAL FIBER OPTIC NETWORK

By John D. Bradford
Economic Development Manager
VTX1

VTCI is a leading broadband service provider offering Internet, television entertainment and telephone services to approximately 4,000 member-owners in South Texas. The Cooperative covers approximately 7,300 square miles with 5,200 route miles of buried fiber optic and copper cable, from Rio Grande City to Brownsville to the northern areas surrounding Dilley, Texas, a community located southwest of San Antonio.

VTCI and subsidiary companies continue to expand their broadband network to enable greater bandwidth capacity and improve capabilities. VTX Communications, LLC (VTXC) and VTX Telecom, LLC (VTXT) were established to reach new communities and diversify the original product line, telephone service, to other lines of business such as wireless Internet and data transport. These subsidiary companies currently serve an additional 4,000 customers with broadband service. One of VTX Telecom's ongoing projects is to expand the company's current broadband network to serve twelve additional communities surrounding VTCI's existing service area.

VTCI's subsidiary companies also provide features such as long distance and television entertainment which add value to our offerings and make our broadband service more attractive. Subsidiaries provide 1,500 route miles of fiber optic transport service to other telecommunication companies, including 8 of the largest telecommunication companies in Mexico. Additional services include tower design, maintenance and construction.

The Rio Grande Valley of Texas is composed of four (4) counties that encompass 4,872.50 square miles bordering the Rio Grande River with Mexico. The four counties' combined population in the 2010 U.S. Census was an estimated 1,550,000 to 1,750,000; however, these population counts have been challenged by Hidalgo and Cameron Counties believing there was an under-count by the Census process. Even with more than 1.5 million in population, the Rio Grande Valley has not been high on competitive carrier's priority because there is not a single Tier I or Tier II city with more than a 500,000 population. Brownsville is the largest city with 175,043 followed by McAllen with 129,877 and Edinburg with 77,100 in the 2010 Census. In the late 1980s and early to mid 1990s, Competitive Access Carriers (CAPs) Metropolitan Fiber Systems (MFS), Expedius, Yipes, WIN, tw telecom, etc. were busy connecting intercity competitive carriers such as MCI, LDDS, ATC, Sprint, etc. from their local points of presence to major commercial carriers and enterprise accounts. With the introduction of the Internet, dial-up speeds were quickly being replaced by Digital Subscriber Loops (DSL) by major telephone companies followed by the hybrid-fiber DOCSIS technologies by the major cable companies. The Internet has been the driving force behind the deployment of faster broadband speeds with more users and more complex and larger transmission demands to be transported over these networks.

Prior to 2013 construction of the Texas Rio Grande Valley's Educational-Medical Fiber Optic Network by VTX Communications, LLC, the Rio Grande Valley's choice for ultra-high speed network between the major communities was limited to primarily the two major Incumbent Local Exchange Carrier networks of AT&T and Verizon. In 2005, the University of Texas Systems had completed a dark fiber network connecting Dallas with Austin with San Antonio with Houston and back to Dallas. This DASH (Dallas, Austin, San Antonio, Houston) network connected the major University of Texas schools in these cities at a Gigabit Ethernet speed. In the Rio Grande Valley, the Time Division Multiplexing speeds of DS-1 through DS-3 were the norms; however, the University of Texas Systems and the Texas A&M Systems decided to explore a public-private partnership where an exchange of privately held dark fiber was augmented by publicly held electronics.

This joint network began operating in 2006 at 10 Gbps; however, unlike the major cities in northern Texas, a competitive access provider was not available to get past "local loop bottleneck" created by the Incumbent Local Exchange Carriers' antiquated networks. The intercity fiber transport network connecting San Antonio with Laredo with McAllen to Harlingen and Corpus Christi and returning to San Antonio was operating at 10 Gbps, and it was disheartening to discover that the local across-town special access loop was able to operate at a mere 100 Mbps. These South Texas universities required connectivity to major research university computing sites in Massachusetts, California, and Illinois. In Texas, colleges and universities have formed a collaborative network called the Lonestar Education And Research Network (aka LEARN) where Texas based institutions of higher education share resources and information. Both major Texas university systems (The University of Texas and Texas A&M), have 10 Gbps connectivity into the National Lambdarail and Internet2 networks.

In 2010, the U.S. Department of Commerce's National Telecommunications and Information Administration (NTIA) issued a Notification of Available Funds (NOFA) that would permit construction of ultra-high speed fiber based broadband connectivity between a privately built network and local public institutions. Under the Broadband Technology Opportunity Program (BTOP), VTX Communications and the Rio Grande Valley institutions of higher education held several planning meetings to address the apparent problem created by the ILECs' slower and out-of-date special access networks. A BTOP Application was submitted to the NTIA in the Round #2 of the Program. Highlights of the application are outlined here.

Initially there were five Participating Community Anchor Institutions, and they were as follows:

- The University of Texas at Brownsville and Texas Southmost College with 4 locations, connectivity with dark fiber,
- The University of Texas Pan American with 6 locations, connectivity with dark fiber,
- The University of Texas Health Science Centers with 3 locations, connectivity with dark fiber,
- South Texas College with 6 locations, connectivity with dark fiber, and
- Texas State Technical College with 4 locations, connectivity with dark fiber.

The University of Texas Pan American and South Texas College have remote campus locations in Rio Grande City, Texas. South Texas College has a remote campus in the City of Weslaco, Texas, and Texas State Technical College and The University of Texas at Brownsville have a shared remote campus in the Raymondville Rural Technical Center location. At the remote campus locations, the fiber optic broadband connectivity makes distance learning via video conferencing a reality. The distance learning with university and college faculty teaching via full motion video saves students in neighboring counties thousands in transportation costs during a semester.

- Dark Fiber Connectivity included multiple strands of dark fiber with each Participating Community Anchor Institution having its own interconnection with all of the other Participating Community Anchor Institutions via an in-house Fiber Termination Panel (FTP). No longer would any of the higher education locations have to depend on the local ILEC for expensive, outdated, and slower technology to provide broadband.
- VTX Communications would provide the initial design, engineering, and construction management to build a 166 fiber route mile network including connectivity into and out of national gateways that provide access to the continental USA. VTX Communications permits connectivity to all the major carriers in Mexico.
- In 2010, VTX Communications and its Participating Community Anchor Institutions were awarded a BTOP determination, and construction of these networks began. Since the beginning of construction, two major events have transpired. First, the University of Texas at Brownsville and Texas Southmost College agreed to separate their once united campus operations, and dissolve their prior operating arrangements. Simply put, these Participating Anchor Institutions became two separate and distinct campus geographies. The University of Texas at Brownsville still required 4 points of connectivity, and Texas Southmost College also required 4 new points of connectivity.

The second major announcement was made in the 85th Texas Legislative Session that involved the combining of The University of Texas at Brownsville with The University of Texas Pan American to form The University of Texas Rio Grande Valley. The combined University will be eligible for bi-annual funding from the University of Texas' Permanent University Fund (public lands oil and gas revenues). The inaugural class for The University of Texas Rio Grande Valley will commence in September 2015 with an expected enrollment of 28,000 and a ten year growth forecast to 48,000 students.

In the University of Texas Systems Research Information Technology Strategic Plan, the interconnection of the nine academic institutions with each one having designated research projects, and the six University health institutions already having national reputations of national biomedical research leaders, in areas ranging from cancer to infectious diseases. It is expected that the Rio Grande Valley institutions in the University System specialize in geriatrics and aging opportunities (Winter Texans) as well as the prevalence of diabetes in the predominant Hispanic population of the area. As the University Chancellor stated during the announcement of the combining of these two campus locations, the era of brick and mortar has been replaced by high speed fiber optic broadband that will permit students to have access to the learning process without the confines of a building.

The University System's research has involved projects such as working on the theory of gravity and communications with deep space elements. This type of research requires infrastructure to connect to the Texas Advanced Computing Center in Austin and the National Lambdarail. Plans are underway to move to the next increment of fiber optic broadband speeds that may be at the 40 Gbps or 100 Gbps levels. With each campus controlling its fiber optic ended technologies, the University System and the Texas A&M System have saved millions in fiber optic transport and local access costs over the past eight years. In addition, the University System and Texas A&M System do not have to have an intermediary (ILEC) obstacle when they desire to collaborate with another campus or another institution.

Finally, the 85th Legislature of Texas passed a bill establishing a new medical school for the Rio Grande Valley. VTX Communications, in conjunction with The University of Texas Health Science Center has completed fiber optic connectivity with building housing the upper levels of medical study (Years 3 and 4). When the building where the first and second year medical students will be built or designated, VTX Communication will make these connections. From the private side of medicine, the three major hospital systems in the Rio Grande Valley have been in negotiation with VTX Communications for connectivity to all their locations as well as The University of Texas Health Science System's three existing locations, and the fourth when designated. With the health care focus at a national level, standards for the content and layout in patient information have been established where patient's records can be forwarded to a centralized depository for secured access around the globe. The days of a patient carrying an armful of copies of their health care records from their doctor's office to the hospital have been replaced via electronic transmission of Gigabytes being sent across their newly installed fiber optic network.

Although the initial network was focused on the educational and medical communities, the Rio Grande Valley Educational-Medical Fiber Optic Network has begun to get connectivity questions from local and county government locations. Since the network was commissioned on July 1, 2013, inquiries for connectivity from the private sector have begun to come into VTX Communications for enterprise networks requiring Metropolitan Access Networks and Wide Area Networks. The Rio Grande Valley was fortunate to have a "foundation" network constructed where fiber optic connectivity will be possible for generations to come, and it was made possible by public and private visionaries being willing to work together for the enrichment of the region.

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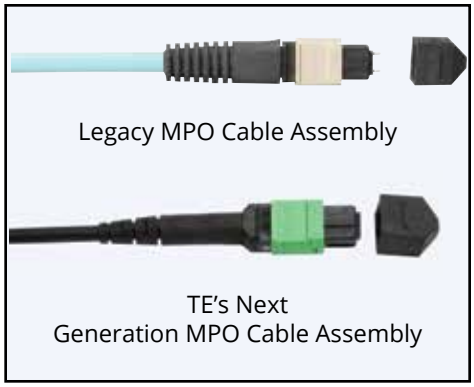
Evolution of the MPO: From Data Center to All-Network Solution

By Pat Thompson
Business Development Manager
TE Connectivity

As networks have ramped up to ever-higher data rates over the past decade, some service providers have sometimes been hesitant to adopt new connector technologies. They want to make sure any new connector has a proven track record showing that it can deliver the optical performance and mechanical reliability necessary to support high-speed networks.

To stay ahead of customers' demand for bandwidth, service providers must continue to add fiber to their networks and accelerate the speeds at which traffic moves across those infrastructures. As they do so, they are looking for ways to reduce the overall cycle time required to expand network capacity and to ensure they can deliver service with "five 9s" of reliability. Many leading service providers have discovered the plug-and-play multifiber push-on (MPO) connector helps them achieve both objectives.

First introduced over 10 years ago, the MPO connector–defined by Telcordia GR-1435–has evolved significantly over time, as companies have re-designed and re-engineered their MPO products and processes. Today's manufacturers have not only radically improved the MPO connector, but also combined it with an innovative cable design to make the MPO easier to install. The result is a next-generation, carrier-grade MPO assembly which has proven, in both laboratory tests and field deployments, that it can satisfy–and in many cases exceed–the Telcordia GR-1435 and even GR 326 requirements for single and multifiber connectors. In fact, MPO connectors are used around the world today to support not only multiple-dwelling unit (MDU) applications but also those in the core network, including data centers, central offices, switching centers, radio network controllers, base station controllers and cell sites.



MPO connectors today have improved mostly notably in four areas. The first, manufacturers such as TE use an improved polymer material, a major technological step forward, compared with previous generations. Second, a state-of-the-art manufacturing process focuses on updated polishing techniques, which ensures lower return loss across all fibers, and an integrated inspection procedure--no MPO leaves the factory before having been visually inspected, cleaned and tested for performance verification. This revised manufacturing process ensures optimal connector performance and reliability in the network. Third, the MPO connector design satisfies the rigorous requirements of GR-1435-CORE, ISSUE 2 – meaning – it meets similar reliability requirements of the SC connector, which service providers use throughout the network. Finally, the MPO connector is designed to perform in extremely harsh environments, and will accommodate a range of temperature extremes from -40°C to 75°C. And when used indoors, the next gen connector has proven its ability to exceed specified requirements.

Simply put, today's MPO connectors offer service providers a reliable, robust solution for their networks. They are less susceptible to failure than earlier versions and deliver the optical, mechanical and environmental performance needed to expedite the addition of fiber capacity and to support higher data-rate services.

Expanding the Toolbox for Gigabit FTTH

by Kurt Raaflaub
Sr. Product Marketing Manager
ADTRAN

The FTTx toolbox of most service providers consists of sealed DSLAMs, traditional Fiber-to-the-Node cabinets, FTTH aggregation equipment, and a variety of ONTs. However, for the service provider to economically deliver Gigabit speeds, they must continue to move the equipment closer to the customer. This calls for a new set of tools and capabilities.

The Crossover Cabinet/Enclosure – Cabinets have traditionally been viewed as big, bulky, very expensive and somewhat unsightly near a customer premises. This is changing with the introduction of the Crossover Cabinet. These are innovative, ultra-compact solutions that are bridging the gap between a sealed DSLAM pedestal and a traditional Fiber-to-the-Node (FTTN) cabinet. These solutions are rapidly deployable and rival the cost and simple installation of sealed DSLAM solutions. In addition, when used with Multi-Service Access Platforms (MSAPs) they can offer a wealth of service options. Some of these devices offer simultaneous support of both FTTN and Fiber-to-the-Home (FTTH) access, enabling a seamless migration path from 100Mbps VDSL2 vectoring to full Gigabit FTTH services. These new cabinet enclosures are changing the face of deployment with profiles as low as 40 inches, which allows for more "pedestal-like" mounting techniques, thus eliminating the need for a concrete pad and drastically reducing the cost and time required for FTTN and/or FTTH installation.

Low-Profile MSAPs – There is no denying that the advent of the MSAP changed the face of service delivery by enabling the delivery of multiple services to multiple customer groups, all from a single device. However, one hurdle faced with these platforms is the inability to adapt these solutions for cabinet retrofits or remote terminal installations. This is changing thanks to the recent introduction of low-profile, high density MSAP solutions. These solutions extend the service providers' ability to deploy a mix of innovative residential and small business access services further into the outside plant as service providers enter new markets. Their smaller form factor (2RU) also results in lower installation costs and affords the service provider with the ability to tailor services expansion based on the needs of each individual market.

When combined, these tools enable service providers to migrate seamlessly from FTTN, to a mix of FTTN and FTTH, and ultimately to 100 percent FTTH while limiting throw-away investments typically associated with cabinet deployments.

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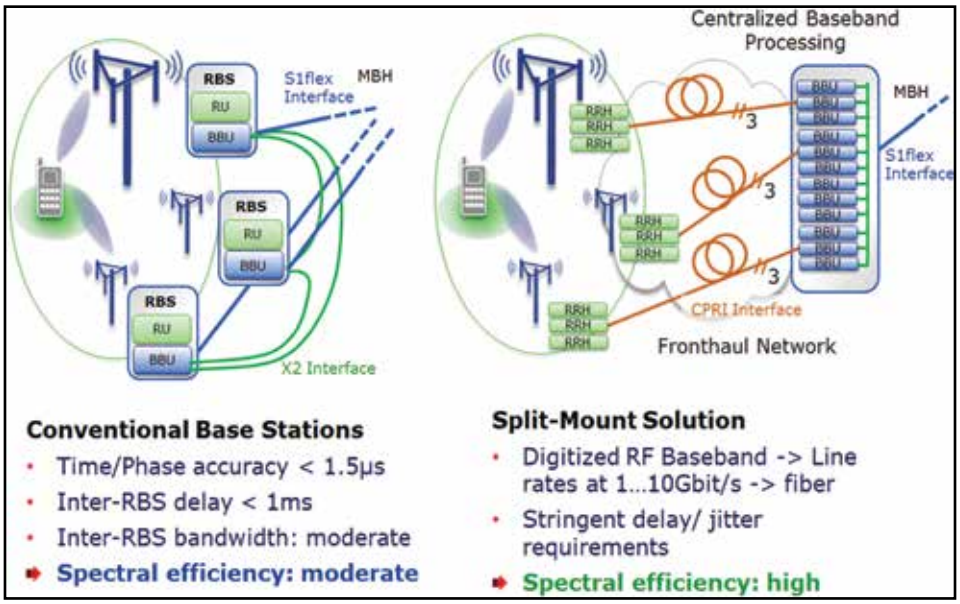
The Changing Landscape of Mobile Backhaul

Jim Theodoras
Senior Director Technical Marketing
ADVA Optical Networking

Mobile backhaul (MBH) has traditionally meant carrying traffic between a Mobile Network Operator (MNO) cell site and its core network. As always, carrying someone else's traffic is different than carrying your own. An analogy that I like to use is that of FedEx. You need to have a drop-off point, package the item, give it a tracking number, track it, and then have confirmed delivery. The growth in Carrier Ethernet brought both the bandwidth and service assurance needed to carry a MNO's traffic between their tower and core. However, two recent trends are rapidly changing the MBH landscape.



The first is the increasing number of cell sites. The growth in cell sites is not only due to increasing geographical coverage and number of carriers and subscribers, as one would guess. Cell sites are also getting smaller and smaller in coverage, as reducing the cell sizes allows more subscribers per frequency slot, and improves the end user experience for those within the cell. However, making cells smaller balloons the number of cells needed to cover a given area. Long gone are the days of a single base station per tower, as it simply would not be cost effective to put everything needed at every antenna node. At first, simple daisy chaining and hub and spoke switching were used to extend a base station to nearby nodes. However, things are much more formal now, with standards emerging that create protocols for the information between sites. Essentially, towers have become dumber, and the smarts have been moved to a centralized location, with specialized transport pipes between them. This is known as "fronthauling". The radio headends remain at the tower. The baseband processing is centralized elsewhere. And CPRI (Common Public Radio Interface) is used to transport traffic between them.

The second trend is tighter timing requirements, which not only impacts the MNO, but also anyone handling their traffic. Within the ever shrinking cells, there is still a need to maximize the number of subscribers per channel slot. The latest wireless protocols like LTE-Advanced use antenna beam steering and call duplexing techniques, both of which require tighter frequency accuracy coupled with phase retention to work properly. And since today's towers serve multiple MNO's at a time, any given tower might have several different time domains to support simultaneously. All of this greatly impacts a MBH service provider. Not only must a service provider be able to carry timing information, like the earlier FedEx analogy, they must be able to track and assure the delivery of the customers' timing domains as well.

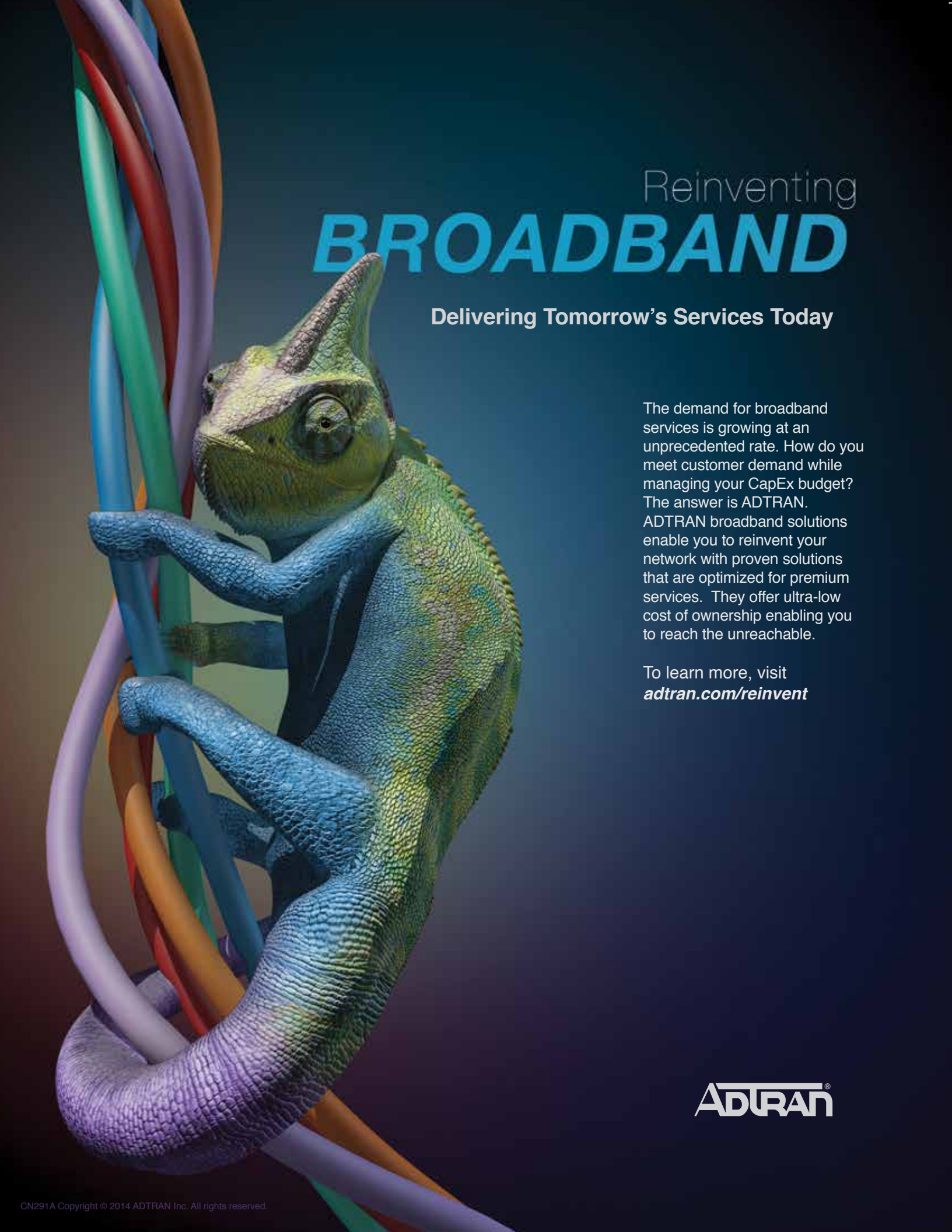
To meet the exploding demand for mobile bandwidth, MNO's are altering their architectures, and MBH service providers will need to update their service offerings to include fronthauling and timing delivery and assurance solutions that cover frequency and phase.

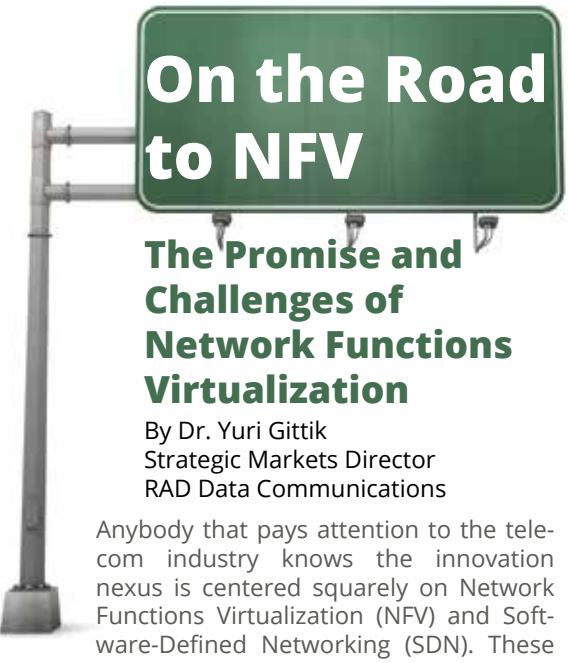
Skinny Wire Partners With Industry Events

By Randy Turner
Director, Marketing Communications
Walker and Associates

Beginning with COMPTEL PLUS Spring in Las Vegas, attendees at national industry events will find Skinny Wire featured as a Media Sponsor. We are pleased that this publication has reached a status that brings additional value in marketing these events, as well as providing attendees important articles that augment their attendee experience. Contributors from a broad range of industry leadership have helped shape Skinny Wire into a widely recognized publication.

Look for this level of partnership at both *COMPTEL PLUS Spring and Fall* in 2014, as well as *UTC Telecom 2014*. The *TIA 2014: Network of the Future* will also feature Skinny Wire partnership, as well as the *Lightwave Optical Innovation Summit* in Austin this July. Your readership is important to us, and we want to hear from you on additional topics you would like included in upcoming issues. Skinny Wire also accepts non-solicited articles for consideration in future issues. Contact us at SWEditor@walkerfirst.com.





The Promise and Challenges of Network Functions Virtualization

By Dr. Yuri Gittik
Strategic Markets Director
RAD Data Communications

Anybody that pays attention to the telecom industry knows the innovation nexus is centered squarely on Network Functions Virtualization (NFV) and Software-Defined Networking (SDN). These two complementary, but mutually independent, technologies promise to transform the way carriers deploy and manage their network infrastructure, significantly reducing both OPEX and CAPEX, and accelerating carriers' market responsiveness.

NFV, in particular, extends the successful evolution seen in IT circles of running virtualized applications over low-cost, commercial off-the-shelf (COTS) hardware platforms to the realm of carrier network and service infrastructures. In January 2013, leading service providers initiated an NFV standardization effort in the European Telecommunications Standards Institute (ETSI), via a special NFV Industry Specification Group (ISG). By October, the group published its first five documents, which lay out the terminology, requirements, architectural framework, and use cases. These documents provide the blueprint to help the industry move towards a fully interoperable NFV ecosystem, and toward the considerable benefits derived thereby.

NFV's Promise

Among the benefits that NFV can bring to service providers are:

- Rapid deployment, upgrading, and turnoff of network functionalities and service capabilities
- Ability to flexibly locate and relocate network functionality wherever it is most effective or least expensive
- Potential to combine multiple network functions on a single server platform
- Reduced costs through the use of ubiquitous standard servers, rather than proprietary communications hardware

Centralized or Distributed?

The common conception of NFV is that all of the applications and functions will be centralized in the data center. With all of the hardware and virtualized applications running in a single site, carriers will greatly benefit from economies of scale of in-house IT resources.

A more precise conception of NFV, as fine-tuned in the seminal papers produced by the ETSI NFV ISG, is that virtualized functions should be located wherever it makes the most practical and economic sense, whether that's the data center, a network node, or the customer premises. This is the Distributed NFV (D-NFV) approach.

While centralization offers scale economies for IT resources, there are many cases in which there are clear advantages for a distributed architecture wherein the service provider would host virtualized network functions at the customer premises. These advantages range from economics (including network costs), to performance, to the feasibility of the functions being virtualized. In fact, there are a variety of applications and functions that perform better, virtualized or otherwise, at the customer premises:

- Loopbacks: Some loopback functionality should be hosted in the CPE.
- End-to-End QoS/QoE Monitoring: Monitoring can be implemented in edge devices, but would provide more reliable and accurate measurements if hosted in the CPE.
- Firewall: Hosting a customer firewall outside of their CPE introduces potential risks. Also, some customers may require the firewall hosted locally as a matter of policy.
- End-to-End Security: Security should be implemented only at the customer site.
- IP-PBX: There are cases where centralization of this function is not accepted or accepted only in part. For example, when local voice connectivity is required even during a lost WAN connection.
- WAN Optimization: By design, optimization (in particular for the access segment) should be implemented at the customer premises.

Economics of Distributed NFV

While traditionally, Layer 2 & 3 network interface device functionality has been best cost-optimized with dedicated hardware and embedded software, service providers are even more interested in increasing service value and the revenue stream through new capabilities. In a pre-NFV era, they have been constrained by the cost of introducing these value-added services.

Now NFV, in general, and through its location at the customer location in the D-NFV architecture in particular, enables downloading of any desired new functionality without the need for installation of new equipment or costly truck rolls. It also delivers lower on-site installation, maintenance, and energy costs.

Moreover, with a keen eye on the dynamic equation of networking resource cost, network quality and performance, additional revenue potential, and operational efficiency, a D-NFV architecture offers the service provider ultimate flexibility to allocate virtualization resources wherever it makes the most sense.

Going Forward

Whether service providers opt for a data center-focused approach to NFV or see the advantages of a distributed and customer premises-based strategy, a key factor will be how quickly providers can change the relationship between their network and IT operations. The more harmonious the relationship and integration, the quicker and more successfully we will see large-scale NFV roll-outs in the network.

Another major challenge for service providers is to ensure orchestration of the virtualized capabilities and functionality, as well as harmonization of IT/cloud and network resources. Frankly, assuring service level agreements (SLAs) in a virtualized environment with service chaining and multiple network segments, will be a considerable challenge. Considerable, but not insurmountable.

Whatever the challenges, it is important to begin work on NFV early. With early adoption, a provider not only gains business and economic benefits and advantages sooner, but also accelerates the learning curve of the new "virtualized" carrier world.

Dr. Yuri Gittik heads Strategic Marketing for RAD Data Communications, a leading global provider of Ethernet systems and other network access equipment. Contact him at yuri_g@rad.com.

Searching for Your Life's *Give it a rest!*

By Brenda Abdilla
Founder, President
Management Momentum

Brenda Abdilla is a certified career coach, author, leadership expert, and the founder of Management Momentum LLC. For over 13 years, Brenda traveled the world as a professional speaker, business consultant and executive recruiter, working with thousands of top level professionals in the areas of sales, management and leadership.

Since 2004, Management Momentum clients have had access to a battery of proven tools, resources and assessments that help them reach their desired outcomes sooner rather than later. After working with Brenda, clients feel engaged, challenged, energized, fulfilled and certain about their career direction. Brenda helps clients navigate career-changes and job promotions, increase productivity, improve leadership skills and remove obstacles in the way of moving forward.

Brenda's new book, What's Your Lane? Career clarity for moms who want to work a little, a lot or not at all, is now available for moms in career-question mode.

You can sign up for Brenda's newsletter and take free assessments at www.ManagementMomentum.net.

MANAGEMENT MOMENTUM
Move Your Career Forward

As a career coach, I talk to a lot of people in search of their life's purpose or their mission on earth. I want to say right now that I am 100% in favor of finding and living out your purpose; I live my own personal mission as a coach every day. But I am strongly against the added pressure and confusion caused by all of the well-meaning advice that implores one to "go and live the life of your dreams" or "find your purpose, and you will finally achieve happiness."

The truth is that if you are not currently living the life of your dreams, and are instead feeling stuck, burned-out, stressed and unhappy in your work (or life), adding the pressure to "find your purpose" is completely unhelpful and may actually push you further away from the clarity you seek.

Those who know their "purpose" make it appear to be an easy thing for others to attain

Imagine for a moment that you are lost in a strange city at night, trying to get to the local shopping mall. You knock on a man's door and ask how to get to the mall, and the man says, "Yes, yes, go to the mall. The mall is great! You are going to love the mall!" and then closes the door. He may have spoken the truth to you, but he left out all the crucial information you needed to help you actually get to the shopping mall! Those who already feel a sense of direction and purpose in their lives tend to make it seem easy to attain—but upon closer observation they probably evolved into this state over time as a result of many decisions—not one big one.

Wondering what to do next in life?

#1 - Deal with the stress first. If you are seriously unhappy or confused about the direction of your life, chances are there is some stress there—more than you might think. The thing about stress is that it actually changes who we are. In times of great stress, not only are we seeing things differently, but we are actually seeing different things. Stress activates the amygdala region of the brain, which is programmed for survival and scanning for danger. This is not ideal for seeing new opportunities or being solution-oriented or hopeful about life. We've all watched a co-worker or loved one unravel under the weight of stress and wondered what actually caused the problem. Stress itself!

The good news is that reducing stress is easier than your stressed-out brain may imagine. Here are two things that can make a huge difference very quickly with stress:

- Make peace with the past. I often send my clients to a therapist for this step, and I recommend it highly if you have some serious "baggage" personally or professionally—yes people have professional "baggage." Otherwise, there are many great coaching exercises, books or other resources available to help this process along, depending on the nature of your grievances. Something that you may think is not affecting you - or is safely in the past where it belongs - could absolutely be impacting you.

  Think about it: do you really want that hurt, angry, bitter part of you making decisions for you about your future? If not, get some help or find some resources to help you quickly explore and then make peace with your past before you make any big moves for your future.

- Explore the categories of your life to see where else the stress lies. Many people call me because they "hate" their job, but often other factors are at play. Explore all of the major categories of life and give yourself a rating on how satisfied you are in each area, including: primary love relationships; family relationships; career, future financial outlook; self esteem; body image; self confidence; mental health; addiction; sleep; nutrition and exercise; medical issues; and work environment. If you are considering a career change but rate yourself low on the satisfaction scale in other (non-work-related) categories, then you might want to address those before you make the big leap.

Purpose?

#2 - Look for clues instead of "Ah-ha!" moments. Many people think they are failing at discovering their next life steps because they have not had a big "Ah-ha!" moment. Sure, it would be great to just stumble upon your crystal clear life purpose and then base all of your life decisions on that knowledge. But that is not real life—that is a Hollywood movie, and probably explains why we love movies so much. As unexciting as it sounds, the answers to life and career direction can come from paying attention to the little clues. How do you feel when you perform certain tasks at work? What gives you a sense of delight? In what life tasks do you lose yourself? What strengths have you used over and over in your career that you may have forgotten about or taken for granted? Start a journal or a file on these observations and begin to build from the clues you find.

#3 - Look for a sense of purpose rather than "the" purpose. If I had to pick one purpose in my life it would have to be the privilege of being a parent. But then what about my work as a coach? Or the outreach I have done with mothers of young children? If you think about it, anything worth accomplishing in life comes from a combination of elements. No successful diet, marriage, or career can be boiled down to one thing—they consist of many things. The same is true for your purpose. Look for what gives you a sense of meaning and purpose in your life currently and how you can get more of it. You may find that you need an entire career change—or not.

"How sad and bad and mad it was - but then, how it was sweet."
— Robert Browning

Carrier Class Orchestration for Network Virtualization

Service providers can define advanced services, deploy across multiple networks and assure performance

By Prayson Pate
Chief Technology Officer and SVP of Engineering
Overture

The term orchestration is used frequently in discussions about cloud computing and network virtualization. Promises of lower hardware costs and on-demand, pay-as-you go deployment models are widely discussed today. Service providers desperately want to capture these same benefits to develop innovative new revenue-generating services, accelerate time-to-market, and reduce operational costs.

What does orchestration mean for the cloud data center? And, what additional requirements are imposed by new communications service provider (CSP) technologies like network functions virtualization (NFV)?

What is NFV?

Network functions virtualization refers to the idea of replacing dedicated network appliances (such as routers and firewalls) with software running on standard servers. A group of large international service providers [i] initially conceived the NFV concept.

This group saw real challenges like:

- An increasing variety of proprietary hardware appliances like routers, firewalls and switches
- Space and power to accommodate these appliances
- Capital investment challenges
- Short lifespan
- A long procure-design-integrate-deploy lifecycle

Together, they proposed a solution: Replace the currently deployed appliances with software running on commercial, off the shelf (COTS) hardware to create an ecosystem of software and scalable cloud-type technologies. The expectation remains that this approach will provide the desired benefits mentioned above as well as enabling innovation that will make it even easier to develop, orchestrate and manage network functions.

Orchestration Basics

Orchestration is the provisioning, control and connection of virtual resources with other network resources. This includes mapping the specific requirements of the service and applications to the availability of the underlying network resources. In a datacenter, these resources include compute, connect and storage resources that have been virtualized using virtual machines (VMs) and open virtual switches (OVSs).

What additional requirements do we get when we add NFV to the mix?

Not Just the Cloud Data Center

The first difference is span of control.

Traditional orchestration solutions are focused on resources within the data center. Carrier NFV will be used to build carrier services across the network, and orchestration must support those additional network elements and requirements.

Orchestration in the data center is simplified by the homogeneous nature of the physical and virtual element. Adding the hodgepodge of metro equipment to the mix makes the problem harder. Heavy Reading's Gabriel Brown likened NFV to "re-building your house while living it in."

Many industry leaders agree that the network will only continue to evolve. No service providers or customers can completely scrap their old stuff and start over. We have to solve the orchestration problem with new technologies and demands, both from businesses and consumers, in mind.

Resources Have Variable Cost and Variable Value

In a data center, resources are all equivalent. The available interconnect bandwidth is high and the corresponding latency is low. There is usually a large pool of each type of resource, so the cost of any given resource is low and uniform. These facts simplify the selection and assignment of resources.

With NFV, new resources may be added in a central office, point of presence or even at the customer site. The resources in these sites will necessarily be limited, so their cost is high relative to those in the data center. However, their proximity to the customer means that their value may be relatively high for some applications.

Why? Two reasons:

- The proximity means that the latency is lower, which may be important for some applications or services.
- Likewise, the required bandwidth may be lower because of the removal of the need to take traffic back and forth.

Orchestration for NFV must take into account the variable costs and values of resources and optimize the use of these elements versus the requirements for the given service.

Lifecycle and Work Flow

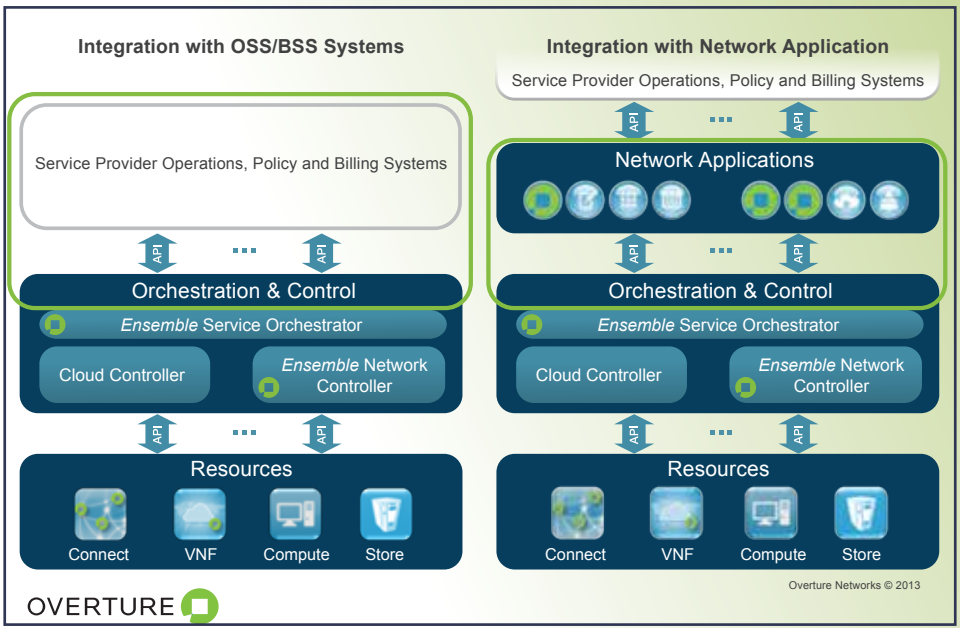
There is some tie-in of data center orchestration into other systems, but these are often standalone scripts.

In contrast, orchestration for NFV must tie into higher-level systems. As shown in the figure at the top of the following page, the orchestration may need to tie into the service provider's OSS systems for operation, policies and/or billing. The orchestrator may instead need to tie into an intermediate level of network applications or higher-level service orchestration. In either case, the need for open APIs is clear.

Service Elasticity

One of the great benefits of cloud applications is that they are horizontally scalable or "elastic". Services built using NFV must also be elastic, and this means the components must be built accordingly. They can't be simple re-compilations of the software to run on a server instead of an appliance.

An appliance has a fixed size and capacity, and its software is designed and optimized for that capacity. In moving from an appliance to a virtual environment, the software needs to be decomposed, analyzed and recomposed to achieve elasticity.



"... industry leaders agree that the network will only continue to evolve."

Another reason for the success of cloud services is the on-demand, pay as you go model. Operators want this same benefit from services built using NFV. When moving from an appliance to a virtualized implementation the supplier also needs to revisit their licensing model in order for the overall service to meet its goals.

Orchestrator Multi-Tenancy

First, it is important to distinguish between multi-tenancy and virtualization.

Multi-tenancy most often refers to a software architecture principle where a single software instance runs on a server, serving multiple client-organizations (tenants).

Compare this with virtualization where components are abstracted, enabling each customer application to appear to run on a separate physical machine.

While the isolation and encapsulation of virtualization is important for NFV, it may be a drawback for orchestration. For orchestration, multi-tenancy simplifies system design and integration into higher level systems, while providing and enforcing the needed separation between the various users (tenants) of the orchestrated services.

Cloud Data Center vs Carrier Class Orchestration

Carrier class orchestration extends beyond the data center and out to the metro service edge. This type of orchestration includes CE 2.0 access gear at the customer and aggregation sites, as well as the connecting links.

By pushing orchestration to the metro service edge, there can be more collaboration with partners, customers, and the networking community at large. It also allows service providers to take advantage of "best-of-breed" technologies involved in the entire service delivery lifecycle to provide a comprehensive set of dynamic services that meets market and customer-driven demands.

And, finally, this strategy will position them to achieve their initially promised outcomes of accelerated time-to-market for revenue-generating services, reduced operational costs and improved resource utilization.

[i] *ETSI. Leading operators create ETSI standards group for network functions virtualization. 01/22/2013 http://www.etsi.org/news-events/news/644-2013-01-isg-nfv-created*

ASPECT	DATA CENTER ORCHESTRATION	CARRIER CLASS ORCHESTRATION
Resource acquisition and assignment	All resources are equivalent	Location, latency and bandwidth matter
Span of control	Within data center	Access metro area
Lifecycle and work flow	Controlled directly by user	Tied into higher level systems
Service assurance and resilience	Coarse status monitoring	Transactional behavior and fine status monitoring
Elasticity, scalability and multi-tenancy	Current resources are elastic	VNFs must be elastic and orchestrator multi-tenant

OVERTURE

In the Spotlight

By Randy Turner
Director, Marketing Communications
Walker and Associates

Rich Ferrante recently joined Walker serving in the role of Federal Business Development focusing on key department and prime contractors around the Beltway. He began his career in 1987 and has worked in numerous technical and sales roles for both OEMs and resellers including several startups. He held the position of Regional Sales Manager in the Mid-Atlantic for seven years with Walker and is thrilled to be back, stating "I believe Walker has many great things to offer the Federal Government such as their industry and product knowledge, custom integration and excellent customer service! " Richard is pictured on the flight deck of the USS Enterprise CVN-65 Aircraft Carrier (world's first nuclear) after its last mission that his nephew served on. Rich can be reached at rich.ferrante@walkerfirst.com.

Chris Walker recently joined the Strategic Business Development team (Government, International, RBOC) at Walker and Associates as the Proposals Sales Analyst. Chris is the grandson of Walker co-founders Chris and Virginia Walker and has worked for the company for over 8 years. He has a Bachelor of Science in Business Administration with a focus in Organizational Leadership from the University of North Carolina at Greensboro. Chris brings a wealth of knowledge of Walker's technologies and processes, and is well rounded in his expertise as he has held various positions at Walker. He has been an Outside Commercial Sales Regional Account Manager for over a year before embarking on this new position. Prior to that, he held other positions as an Inside Sales Executive, Business Development Specialist, Buyer/Planner and Marketing Promotional Specialist. Chris has also spent time working in Walker's warehouse and is knowledgeable about the supply chain component of the company. Chris will focus on generating sales revenue from various major contract sources and select the most strategic and profitable opportunities for Walker. He will report directly to Jane Brightwell, Vice President, Strategic Business Development. Chris lives in Winston-Salem, NC and can be reached at chris.walker@walkerfirst.com.

Doug Funkhouser has joined Walker and Associates as the Sales Regional Account Manager for the Northwest, consisting of Washington, Oregon, Idaho, Wyoming and Alaska. Doug is an established professional sales executive calling on all facets of the telecom arena including LEC's, CLEC's, public utilities, wireless carriers, MSO's, transport carriers and call centers. His product knowledge includes OSP, CO, Cabinets, AC/DC power, FTTx, GPON, transport hardware and CPE. Over the last 20 years Doug has worked closely with channel resources such as Walker, and fully understands the integral role they play in the marketplace. He comments "Walker and Associates has distinguished themselves as the premier telecom channel partner within the industry. The company recognizes the responsibility to its client base to provide an all-inclusive full service partnership that will provide customers with timely, professional and state-of-the-art resources to fully address all their telecom product requirements, comprehensive consultation services and technical expertise."

Doug began his telecom career in the CATV industry as a ViaCom design engineer, moved to GTE/NW as their OSP Engineering Director and then coupled his technical experience with a desire to move into sales. He has held sales management positions with Stromberg/Carlson, Westinghouse, Reltec/Marconi, Telstrat and most recently Zhone Technologies. His tenure with these companies has afforded him a strong technical understanding of the elements of a telecom networks and considerable relationships with many major

vendors who appear on the Walker and Associates product and services line card.

Doug can be reached at doug.funkhouser@walkerfirst.com.

Dan Neitge recently joined Walker and Associates as Sales Regional Account Manager for the Upper Midwest territory, covering Minnesota, North Dakota, South Dakota, Iowa,Nebraska and Montana.

Over the past 13 years, Dan worked with ADC and OSIG and had the privilege of working with many of Walker's customers. His background and areas of expertise include network connectivity, central office, outside plant, and FTTx solutions.

Dan commented "I am very excited to join the team of experienced professionals at Walker and Associates. Walker has a great reputation in the industry for combining best of breed technologies with best practices to provide solutions that give customers a good return on their investment. I expect to provide customers with the expert support and exceptional service they have come to expect from Walker and Associates."

Contact Dan by email at dan.neitge@walkerfirst.com.

Trey Hall joined Walker and Associates as Director of Sales, Western Region in July 2012. Trey has worked in the telecommunications industry for over 15 years and comes from Fujitsu Network Communications where he served in various roles including channel sales, business management, and operations management. Trey holds an MBA from the University of Texas Dallas and an Industrial Engineering BS from Texas A&M University.

Hall comments " The opportunity to join the Walker team is an exciting moment in my career. Having worked with Walker and Associates for many years I know the company has an excellent reputation in the market for strong core values centered around integrity. Walker's extensive portfolio of products and services enable a consultative engagement with customers which I am very passionate about. I believe people make a difference in our industry. Walker and Associates is constituted by a large collection of outstanding professionals whom I am proud to now be a part of."

Trey lives in Dallas, Texas with his wife, Kayleena, where he also serves as Vice President of Habitat 4 Paws, which is a North Dallas based 501c3 dedicated to animal rescue.

Trey can be reached at trey.hall@walkerfirst.com.

Eddie Lester was announced as Walker's Outside Salesperson of the Year at Walker's recent Annual Sales and Marketing Meeting. This marks Eddie's fourth time receiving this prestigious award during his seventeen year career with Walker. He currently manages accounts in Virginia, North Carolina and South Carolina. He credited Inside Sales counterparts and manufacturer field sales contacts for his ongoing success, and expressed his commitment to his customers. Eddie has long been recognized as a leading performer in the company, and maintains strong customer and manufacturer relationships. Congratulations are certainly in order for his achievement and success.

Additional awards were presented to Sales Regional Account Managers **Eric Dowson, Ben Dierker,** and **Todd Kruegler**. They were each recognized for exceptional performance in their respective sales territories in 2013.

Annette Bittner was recognized as Walker's Inside Salesperson of the year at Walker's Annual Sales and Marketing Meeting, held recently in Greenville, SC. Annette has worked for Walker and Associates since 2008, and works out of the sales office in Alpharetta, GA. She manages sales accounts in the northeast sales territory, supporting sales and customer service for large numbers of customers. Her expertise and experience provide customers with a dependable resource who can assist them with a variety of services, including technical assistance, product selection, order management, connections with internal and external product specialists and more. She is an outstanding sales performer, generating customer loyalty while improving market share improvement in her territory.

Additional awards were presented to **Trudy Nance**, **Lee Ann Gilley** and **Tracy Crowell** for their outstanding performance in 2013. As Inside Sales Executives, they manage accounts throughout the country, providing valuable support to their counterparts working as Regional Account Managers. In addition, they work directly with customers to assist with network projects by providing logistics support, recommending new product lines, and matching customer requirements with Walker's available services and resources. Collectively, Annette, Trudy, Lee Ann and Tracy offer customers more than 50 years of experience in telecom sales. Congratulations to each of these associates!

Toby Bent, Channel Manager for TE Connectivity, was presented with Walker's annual Hank Ford Memorial Award. This was his consecutive win of the award, which recognizes distinguished performance by a manufacturer partner. Toby's work with Walker was highlighted in comments by Lisa Smiley, Vice President of Marketing at Walker, who acknowledged his tenacious attention to detail, his scheduling of time required to effectively manage Walker's account, and his resourcefulness in resolving customer affecting issues. Walker's customers and associates are equally served by the work of Toby Bent, and this award is intended to recognize him as a leader among his counterparts.

Teri Ward, Market Development and Proposals Manager at Walker and Associates, was presented the President's Citation Award for exceeding her annual marketing plan in 2013. Teri manages a number of manufacturer relationships for Walker, and serves as a valued resource for sales, marketing, materials management and engineering. Teri is noted for her resourcefulness, professionalism, and strong work ethic, and provides valued influence in her work.

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Real-World SDN: Multi-Layer Network Provisioning and Optimization

By Michael Schiff
Product Marketing Manager
Data Center Switching and Routing
Brocade Communications Systems, Inc.

The true value of SDN will come from the real-world applications that it will enable. Although at times, when listening to vendors describe their SDN strategies, it seems like we are hearing more about solutions in search of a problem, and not the other way around. At Brocade, we are developing solutions that customers are asking for, and in this article, I will explain how an SDN application that can solve a major challenge facing service providers today.

For service providers, the onslaught of data on their networks has made them re-examine and re-examine again how to build a more efficient network. The goal is to have a dynamic network infrastructure at all layers to not just handle the massive amount of traffic, but to also unlock new revenue streams by providing premium services with greater SLA's to customers. However, to date, there has been a lack of common management abstractions that work across multiple layers in the network in a multi-vendor environment in a simple way. Achieving multi-layer network control that spans both the packet and optical layers in a network has been impossible at worst or far too complex at best, especially in a multi-vendor environment.

With SDN, greater control of the network can be realized through virtualization of the network. Also, by establishing APIs between layers, software components and best-of-breed network elements this can ignite innovation, enabling the development of customized applications. For example, an SDN application can be developed leveraging OpenFlow to provision services and automatically optimize network resources across a multi-layer network as traffic and service demands change. One use case for this application would be for on-demand multi-layer provisioning of bandwidth services spanning the multi-layer network, orchestrating and triggering provisioning activities at both the network and transport layers; speeding service delivery and saving operational costs.

This example is not just a theory. This is something that can be achieved today. SDN is no longer theoretical; practical use cases are emerging, and customers for the first time are empowered with tools to drive network virtualization— with little hand-holding from their vendors and no changes in vendor software. That is the benefit of abstractions; by viewing SDN technologies like OpenFlow as an API to the data plane, the speed of change can be accelerated for use cases unanticipated by a vendor. To draw a parallel, can you predict the next app that will come out on your smartphone's OS? No. SDN has allowed networking to begin that same evolution. And Brocade's customers have been deploying SDN-enabled routers for over seven years! The inherently programmable and future-proof architecture of the Brocade MLX Routers and the rest of NetIron Series enable Brocade customers from even before SDN was part of the industry's vernacular, to support and reap the benefits of SDN with OpenFlow. In 2014, you are going to see a lot more real-world applications of SDN, so this is just the start.

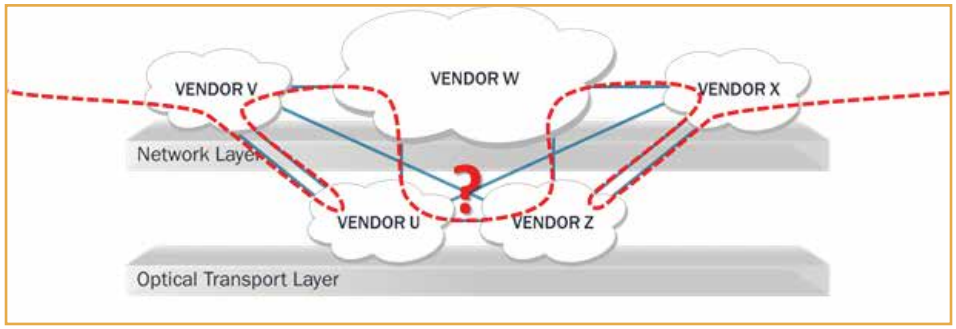

Figure 1: Complexity in service provider networks today causing the need for multi-layer, multi-vendor network control.

Blurred Lines continued from page 16

device, the need to protect those devices and the trove of data they access was a lot more than many IT leaders wanted to step up to. Advancements in mobile security solutions, privacy and device management solutions are rapidly allaying the fears of enterprise IT and are also paving the way for a more mobile SMB (small and medium sized-business).

Rural service providers are uniquely positioned to deliver powerful new solutions for SMBs. In many cases SMBs are already using wireline or wireless services of the service provider, who has a well-established understanding of their customers' businesses. The typical resource or agri-based economies of rural markets are prime to benefit from the power of mobile SMB applications. Remote video surveillance over wireless broadband, M2M solutions for irrigation management or inventory control are no longer just large enterprise plays, they are compelling SMB services that have far more impact than a data package and a slick new smartphone.

Creating and taking these new offers to market may appear to some as a daunting task, especially for operators who have traditionally been focused on connectivity or non-forborne services. But it doesn't have to be. One of the upsides of being smaller is the ability to be more nimble and responsive. NewCore Wireless and their business partners have witnessed firsthand the success in creating effective partnerships with SMB's that create new offerings effectively and economically.

"Thriving in this world depends on truly understanding how the game is changing and doing something about it - fast!" offers Willetts. Building partnerships to build new revenue opportunities may blur the image of yesterday's rural operators, but it sharpens the vision of what they can be in the future.

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Innovative Solutions Simplify New Tenant Turn-Up

By Graham Gibson
Business Development
Walker and Associates

Innovation at Walker and Associates begins and ends with understanding customer goals and objectives. The company's strategies include not simply selling a product, but imagining how that product and Walker's blend of responsiveness, creativity and service can come together to make customers' jobs simpler and more efficient.

In order to deliver on this commitment, Walker has continued developing its fleet of value-added services designed to save time and money for its customers. Part of that development has focused on deployment kits, where Walker continues to innovate. Although working with customers to create customized kits is not new, making them more relevant to current customer requirements in the marketplace is an ongoing evolution.

As a distributor that represents over 250 manufacturers that range in technology from the nuts and bolts on the rack to the cutting-edge active equipment gear that runs the digital economy, Walker holds a unique ability to blend various customer demands into a single kit. The advantages are numerous and widely recognized. Having performed this service year after year for CLEC and wireless customers, Walker has the expertise and experience to deliver the goods across multiple markets.

In the colocation-provider industry, for example, depending on where the handoff of data center migration occurs, the turn up of a new customer typically involves a standard set of products from a diverse group of manufacturers. In high-demand, high-growth data centers, that routine process of ordering parts from disparate sources can hinder an already stretched staff.

Walker's solutions provide a fully customizable deployment kit that incorporates all of the necessary hardware and equipment to get a new tenant in the building, connected to the provider's network and lit up. Mostly orderable in a single container and collated in Walker's state-of-the-art facility, these kits provide logistical certainty, guaranteeing that all components show up at the same time. No more missing parts, delayed migrations, or upset tenants. Likewise, the deployment kits being orderable under a single part number maximizes back-office efficiency, reduces on-site waste, and limits delivery concerns.

Small, innovative solutions like these can make a big difference on the data center floor, where migration is a delicate and orchestrated process. With downtime being the sworn enemy of any company and a legitimate business risk, the move must be both rapid and seamless.

Being able to depend on Walker's 43 years of logistics success and its current 99.9% shipping accuracy rate allows providers to rest easy. Learn more about all of Walker and Associates' professional services including Network Design, Engineering, Deployment Kits, Managed Services, Installation and Integration at www.walkerfirst.com, or contact us for a free customized kit quote at info@walkerfirst.com.

2014 UPCOMING EVENTS

As an active member of multiple state, regional and national industry associations, Walker and Associates is strategically engaged with organizations supporting telecommunications markets. We demonstrate our commitment through event sponsorships, exhibiting at conferences and expos, and directory advertising.

Look for us at the events listed here, and refer to our Upcoming Events section of our website, www.walkerfirst.com, for additional details.

We look forward to seeing you at these events!

FEBRUARY	
* Utility Telecom Forum (Region 8, 9, 10)	Reno, NV
GTA 17th Annual Vendor Showcase	Macon, GA
* CalCom Showcase & Tech Expo	Sacramento, CA
Telecom Training & Safety Conference	Bismarck, ND
LTA Annual Convention	New Orleans, LA
BICSI Winter Conference	Orlando, FL
AFCEA West	San Diego, CA
MARCH	
Iowa Communications Alliance Annual Meeting & Expo	Des Moines, IA
* ITA Showcase Northwest	Portland, OR
MTIA Show-Me Expo	Columbia, MO
MTA Annual Conference and Expo	Minneapolis, MN
CCA Global Expo	San Antonio, TX
* COMPTEL PLUS Spring	Las Vegas, NV
APRIL	
* Texas Communications Expo	Belton, TX
TANE Telecom and Technology Symposium Northeast	Portland, ME
SCTA Spring Convention	Charleston, SC
ANMTA Spring Conference	Albuquerque, NM
OTA Outside Plant Seminar	Newport, OR
* ACE/RUS School & Symposium	St. Louis, MO
MAY	
NDTA TOC Conference & Showcase	Fargo, ND
OTA-WITA Joint Annual Meeting	Stevenson, WA
WSTA 104th Annual Convention	Lake Geneva, WI
KTA Annual Meeting	Lexington, KY
* UTC Telecom	Phoenix, AZ
JUNE	
ITA 109th Annual Convention - Illinois	Lake Ozark, MO
* Tri State TCI Technology Conference	Cherokee, NC
TTA Spring Meeting	Franklin, TN
ITA Annual Convention - Indiana	French Lick, IN

* - Indicates Walker and Associates is an event sponsor

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