

White Paper

HP Virtual Application Networks

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New IT Trends Impact the Network

To be successful, modern businesses must be extremely agile and IT plays an ever-increasing role in enabling that nimbleness. ESG sees a number of IT trends closely aligned with business agility that impact everything from data center assets to remote workers. These trends will have an especially profound impact on corporate networks. Some of these trends are:

- **Aggressive data center consolidation.** Large organizations are consolidating data centers to bolster security and operational efficiency while cutting costs. According to ESG research, 63% of enterprise respondents were either actively consolidating data centers or had just completed a data center consolidation. Furthermore, almost half of those organizations (48%) were creating multi-tenant data centers to accommodate separate business units¹. As a result of this consolidation and multi-tenancy, the overall network environment will become much larger and more complex, and will need to provide secure, network segmentation for mission-critical applications and disparate business units.
- **Increasing use of server virtualization technologies.** With the proliferation of server virtualization technology (ESG research indicates “increasing use of server virtualization” was a top IT priority for the last three years²), network traffic is steadily increasing within data centers. In addition to the greater bandwidth requirements driven by higher virtual machine densities, this highly dynamic environment means that networks also have to contend with rapid VM provisioning and mobility while seamlessly integrating with virtual switches.
- **Wide and growing deployment of web applications.** In a recent ESG research survey, 25% of large organizations reported having deployed service-oriented architectures (SOA)- or Web-based applications extensively while another 60% have done so to some extent. Web applications rely on bursty communications across horizontally scalable servers. Therefore the network must accommodate an increase in “east-west” traffic, which it may not be designed to handle.
- **Consumerization of IT.** Employees are driving change as IT organizations are forced to support a plethora of different mobile devices. What started as “bring your own device to work,” or BYOD, is now BYO3, as employees routinely show up with a smartphone, tablet, and PC—all of which need access to corporate networks. In addition to the scalability requirement for campus and branch networks, mobile devices have also led to higher volumes of consumer traffic, such as audio, video, and social networking sites. Overall, the network is being tasked to deliver the appropriate level of access, security, and performance for these new devices.

Network Discontinuity

As a result of these IT trends, organizations need to deploy networks capable of rapid and massive scale that can accommodate highly dynamic environments and the demands of new traffic patterns, without adding cost or complexity to network operations. Unfortunately, legacy networks cannot keep pace with new technical demands let alone address the current speed of business. ESG calls this imbalance “network discontinuity.” While networking teams struggle to fight fires and keep up with business and IT demands, ESG research points to a growing number of cracks in the network foundation. For example, networking professionals identify challenges because (see Figure 1):

- **Current network security policies and controls are no longer adequate.** Massive data centers, server-to-server traffic, and mobile VMs make traditional security best practices and physical control obsolete. This forces networking and security professionals to try and catch-up, but they typically lack the right technical safeguards and skills to do so. Alarming, these issues are occurring as the threat landscape becomes increasingly ominous.

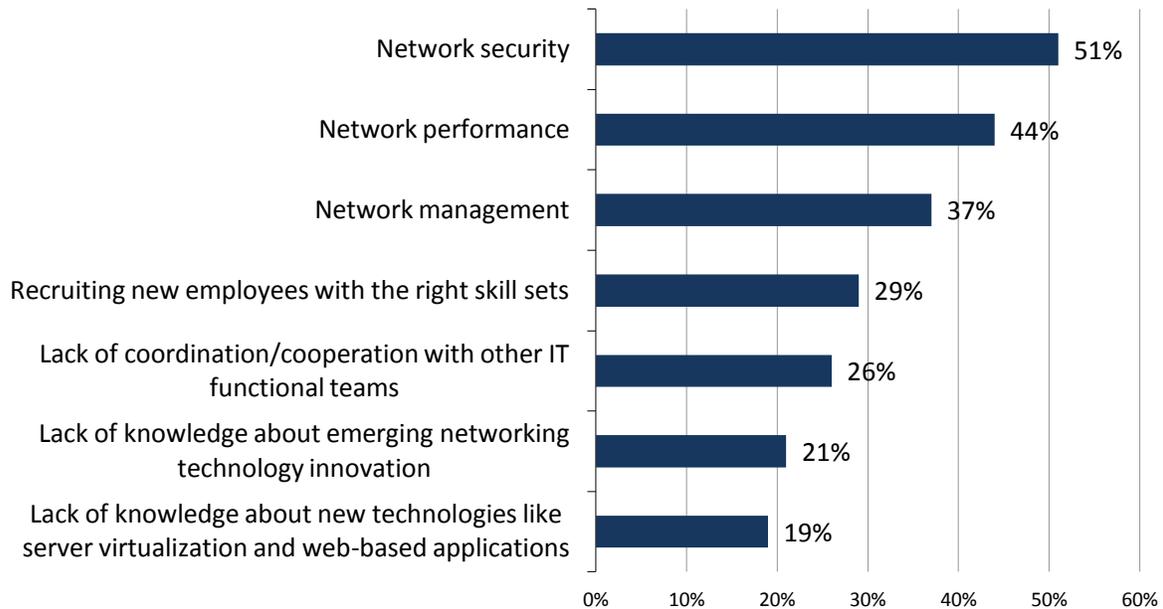
¹ Source: ESG Research Report, *Data Center Networking Trends*, January 2012. All other ESG Research references in this white paper come from this report, unless otherwise noted.

² Source: ESG Research Report, *2012 IT Spending Intentions Survey*, January 2012.

- New network traffic trumps legacy network capacity.** Large organizations are moving to 10GbE server-to-network interfaces, standardizing on 10GbE access switches, and replacing copper with fiber cabling. In spite of these investments however, network performance remains a major challenge. Why? Legacy networks tweaks are no match for data center scale, VM mobility, and the growing army of bandwidth-hungry applications.
- Static network management can't keep up with dynamic server virtualization and cloud computing.** Networking equipment is often provisioned, configured, and managed on a device-by-device basis using CLIs or proprietary management software. Alternatively, virtual servers and cloud platforms are provisioned and administered with a few mouse clicks. As enterprises further embrace cloud computing models, stagnant network management processes and tools will lag further and further behind.

Figure 1. *Biggest Challenges for the Data Center Network*

What are the biggest challenges facing your networking team with regards to data center networking? (Percent of respondents, N=280, multiple responses accepted)



Source: *Enterprise Strategy Group, 2012.*

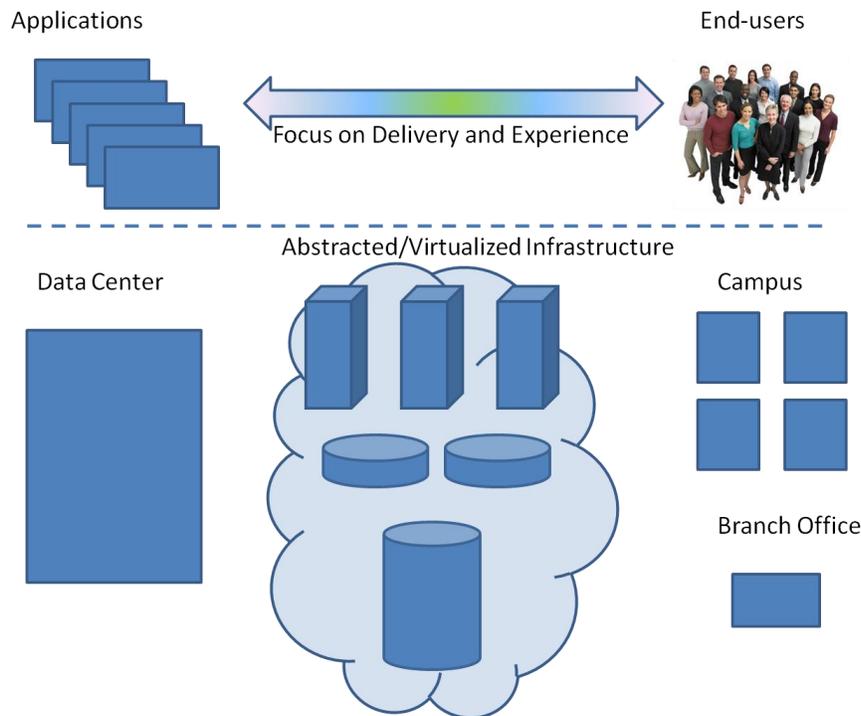
The ESG data also identifies a number of organizational problems around skills and cross-functional cooperation. This is due to the fact that many IT departments are still organized by separate technology silos around compute, network, and storage. These divides make it even more difficult to improve IT skills or solve the end-to-end application to end-user delivery problem. While server and storage technologies have adapted somewhat, legacy network architecture is still rigid and inflexible. Taken in its entirety, these points clearly illustrate the fact that something needs to change. Networks need to evolve to address these new requirements and enable the business, or network discontinuity will ultimately impact business operations.

What Is Needed?

ESG believes that existing legacy networks will not be able to sustain future growth. Therefore a new “cloud-friendly” architecture is required. This new architecture will support rapid growth, handle dynamic environments based on business and IT policies, and provide sufficient levels of automation and orchestration for rapid software-based deployment of end-to-end services. More specifically the network must be:

- A foundation for connectivity and performance.** Next-generation networks need to be built for “any-to-any” connectivity – any application, any services, for any user – while providing high performance, low latency, non-blocking connectivity. In networking terms, this translates to a network fabric that spans across data centers and campus networks.
- Virtualized and abstracted.** Just as the server and storage domains have adapted to the cloud era, the network must also. This means that control needs to be abstracted from the physical devices and centralized for ease of operation. In other words, networks must become a “platform” that can be provisioned, segmented, changed, and managed independently from the physical devices. This platform will need to extend from the data center to campus and branch networks as well. With this architecture, when the network environment rapidly scales, organizations will be able to keep pace via centralized management functions and not individual acts of IT heroism.
- Tightly integrated with adjacent domains and orchestration programs.** As the network environment scales, it will be impossible to continue with manual processes. Networks need to be connected to higher level cloud and virtualization platforms for orchestration and automation. With technology domains more interdependent than ever before, the network needs to be fully aware and tightly integrated with adjacent technologies and management platforms. This would include north and southbound application programming Interfaces (APIs), integration with layer 4 through 7 services such as load balancers and security applications, and visibility into virtualized environments like virtual switches and VMs. Ultimately networks have to become an integral part of end-to-end integration, management, and visibility for application connectivity and delivery—from the IT infrastructure to the end-users.

Figure 2. Network Requirements for Cloud Computing Era



Source: Enterprise Strategy Group, 2012.

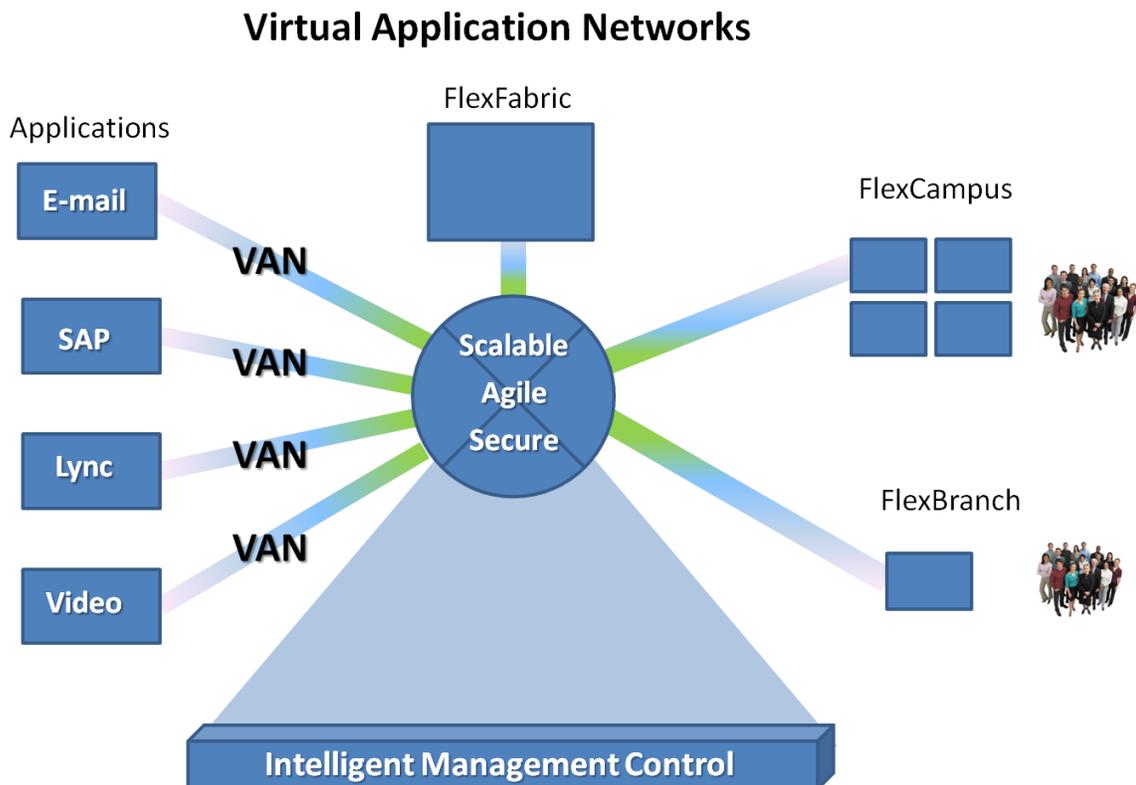
As organizations adopt and deploy cloud computing environments, networks will require greater levels of programmability. The only way this will be accomplished will be through a network abstraction layer and further software-based functionality.

Large organizations understand that networks are in a state of transition but are often confused by the ever changing new standards and innovations in development. For example, ESG research found that only 34% of networking professionals are familiar with OpenFlow, a set of open APIs and software initiatives for Software-defined Networking (SDN). ESG believes that OpenFlow has the potential to deliver the new networking requirements described above, but it is just starting to get traction and enterprise networking professionals are only beginning to explore its capabilities. Networking teams cannot be expected to bridge the technology and knowledge gap between legacy and next-generation network alone. Rather, they need help from their networking vendors with a combination of new products, design guides, reference architectures, training, and support.

HP Virtual Application Networks

Since the inception of HP Networking and its integration with the Enterprise Server and Storage groups (ESSN), HP has made significant investments in the network space and continues to improve upon the Flex Network architecture. This includes the development of Intelligent Resilient Framework (IRF) technology and its involvement in the Open Flow standard (16 HP switches currently support OpenFlow). Now HP introduced its Virtual Application Networks, or VAN, which represent HP’s vision for cloud networks. VANs are logical, purpose-built virtual networks that leverage existing Flex Network architecture, and are designed to connect users to applications and services, resulting in a scalable, agile, and secure network that streamlines operations(see Figure 3).

Figure 3. HP Virtual Application Network



Source: Enterprise Strategy Group, 2012.

VANs are enabled by:

- **Integration with HP's FlexFabric, FlexCampus, and FlexBranch offerings.** When combined with HP's data center, campus, and branch solutions, VANs enable intelligent end-to-end cloud networking connectivity and services. It accomplishes this by abstracting the control plane from the physical devices spanning the data center, campus, and branch offices. Starting with the FlexFabric, HP's data center solution provides high performance connectivity over a converged infrastructure. The simplified network design allows for streamlined operations and reduced cost and complexity. The FlexCampus and FlexBranch solutions extend the capabilities out of the data center into campus and branch office environments, completing the end-to-end architecture. HP is currently expanding upon this vision by supporting the Open Flow standard on generally available network switches.
- **Software control.** HP's Intelligent Management Center, or IMC, can provide a single pane of glass to monitor and manage a cloud network based on a FlexNetwork architecture. The program is based on a service-oriented architecture itself and the modular component design enables IMC to integrate disparate management tools. Given the complexity and often heterogeneous nature of an end-to-end network environment, this capability can be critical to ensure successful implementation with end-to-end control for a complex enterprise network environment. For the data center, the IMC VAN Manager for FlexFabric includes a plug-in that is installed on the hypervisor manager to gain visibility into VMs and the vSwitch Manager communicates all vSwitch activity. This includes support for Edge Virtual Bridging (EVB) for viewing VM to VM traffic. It is this visibility and control that allows organizations to automate the provisioning and reconfiguration of VMs in large complex environments with minimal effort as compared to manually provisioning an application.
- **Higher level integration and partnerships.** To better enable VANs, HP has worked closely with partners in the cloud ecosystem and supports VMware environments out of the gate, with planned support for Microsoft Hyper-V, Citrix XenServer, and KVM for Linux. In order to facilitate connectivity to automation and orchestration platforms, HP has developed a set of APIs to integrate with existing or planned platforms. These technology integrations could extend beyond L2 and L3 functions and include higher level layer 4 through layer 7 services as well.

HP VAN Methodology

HP leverages a comprehensive approach to designing compute, network, and storage environments, with an overarching theme related to converged infrastructure. Its network design is based on the FlexNetwork, which takes a software-defined networking approach to focus on end-to-end delivery of applications and services that span data center, campus, and branch environments to end-users. To deliver this comprehensive network architecture, HP methodology involves:

- **Characterizing the application or service that will be run across these environments.** By understanding the needs and specific characteristics of the application or service, (rich media or a high frequency trading application), the network will be able to adjust its service accordingly. By grouping these applications and service types into defined categories, HP believes organizations can dramatically speed up the provisioning process by simply associating a new application or service with a category.
- **Virtualizing the network domain.** This is the act of creating a layer of abstraction from the physical network in order to create a virtual network. In highly dynamic cloud environments, the ability to rapidly provision or reconfigure a network segment will be critical. By creating secure and segmented logical networks leveraging software, the underlying physical network can be quickly and easily reconfigured to deliver the desired type of service from any connection to any connection.
- **Providing access to orchestration and automation tools.** As networks continue to scale, manual provisioning and reconfiguration processes will not be able to keep up with demand. By automating and orchestrating the provisioning and reconfiguration processes, organizations will be able to

dramatically save time and enable more cloud-like infrastructures. This will result in closer alignment of server, network, and storage operations via advanced cloud orchestration frameworks.

Ultimately, this is all about enabling a comprehensive network solution to deliver applications and services from the data center or cloud to the end-user and ensure a great experience. Moving forward, HP has a vision for achieving this goal and has focused its initial efforts on the data center, where scale and complexity are rapidly affecting IT's ability to meet the needs of the business. HP's roadmap includes incorporating campus and branch networks to deliver on its complete solution.

The Bigger Truth

Entering the cloud computing era, servers and storage have become highly virtualized, but the network environment lags behind. It is under increasing pressure to become more agile and responsive. To keep pace, it must become more dynamic and virtualized as well. This goes well beyond tactically replacing a switch here or there or upgrading to a higher bandwidth core. Organizations must take a much more strategic approach to upgrading the network so it becomes an enabler and not an obstacle to success.

ESG believes that software-defined networks are inevitable and new technologies and platforms are rapidly emerging, but organizations must invest the time to evaluate new architectures and understand how they will fit into their environments. Organizations should not only understand the end state, but also what steps are required to get there. Essentially they need to understand what has to be done today and how that ties into future deployments and capabilities. Failure to act now will find organizations struggling to keep up with competition and decisions made now may potentially decide who will be successful in the cloud computing era and who will fall behind.

HP has put forth a strong vision for enabling networks for the cloud computing era. Leveraging the FlexNetwork architecture that incorporates technologies like IRF, EVB, VEPA, and Open Flow to deliver virtual application networks that can enable organizations to virtualize their network infrastructures and provide automation and orchestration. ESG believes HP's approach of focusing on optimizing the end-to-end delivery of applications to end-users across data center, campus, and branch networks, should be well received. This will only become more important as the cloud computing era progresses and users expect and even demand instant access to applications and services. Given this, organizations currently struggling with legacy network issues should evaluate whether HP's VAN solutions can help alleviate short-term challenges while providing a flexible network for future business and IT initiatives.



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