BROCADE

Software Networking and the New IP: How Enterprises benefit from the adoption of Software Networking in Service Providers

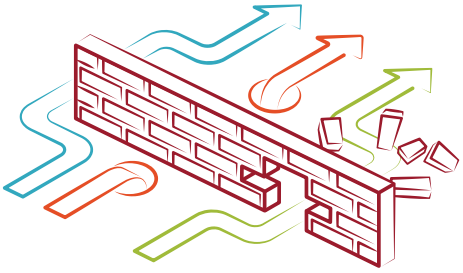
Just over two years ago, the networking and telecom industry embarked on perhaps one of the most ambitious infrastructure projects of recent times to split networking hardware from networking software and drive virtualization and automation across their infrastructures. However, unlike other industry movements such as LTE adoption, or the shift from TDM circuits to metro Ethernet, this initiative has been little heralded outside of the inner circles of network operators and vendors, most likely because the impact is perceived as benefiting network providers rather than their end customers.

This movement to the New IP is actually two projects in one—to shift physical infrastructure to virtualized software and to automate the processes of managing networks. Already, there have been profound effects on traditional networking equipment vendors who are coming to terms with radically different operating models as they deconstruct proprietary monolithic product ranges and reposition themselves as open software vendors. In turn, the adoption of this software is set to drive the economics and scaling of the network providers themselves, enabling the embrace of billions more users, devices and end-points.

Much of this effort has been internally directed—focusing on the cost and operational savings that these technology shifts provide. It's strange then, that little attention has been paid to the end-user benefits of such migration. To put it another way, what's in it for the end users and what will encourage them to embrace this new approach?

Of course, there is always the argument for price. If the cost points of service delivery drop, then surely service pricing will drop too. This is undoubtedly true, but only if the measure of price is linked to the amount of bandwidth delivered. To this extent, it could be argued that the move to software networking is simply an inflection point the industry must go through to deliver ever larger amounts of bandwidth at a similar or lower price points to ever more users. At the end of the day, it's a zero-sum game for the network operators. However, to focus on price exclusively is to miss one of the key advantages of adopting software networking—namely agility. In this document, we will explore how we can harness this attribute to deliver real customer value to enterprises large and small.

This white paper was created by the Brocade service provider Customer Advisory Board (CAB). The CAB includes 15 service providers across the globe that meet to discuss key industry trends and challenges, and collaborate to help transform the industry toward the New IP.



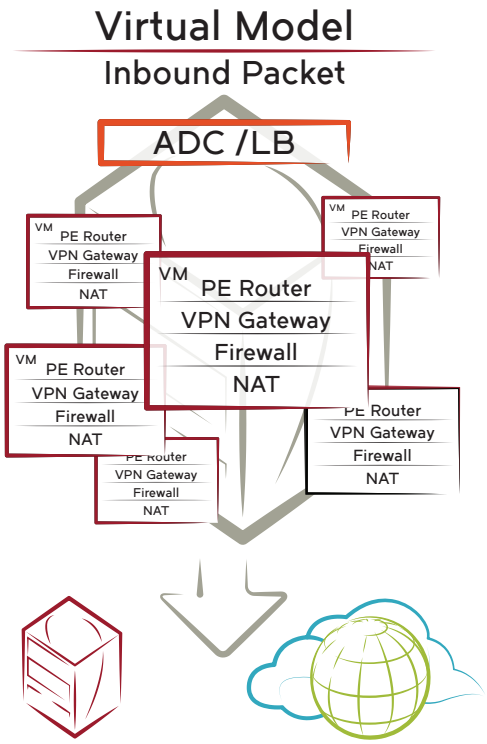
Agility—in this context, the ability to create and enable new network services quickly and automatically is at the center of many network operator adoption plans for software networking and the New IP. Moving from a physical networking world where provisioning takes weeks to one where provisioning is done by users themselves and occurs in seconds has massive appeal to both network operators and end users. Indeed, as we've seen with cloud service providers, not only do users love the ability to provision their own services dynamically, this level of automation has become a prerequisite for doing business.

This level of agility, tied with virtualization also provides a number of benefits that are not immediately obvious, but yet carry significant benefits.

In a traditional, non-virtualized network, resources such as routers, firewalls, NAT and VPN gateways are usually configured to be shared between customers. Because of the potential impact on other customers, these resources tend to have fixed configurations and are not designed with constant change in mind. However, by providing each customer with one or more of their own virtualized machines, containing many of these services, the virtual router/firewall/VPN/gateway can be configured dynamically by the network operator or the end customer without fear of impacting other users and with far greater granularity that would typically be allowed (or available) in a shared resource.

Additionally, because these services are delivered from a general compute platform, should the demands of one customer grow, the virtualized platform can be scaled-up within a single machine, or scaled-out across multiple x86 servers.

The ability to ramp-up services speaks to another unique customer benefit derived from the move to virtualization—dynamic service scaling. As customers' requirements for bandwidth and connectivity to cloud services change—for example, seasonally, geographically or due to exceptional load—not only can the network scale up or down these services, but the customer only pays at the time of consumption. This flexibility can help enterprises deal with events such as large web or video access, large-scale internal or external meetings and events, disaster recovery or simply turning-on a new site which would otherwise have triggered a hardware upgrade.



Of course, providing end-users with this amount of power and control presents its own problem—how do you present information and configuration options to customers that can be easily understood and consumed? Simply providing a command-line interface to an end user and telling them to configure their own services may have certain appeal but then nothing has really changed in how they manage their services from the physical equipment you are encouraging them to swap. Alternatively, tying-in a web portal to the business logic and automation that SDN provides will give end-users direct access to business rules, translated to network actions. For example—enable or disable access to specific applications or web services, rather than router configuration. This moves configuration from an esoteric firewall rule to a potential upsell—click here to enable SLA managed access to Salesforce.com.

Extending this a step further into system automation would provide a set of APIs to allow customer's own applications to request services of the network dynamically. A recent example of this is "cloud bursting", where a customer's

application or service need additional compute resources beyond those provided within their own data center. The application signals (through an API) the network operator to request both bandwidth and compute resources. When the peak load has subsided, the compute and bandwidth are rescinded.

All of these new controls and management methods lead to an interesting question. How is an end-user (or indeed the network operator) able to understand the performance of the network and more importantly fix issues if they occur? After all, it's now the customer's network that's operating essentially as an overlay on top of the network operator's infrastructure.

In a traditional network, the answer would be to use SNMP traps to monitor network events and aggregate this information into a network monitoring dashboard of some description. However, this model would speak only to the performance of the physical and virtual devices under the direct control of the end customer, and misses the end-to-end service experience. To get to this information requires not just traps or logs from the state of network interfaces, but the performance analysis of the customer's applications running over this network.

To put this in context, if an enterprise is connected to a service provider through a 1GB metro Ethernet link (which is apparently working) but access to their Salesforce applications is slow and video conferencing unwatchable, where do you turn for answers?

To get to this data requires that the service offering deliver analytics—metrics and KPIs on the type and performance of each application as traffic traverses the network. This information can be aggregated at a customer level to provide an SLA-type dashboard (along with discovery of all the different types of applications and destinations being consumed). Further, across multiple customers and multiple locations, the information can be aggregated to provide a total application performance view. In this aggregated view, the performance of Salesforce is assessed across the network, and individual user experiences are compared with the average experience over time.

From a customer control perspective, being able to understand the bandwidth consumed by the video application, along with a comparative analysis of the video quality would allow (through the web portal we described) the enterprise IT manager to change the quality or QoS settings of their virtual network, or alternatively, reconfigure their video application to use a less demanding video codec. This ability to allow customers to monitor and then tune their network experience is a key change in IT network management that in-turn, creates loyalty in the end user. After all, why would you defect to another service provider if you've invested time and effort into tuning your applications to work perfectly?

Another aspect of this performance monitoring ties into security. Having a view of the applications and destinations of traffic leaving the enterprise gives an ongoing view of what individual end users are doing on the network. Tying this information into virtualized security services either permanently, or event triggered provides a method of detecting and reacting to inbound and outbound threats to the enterprise. Delivering this service from the cloud, rather than deploying yet more appliances in the enterprise is appealing from both an agility and cost perspective.

To implement the services laid-out in this document requires the foundation of virtualization—the virtual network functions (VNFs) together with the SDN level control through open source projects such as Openstack and OpenDayLight. On this foundation, each of the service management methods we've described must be defined as a data model and then exposed and delivered through a comprehensive web portal.

This leveraging and execution of software networking tools and methods will define how network operators compete with each other, and how software networking vendors such as Brocade will compete to deliver the New IP.

Feature	End Customer Benefit	Service Provider Benefit
Service Now		
Customers configure their own network services directly through a web portal, a CLI or an API	Changes not required to submit change orders and wait days or weeks for services	Reduced operational costs, reduced errors and improved customer satisfaction
Every Customer Gets Their Own Network		
Each customer receives one or more virtual machine for their networking needs	Each virtual machine is configured by the end customer, uniquely for their needs in real-time.	If a virtual machine configuration breaks networking, only one customer is affected (single fault domain)
Pay as you Go		
Additional or up-sell services can be enabled or disabled on-demand and only paid-for as needed. Examples include bandwidth, compute, security, mobility services	Flexibility in paying only for resources consumed with easy ability to extend or reduce service levels as needed. Minimizes the need for extensive pre-planning or accurately predicting future needs.	Ability to tap-in to additional revenue streams previously prohibited by complexity or set-up cost. Creates differentiation and faster time to revenue
Keeping the Customer View of the Network Simple		
Abstracting network configuration to business logic keeps decision making and configuration changes simple for customers. For example enabling or disabling access to internal and external applications without understanding firewall rules	Network services can be configured with minimal technical knowledge	Customers are more likely to purchase and use services which are easy to understand and deploy
React to Security Situations Fast		
From mitigating denial-of-service attacks to enabling new software for threat detection, being able to detect and react to network threats is a key concern of customers	Enabling a library of security detection and mitigation services provides customers with tools to take fast action.	Threats affecting one customer often affect many, and being able to move general compute resources to address specific threats mitigates their larger impact.
On-demand and Scheduled Networking (Cloud & Network Bursting)		
Turning up and down services can be triggered automatically by customers' applications or against a time-schedule. Providing network APIs allows the customers' own applications to make network requests.	Customers' applications can scale dynamically with demand and payment is made by the hour or by the gigabyte.	Tying access to both dynamic bandwidth and dynamic compute provides a unique advantage over cloud-only service providers.
Works with Existing Customer Premise Equipment		
Seamless interoperability with existing hardware-based (CPE) infrastructure	Allows customers to mix existing legacy CPE hardware with new vCPE equipment. Offers a smooth evolutionary path from traditional implementations to cloud.	Offers a good insertion point that doesn't completely disrupt the customer's environment, faster and simpler adoption of cloud services
Deliver Real-time Performance Analytics		
Delivering real time SLA analytics on application and network performance shows which applications and devices are consuming network resources and how the service provider is meeting their SLA	Users can tune their network to match the performance needs of their applications and isolate which applications require more or less bandwidth or latency.	Transparent availability of SLA information provides service providers with an immediate feedback loop on network issues and performance from a customer perspective.
Provide the Tools to Fix Problems		
Connectivity from remote sites and users often create hard-to-trace problems. Delivering simple dashboards that provide visibility into connectivity issues shows which sites and users have attempted to connect, even if access failed	Customers can self-diagnose issues and if help is needed, a common set of diagnostic information is available	Reduced customer service calls and faster time-to-resolution.
Drives Customer Satisfaction		
Combined benefits of NFV and SDN implementation	Customers get better SLAs for: 1. service turn up, moves, adds, and changes, 2. service availability, 3. service performance. Results in better overall customer experience and satisfaction.	Creates differentiation and competitive advantage in the market

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