



The Power of We™



The Network That Adds Value

Introduction

Plato, perhaps the world's prototype 'Renaissance Man', credits the Greek philosopher Heraclitus with one of life's genuinely true axioms: 'nothing endures but change'. And what was apparent in Ionia, in the 5th century BC, is even more patently obvious in today's dynamic, IT-driven business world. Strategies change, mergers, acquisition, and divestitures are forced upon already stressed and stretched resources, and yet the pace remains frenetic. It's something of a mystery that after all this time and experience, many IT departments continue to place their trust - or perhaps, more accurately, 'their hope' - in 'classical' technology to deliver next-generation service agility.

Maintenance of the operational network, incorporating fixes and enhancements, and catering for services variations and activations, is generically referred to as 'Change'. This gives rise to 'Change Control', 'Change Meetings', 'Change Approval', 'Change Windows', and occasionally, 'Change Rage'. It's almost as if the business was being controlled by the process of Change, as opposed to the business driving the Change it needs; a case of the tail wagging the dog.

Applying Albert Einstein's belief that problems cannot be solved from the same level of consciousness that created them, Avaya has radically altered the networking landscape with innovative solutions that revolutionize the way that networks can be built, translating into a new service delivery model.

The Three Phases of Change

Delivering Change involves three distinct phases; each consumes valuable and finite IT resources, and each is applied serially. The end result is that the effort involved in executing Change is vastly over-shadowed

by the effort and delay involved in authorizing and following-up the act itself.

The three phases involved in Change are 'the before', 'the during', and 'the after':

- **Before** - the administrative burden of planning and the negotiating Change through business/IT processes
- **During** - the technical execution of the Change
- **After** - the verification and validation of Change; the more seismic the Change the more thorough and wide-spread the testing has to be, involving multiple skills groups and correspondingly large burden

In order to better quantify the scope and scale of the issue, Avaya commissioned research¹; surveying IT professionals in large organizations in North America and Great Britain, across a wide cross-section of industry sectors. This research shows that, on average, IT waits 27 days to get a Change Window (although this can be up to two months), while the business spends a total of nine months of every year waiting for IT to deliver service change; hardly an ideal situation for either. Indeed, 99% of improvements to business systems are delayed by having to wait for a suitable maintenance window.

On average, one of every five network outages is caused by errors directly related to pre-planned Change, and so it's not surprising that companies have developed significant, and time-consuming, processes specifically intended to reduce the likelihood negative impact. Still, 82% of companies continue to experience network downtime as a result of errors during change to the Core. More dramatically, Change-induced network downtime can have serious career-defining consequences, with 20% of IT personnel acknowledging dismissals, and this rises to 33% in the Telecoms and regulated industries, being as they are, less tolerant of failure.

Avaya has created a new way of deploying and running networks, one that fundamentally transitions from traditional 'cost center' perception to that of 'business enabler', so that you can lower the cost of ownership and enhance returns.

¹Network Agility Research 2014, commissioned by Avaya and published by Market Dynamics Limited.

Given that 90% of companies admit that the complexities of their current network limit the timing or type of applications they can deploy it is not unexpected that attempts to administer this complexity cause outage. Employee productivity and business analysis are the applications most adversely affected by network complexity considerations.

Virtually every organization, indeed 94%, suffer negative consequences due to Change errors, and the most significant areas of the business impacted includes employee productivity, followed by disruption to IT projects and the supply chain. Worryingly, 80% of companies report that they lose revenue every time the network goes down.

The research also suggests that forcing IT to wait for windows, perhaps accumulating numerous tasks, appears to exacerbates the issue of Change errors, with those companies reporting regular delays also reporting higher than average errors. The risk is that this becomes a self-perpetuating problem; businesses will be less accommodating of Change, forcing further delay, backlogging engineering work, and necessitating larger and more complex Change programs when opportunities finally present themselves.

Quite obviously this is a less-than-optimal situation, but without a fundamental change in how networks are actually designed and built, there is no light at the end of the tunnel, no opportunity to evolve and progress. The fact that compute and storage environments are increasingly virtualized – and therefore, by definition, agile, dynamic, and kinetic – only adds to the pressure on the network to more readily and reliably support Change.

Time to Change, Literally

Enter the Avaya VENA Fabric Connect technology. Built on a foundation of the IEEE's unified, next-generation Shortest Path Bridging standard, Fabric Connect empowers a radical evolution, from the business-impacting constraints that

characterize conventional networks. Quite apart of a number of other technical, operational, and business-centric benefits, Fabric Connect enables:

- **In-Service Everyday Change** – involving single or a limited number of services – can be performed every day, without delay; Fabric Connect empowers real-time change, with Edge-only provisioning
- **Seismic Change Avoidance** – encompassing significant re-configuration, typically involving the Core – should be relegated to history; Fabric Connect enables a Core that you build once and configure just the once
- **Automated Change-Ready** – where machine-to-machine orchestration requires tight synchronization – is now possible; delivering today one of software-defined networking's aspirational goals

Therefore, businesses that move to Fabric Connect are likely to realize substantial operational benefits and savings. The volume and scale of Change can be instantly and markedly reduced; this has a knock-on benefit in reducing the burden of administration, the effort in execution, and the scope and resources required for verification. Every single aspect of Change can be positively impacted, immediately and forever.

Sounds too good to be true..? You're probably thinking 'how can such a turn of events be possible..?' Put simply – and all the best innovations are characterized by their ability to simplify – Fabric Connect utilizes a hyper-intelligent unified protocol that builds a robust and resilient topology. This allows for every node to understand precisely where every other node is 'positioned' and therefore the optimum path between A and Z (i.e. the 'shortest path'). Additionally, an instantaneous 'Service ID' update mechanism – administered only at the Edge, that does not require manipulation on every link or device, especially not the Core – communicates unique details for every networking service.

Therefore, Fabric Connect enables the Core to be built once and then quarantined, with service alterations enacted only on the local node, and with these alterations being immediately propagated through the entire network. Typical real-world scenarios provide a clear demonstration of the Avaya advantage:

- **Extending Wi-Fi Guest Access** – this is where there's a need to deliver Wi-Fi service to a new location within the Campus. It requires one configuration action on one Wiring Closet Switch; no touching the Core or multiple transit Switches, and the relevant virtual network is immediately extended and available for service.
- **Partitioned Services** – this could be driven by the desire to give precedence to real-time collaboration applications, or network segmentation for sensitive applications to satisfy compliance requirements. Again, all that is required is a single configuration action at the network entry point; no touching the Core or multiple transit Switches, and each application enjoys its own L2 virtual private network.
- **Multi-Tenant Networking** – this is essentially an extension of the service-partitioning scenario, and here we seamlessly add L3 VRF functionality to deliver complete multi-service networking. By definition, a number of end-points will be networked, each with a number of L2 segments combined together. But still there is no requirement to touch the Core or other intermediate Switches, with all of the configuration work executed only on entry nodes; minimal, simple commands create the VRF, attach the L2 VLANs, and extend services network-wide.
- **Virtual Machine Connectivity** – this forms the high-performance L2 connectivity required between Servers that combine to deliver a unique application; a common life cycle requirement includes migrating the working image from one VM to another. Single end-point

provisioning – easily orchestrated and automated by third party solutions – establishes direct high-capacity connections between VMs. Because no configuration is executed on the Core, changes are conducted in real-time, synchronized with, and even coordinated by, the Server provisioning skills group.

Defining the Impact on TCO & ROI

Analyzing the Data Center more closely, it is interesting to contrast the evolution in the compute and storage environments to that of networking. Where the former is largely focused on virtualization-enabled consolidation and a reduction in infrastructure, most networking vendors, perpetuating archaic principles, attempt to maintain the status quo of multi-tier designs or even promote and expansion of the networking footprint. Avaya’s innovations can reduce costs by simplifying the infrastructure and reducing the operational burden; both the ‘hard’ and ‘soft’ costs associated with IT delivery. Simplifying the infrastructure maximizes the effectiveness of devices and links, and a fully optimized solution translates to a decrease in hardware costs, and a reduction in the operational burden.

Avaya is making networks dramatically simpler and more cost-effective to plan, build, and run. Although there is no such thing as the universal Data Center design, we do offer a template approach that greatly reduces the complexity and costs associated with conventional approaches. The basic building block for the VENA Data Center solution is our Distributed Top-of-Rack technology, delivering a consistent design experience for a range of deployment scenarios, scaling as required and integrated with the broader network.

Fewer and less intense links are required when the Distributed Top-of-Rack technology is deployed – relative to conventional Spine & Leaf configurations – and this places a correspondingly lower requirement upon expensive and complex Core/

Upon introducing its revolutionary Fabric Connect technology, Avaya recognized the agility and efficiency that this afforded in real-world environments; subsequently Miercom was commissioned to undertake a lab testing exercise to quantify the advantage of an [Ethernet Fabric](#) compared to conventional technologies. Key conclusions include that Fabric Connect delivers a 25x reduction Data Center configuration times, that the number of devices requiring configuration are reduced, and the risk of configuration error is lessened.

Avaya has modeled Data Center infrastructure deployments of various scale and leveraged precise data obtained during Miercom’s controlled testing in order to extrapolate operational costs. These models consider the number of networking devices involved, network tiers deployed in competing designs, the time required to configure devices, the number of configuration changes consistent with typical operations, and culminates in the comparative costs involved in building and running the network.

Each provisioning activity assumes a VLAN (or similar) configuration modification on two Top-of-Rack Switches. Avaya’s VENA Data Center solution necessitates action on only two devices, consistently requiring 7.6 minutes and costing \$5.70, whereas conventional models require activity on four devices (ToR and Aggregation or Core) totally – on average – 23.6 minutes and costing \$17.03 (up to 30.8 minutes and \$23.10).



Amortized to a per-port basis (with hardware depreciated over five years) the cost to deliver each Server connection, with either a low or high operational tempo, can be compared for the two competing approaches (depicted in the left-hand and right-hand graphs respectively). These results clearly demonstrate the real-world advantage of the Avaya VENA Data Center solution, with an average of 66.5% and up to a 75.3% saving on operational costs. The results also display a corresponding decline in the significance of hardware costs as the operational intensity increases.

Aggregation networking components. Distributed Top-of-Rack seamlessly integrates with Fabric Connect, our unified, service-orientated, automation-ready network virtualization technology. This empowers businesses to enjoy today much of the futuristic promise of emerging, conceptual solutions, namely: reducing the number of configuration touch-points,

transitioning service provisioning from a manual to an automated process. It also enables the genuine integration of business processes, business applications, and IT infrastructure.



It's possible to quantify the benefits of the VENA Data Center solution, addressing, as it does, both the operational and the infrastructural challenges within the Data Center. Assuming particular hardware scale and certain provisioning activity requirements² we can apply these to equivalent hardware models using conventional methods and Avaya's VENA Data Center solution approach.³ Distilled down to monthly, per-Server port costing comparisons, Avaya offers an advantage of, on average, 66.5% on operational costs.

Crucially, the advantage increases further when dual/multi-site distributed Data Center environments are deployed; the simplicity and agility afforded by Fabric Connect does not alter based upon site diversity and multiplicity, whereas the complexity required by conventional networking goes, quite literally, off the scale.

Conclusion

Avaya's solutions can significantly reduce the burden of network operations, transitioning businesses from device-by-device, hop-by-hop configuration to the goal of automation. We do this through intelligent orchestration systems and by significantly reducing device touch points. The Avaya VENA Fabric Connect technology, a truly unified, next-generation network virtualization offering, features an open and standards-based architecture that promotes integration with organic and third party orchestration solutions. Fabric Connect forms the basis of our VENA solutions, seamlessly complemented by other VENA technologies. Distributed Top-of-Rack is leverage to deliver the Data Center solution, and Switch Cluster, Stackable Chassis, and Unified Access typically combine for the Campus solution. This solutions-based approach allows for the creation of compelling infrastructure and application-specific offerings.

Avaya is reducing the scale, complexity, and intensity of the deployed infrastructure, and proactively simplifies the technology stack; taking complexity out of the operational model. This allows businesses to transition to a real-time networking model – real-time change and real-time service delivery – allowing valuable resources to be re-directed away from labor-intensive house-keeping to genuine value-add. Being committed to supporting open standards allows us to participate in an automation-friendly ecosystem that empowers integrated orchestration, service chaining, and application-driven optimization – all without increasing operational complexity or burden.

Conventional networking has evolved to a point of interdependent complexity that renders it no longer fit-for-purpose; translating into a series of delays imposed upon the business by inflexible and archaic protocols. Yesterday's protocols and designs are demonstrably incapable of meeting today's required levels of agility, simplicity, and efficiency. And that brings us back, full-circle, to Plato, father of that most famous of quotes 'necessity is the mother of invention'. It is obvious something needed to be done to fix the problem that has developed in networking, and the Avaya VENA technologies have been born out of that necessity.

Within the IT industry, we have been conditioned to accept waiting, even desensitized to waiting. We have grown used to waiting minutes for protocols to re-converge, hours for troubleshooting, days for network access, weeks for maintenance windows, and we even wait months to rollout applications. With VENA-based network infrastructure solutions, Avaya is ending the waiting game, empowering IT to deliver genuine business-centric value through the use of integrated simplicity.

² In this case the assumptions are two thousand 10 Gigabit-attached Servers in a single location, requiring one configuration change per month in low tempo environments, and ten in high tempo. Operational intensity scenarios are based on anecdotal feedback collated during real-world Customer engagements.

³ Avaya has conservatively modeled the hardware requirements of its own VENA Data Center solution products and technologies, and those of a major competitor using publicly available information.

About Avaya

Avaya is a global provider of business collaboration and communications solutions, providing unified communications, contact centers, networking and related services to companies of all sizes around the world. For more information please visit www.avaya.com.

