



SINGLE-TOUCH ORCHESTRATION FOR PROVISIONING, END-TO-END VISIBILITY AND MORE CONTROL IN THE DATA CENTER

JOINT SDN SOLUTION BY ALCATEL-LUCENT ENTERPRISE
AND NEC

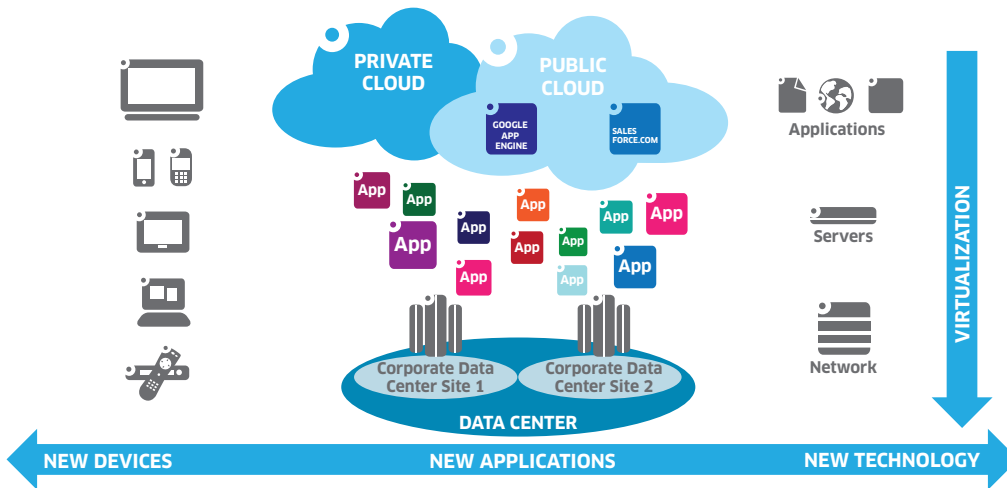
APPLICATION NOTE

EXECUTIVE SUMMARY

Server virtualization makes it easy to see the benefits of abstracting server IT resources from their physical manifestation. Hypervisors like VMware vSphere or Microsoft Hyper-V create immense efficiency and flexibility in data centers by allowing previously underutilized equipment to run multiple applications in software-isolated environments. Data center IT teams manage both applications and network infrastructure. Since they see the benefits of server virtualization, they are looking for ways to simplify and automate the network infrastructure. This can be achieved by an OPEN integrated solution that simplifies application provisioning and accommodates dynamic changes. At the same time the overall infrastructure must facilitate automation, multi-tenancy, resiliency and deliver a high-quality end-user experience. Networks are hence the next piece of data center infrastructure to get the virtualization treatment to improve efficiency, versatility and productivity.

Compared to the traditional method of using a patchwork of virtual LANs (VLANs), network virtualization is an easy and secure way to isolate and segment virtual networks. It is a necessity in a multi-tenant environment or a service provider's or enterprise's private cloud, but also in lagging network operations that frustrate application rollout. Virtual networks are also flexible, as they offer network services and policies such as address translation (Network Address Translation, NAT), address assignment (Dynamic Host Configuration Protocol, DHCP), load balancing (Application Delivery Controller, ADC), and security gateways like firewalls, integrated security gateway (IPS), and VPN appliances, which makes them independent of the physical network. This improves flexibility in network design and makes it possible to chain services as more network functions are virtualized.

Software-defined networking (SDN) provides a way to abstract the complexity of workflow management for the daily operations of building data centers that are agile and agnostic to the changes and migration of workloads. The joint SDN solution from Alcatel-Lucent Enterprise and NEC provides a turnkey orchestration for data center service delivery — visibility and high-quality application experience.



CHALLENGE

In the data center, virtualization needs are expanding beyond the servers to network infrastructure. The growing amount of enterprises migrating to cloud makes it necessary for data centers to support multi-tenant fabrics.

Over the last decade, the server infrastructure has been virtualized, enabling resource optimization and dynamic workload management. This has helped to avoid service downtime even during server upgrades or maintenance. The underlying network infrastructure has remained static, requiring extensive network configuration changes by the IT team during workload, which leads to service disruption and poor quality of experience. Within the data center, the service agility is further hampered by the introduction of virtual switches that create disjoint management frameworks and thus limit unified visibility and control.

SOLUTION

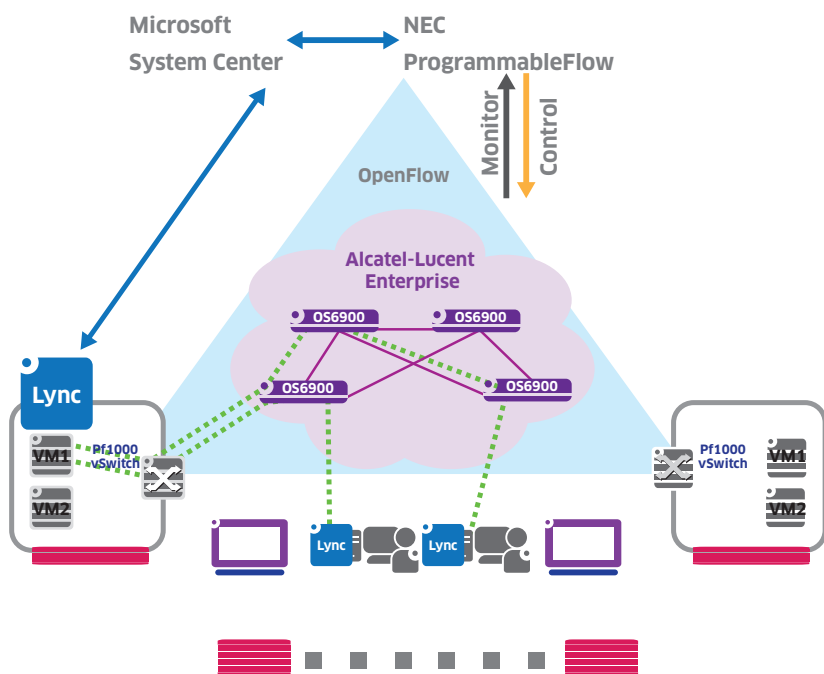
The SDN solution by Alcatel-Lucent Enterprise and NEC enables a multi-site, multi-tenant virtual data center that automates the time-consuming and disruptive task of configuring data center networks and supports the dynamic movement of virtual machines. The solution enables a Microsoft Hyper-V powered data center with single-touch orchestration, controlled by Microsoft System Center Virtual Machine Manager (SCVMM). The IT now has a single touch point to manage workloads and provision the underlying network policies automatically for both physical and virtual networks. This SDN solution provides application agility, visibility and high-quality application service experience in the data center, and enables the automation and virtualization of the network fabric.

The benefits of the SDN solution by Alcatel-Lucent Enterprise and NEC include:

- Centralized and automated single-touch provisioning of the network eliminates fragile and complex protocols and the manual, error-prone processes inherent to conventional networks.
- Highly resilient Layer 2 and Layer 3 multipath networks that support network interfaces of up to 10/40 Gigabit Ethernet. The distributed virtual routing function of ProgrammableFlow® eliminates the bottlenecks associated with traditional network design, providing line-rate-optimal traffic forwarding throughout the network.

- The Virtual Tenant Network (VTN) technology creates isolated and secure virtual networks. Each VTN has its own network policy, eliminating complexity and trade-offs in traditional network security design.
- The solution enables multi-site data center deployments. It enables the construction and orchestration of virtual networks across multiple controllers within a data center as well as across the interconnections between data centers.
- The solution allows traditional networks to co-exist with the OpenFlow™-enabled network. Thus, the customer can transform from a conventional data center to a full SDN-enabled data center.

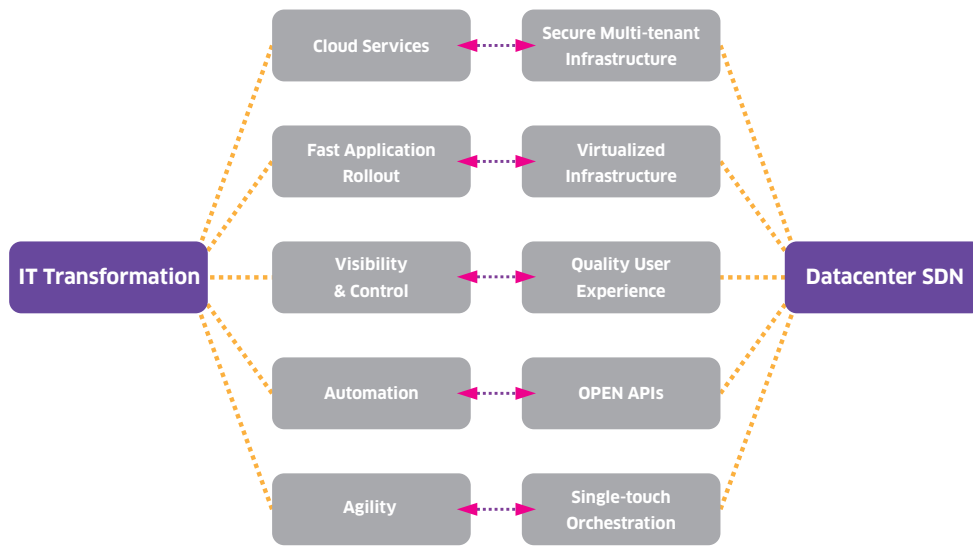
The integrated solution simplifies the service provisioning for IT administrators in deploying on-demand services and tenant networks without worrying about the underlay network infrastructure. Microsoft SCVMM communicates with the NEC ProgrammableFlow Controller (PFC) through RESTful APIs to map Virtual Machine (VM) Networks and subnets into Virtual Tenant Networks (VTN) on the SDN-enabled underlay. The OPEN architecture also allows integrating the enterprise's applications, which in turn enables personalized services. For example, Microsoft Lync SDN API is integrated to install quality of service (QoS) profiles on the Alcatel-Lucent OmniSwitch® 6900 and NEC ProgrammableFlow PF1000 vSwitch for Lync application as well as the Lync signaling protocol improving user experience.



The solution comprises industry-proven components from Alcatel-Lucent Enterprise, NEC and Microsoft that are integrated to leverage the OPEN SDN concepts. The main components are:

- Microsoft SCVMM – Service and Application Center
- NEC PF6800 – OpenFlow SDN Controller
- Alcatel-Lucent OmniSwitch 6900 – High-density 10G/40G OPEN SDN platform for Top-of-Rack / Core Fabric. Supports key technologies around OpenFlow, tightly integrated with NEC PF6800 providing end-to-end virtual network automation, resiliency and scale.
- Hyper-V Hosts – Virtualized Compute
- NEC PF1000 – OpenFlow-enabled vSwitch for Hyper-V

Five key technologies serve as the building blocks of our joint SDN solution enabling data center IT transformation:



SDN is living up to its promises: enabling the data center network to transform to a virtualized multi-tenant network that can be consumed for service delivery, with flexibility to scale and adaptability to dynamic changes. In summary, the SDN solution by Alcatel-Lucent Enterprise and NEC provides a very effective single-touch orchestrated solution for data centers.

To get more details on these and other advanced capabilities on the OmniSwitch platform, visit enterprise.alcatel-lucent.com

To learn more about NEC PF6800 ProgrammableFlow Controller, visit: necam.com/sdn

About NEC Corporation of America

Headquartered in Irving, Texas, NEC Corporation of America is a leading provider of innovative IT, network, communications and biometric solutions for customers across multiple vertical industries, including healthcare, public sector, education and hospitality. NEC Corporation of America delivers one of the industry's broadest portfolios of technology solutions and professional services, including communications, analytics, biometrics, managed services and technology solutions that unleash customers' productivity potential. NEC Corporation of America is a wholly-owned subsidiary of NEC Corporation, a global technology leader with a presence in 140 countries and \$29.5 billion in revenues. For more information, please visit www.necam.com



About ProgrammableFlow Networking Suite

Initially launched in 2011, the ProgrammableFlow Networking Suite was the first commercially available SDN solution to leverage the OpenFlow protocol, enabling complete network virtualization, allowing customers to easily deploy, control, monitor, and manage multi-tenant network infrastructure. Now with version 6, customers can unify and control remote networks, all from a central location, to deliver simplified data center management, improved end-user access to applications, enhanced collaboration, and dramatically increase efficiency of IT resource utilization. Endorsed by customers, the ProgrammableFlow Networking Suite provides the first comprehensive suite that includes both physical and virtual switches as well as an SDN controller and applications. Ideally suited for corporate and service provider data centers, the ProgrammableFlow Controller PF6800 controller provides a cost-effective, high-performance, highly scalable SDN platform

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