



TECHNOLOGY WHITE PAPER

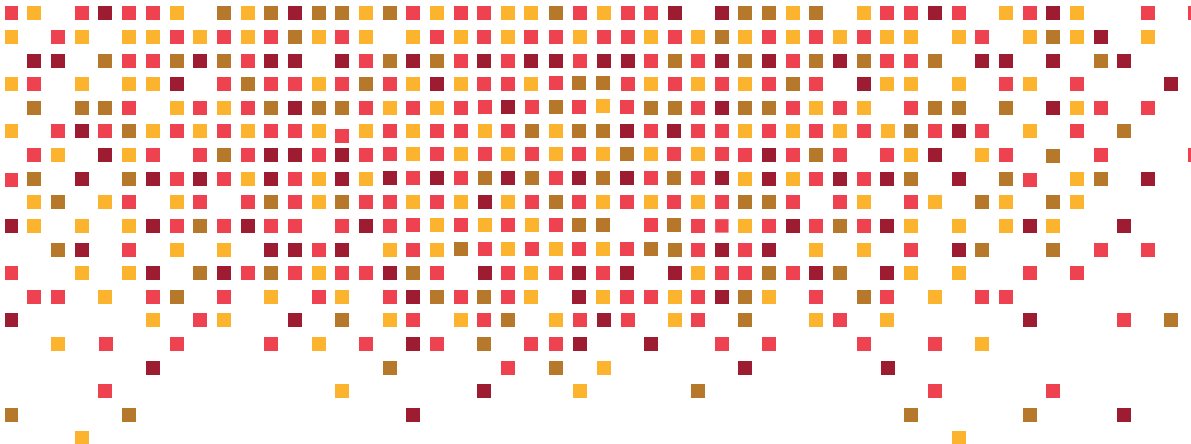
The Advantages of Nuage Networks VSP in HPE Helion OpenStack

Abstract

The Nuage Networks™ Virtualized Services Platform (VSP) provides critical Software-Defined Networking (SDN) overlay networking capability and management within OpenStack Cloud Management System environments.

This technical white paper looks specifically at the advantages of deploying Nuage Networks VSP in a Hewlett Packard Enterprise (HPE) Helion OpenStack environment¹. Nuage Networks VSP has been tightly integrated with HPE Helion OpenStack to allow for multiple deployment scenarios, including support for other HPE datacenter solutions, such as HPE networking hardware, cloud integration platforms and security products.

¹ Hewlett Packard Enterprise (HPE) is the name of the new enterprise-focused organization created from the split of Hewlett-Packard Company into "Hewlett Packard Enterprise" and "HP Inc.". The split was completed on November 1, 2015.



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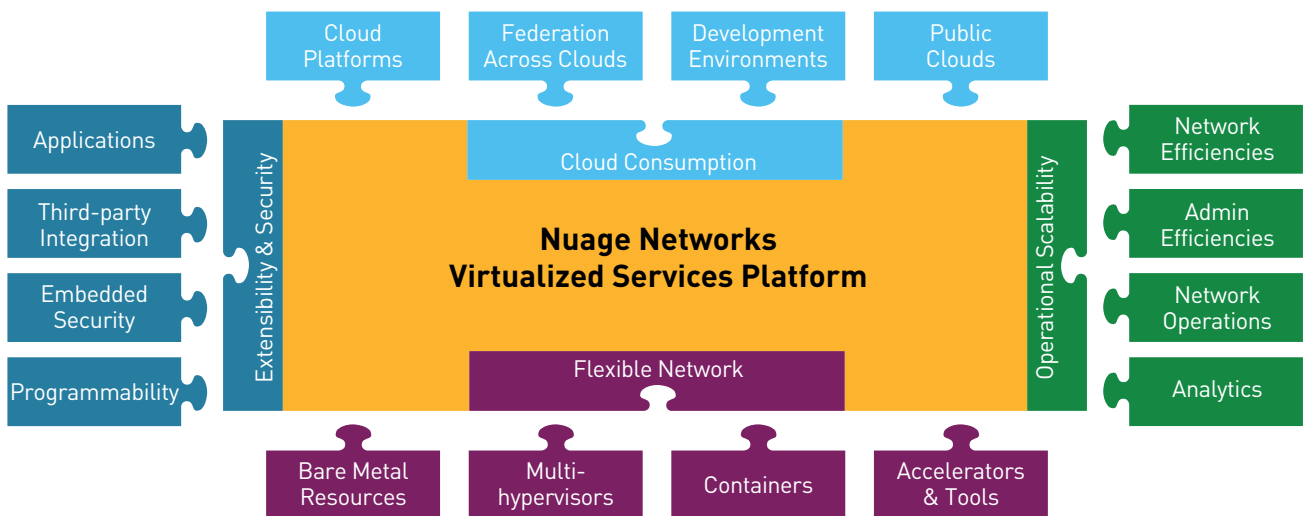
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Nuage Networks cloud networking infrastructure

Nuage Networks VSP is an SDN and cloud networking infrastructure that automates the provisioning and configuration of network resources based on application policies and requirements. Designed to operate in highly scalable, heterogeneous environments, Nuage Networks VSP provides cloud networking across a wide range of application environments from bare metal, major hypervisors and Docker-style containers.

Nuage Networks VSP works in an OpenStack environment to provide much more scalable and robust virtual networking environments and SDN overlays than are available in native OpenStack distributions. It also provides a bridge to non-OpenStack deployments running in the same datacenter.

FIGURE 1. Nuage Networks provides the cloud networking infrastructure that spans application platforms, cloud management systems and the physical infrastructure



HPE Helion OpenStack

HPE Helion OpenStack 2.0 is HPE's enterprise-grade distribution of OpenStack software, the leading open source cloud computing platform. HPE Helion OpenStack is a hardened, extensible product designed to deliver open source cloud computing while adhering tightly to OpenStack software API standards and services. HPE Helion OpenStack is part of the larger HPE Helion portfolio of both enterprises and service providers, consisting of datacenter and cloud automation tools, security and monitoring solutions and more.

Nuage Networks VSP integration points in HPE Helion OpenStack environment

This section describes the various points of integration of Nuage Networks VSP into HPE Helion OpenStack as well as other HPE datacenter solutions.

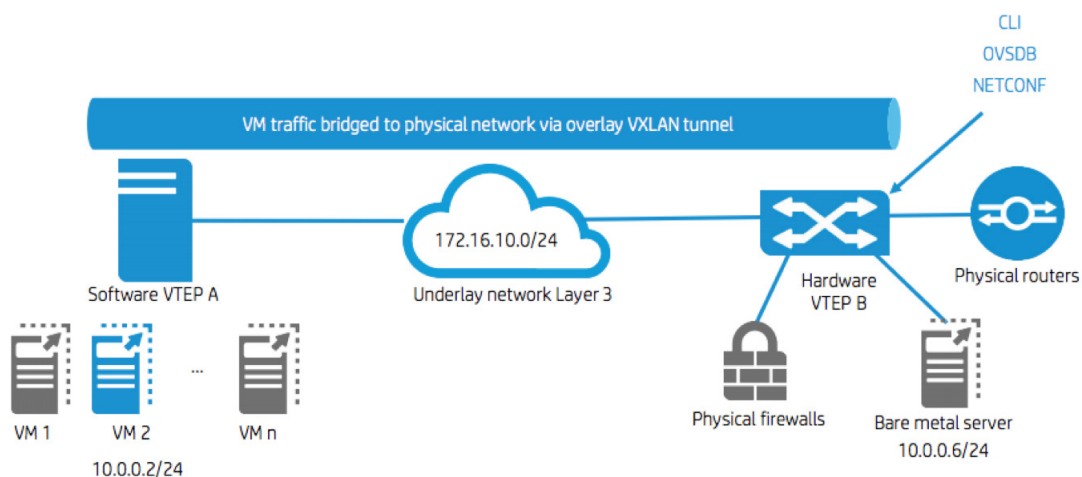
Virtualized Services Controller integration to HP switches

One of the primary functions of an SDN controller in a network overlay environment is to distribute the control-plane information to the various virtual and physical network devices that serve as VXLAN tunnel endpoints (VTEP). In overlay networks, the VTEP provides the encapsulation of the Layer 2 packet with the VXLAN header that will place the packet onto the right VXLAN tunnel. It also provides the destination IP address for the recipient. The mappings of individual workload MAC addresses to the associated IP address of their corresponding VTEP thus has to be shared across all VTEPs, and kept current after workload creation, moves and deletions.

In the Nuage Networks VSP, the Virtualized Services Controller (VSC) is the name for the SDN controller. The VSC configures and updates VTEP mappings, and is aware of when any changes need to be made (typically based on virtual machine (VM) events initiated in vCenter or other virtual workload management systems). The VSC updates Nuage Networks virtual switches (as well as other compatible virtual switches) through the BGP-EVPN protocol.

VSC integration with HP physical switches (including HP FlexFabric 5930, HP FlexFabric 7900 Switch Series, and HP FlexFabric 12900 Switch Series) is through the Open Virtual Switch Data Base (OVSDB) protocol. HP physical switches can then support VXLAN tunnels and cloud networking with any other type of VTEP, including virtual workloads and bare metal applications connected to other VTEP hardware gateways.

FIGURE 2. Integration with Nuage Networks VSP allows HP hardware VTEPs to connect over VXLAN tunnels to virtual switches and VMs, as well as VTEPs from other hardware vendors. (source: HP VXLAN brochure)



Nuage Networks SDN controller integration with HPE Helion OpenStack

The Nuage Networks SDN controller is comprised of two major components, the Virtual Services Directory (VSD), and the Virtual Services Controller (VSC). While the VSC is primarily responsible for distributing control-plane information out to individual devices, the VSD is the central repository for network policies and templates.

One of the functions of HPE Helion OpenStack is to provide network automation as part of the creation of cloud application deployments. Cloud and application network policies designed in OpenStack thus need to be implemented through Nuage Networks VSP, and policies must be consistent between OpenStack and the VSD.

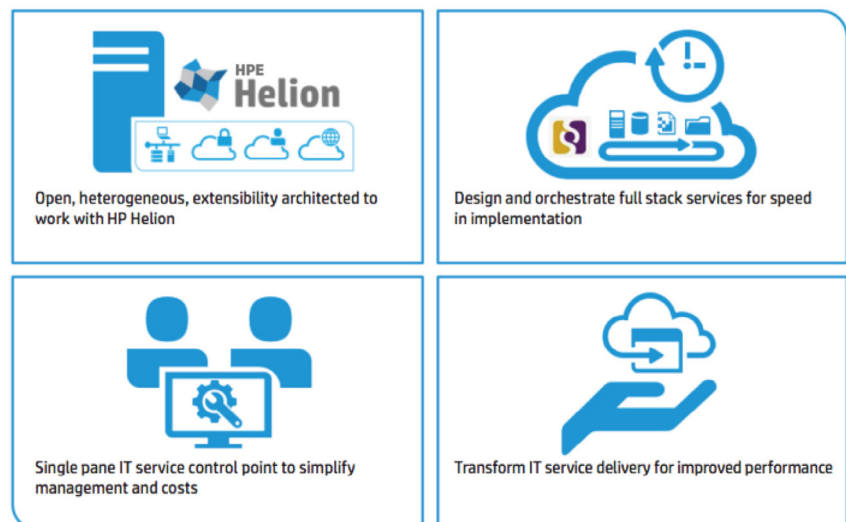
The OpenStack component responsible for networking is called Neutron. Neutron can address a lack of individual tenant control over network topology and addressing, as well as allow the use of cloud tunneling technologies like VXLAN. As network policies and templates are designed, they can be rendered in VSD policy templates, which then allow the VSC to configure the overlay network to support the specific application instances when deployed.

VSD integrates with HPE Helion OpenStack through a Neutron plugin that connects to northbound REST APIs on the controller.

Integration with HPE Cloud Service Automation

HPE Cloud Service Automation (CSA) can be used within a private cloud environment to manage the entire service provisioning process within a comprehensive multi-cloud or hybrid cloud environment. HPE CSA presents a unified marketplace portal of on-demand application services across HPE Helion OpenStack, Amazon Web Services, Microsoft Azure, and other cloud environments. CSA includes the infrastructure and application provisioning for single-tier services or sophisticated multi-tiered application services. Cloud-based application services are designed using the design tools, published to the service catalog and requested by users via the marketplace portal.

FIGURE 3. HPE Cloud Service Automation brings together control and orchestration points for multi- and hybrid-cloud deployments. (source: HPE Cloud Service Automation brochure)



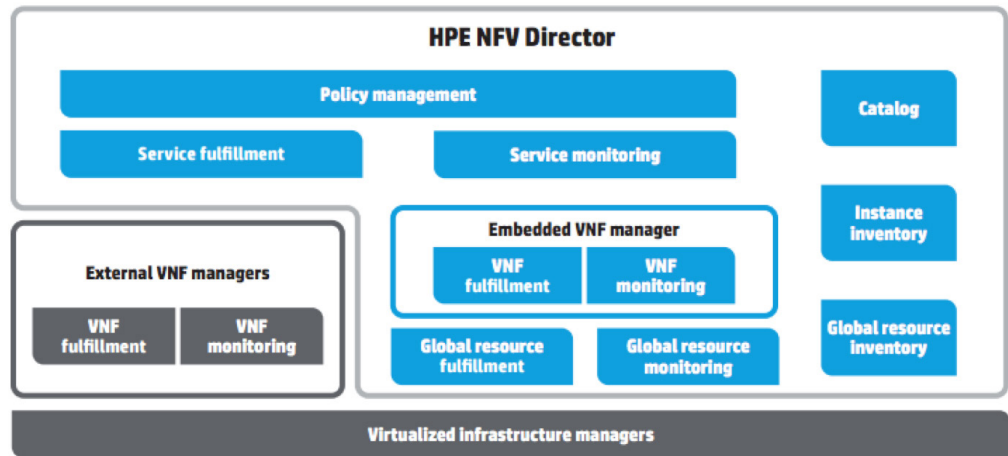
HPE CSA infrastructure provisioning across private cloud environments is likely to be handled by HPE Helion OpenStack, or directly through the Nuage Networks VSP controller. Nuage Networks and HPE have collaborated to deliver CSA integration with the Nuage Networks VSD to build policy-based network templates built on the cloud service designs developed in CSA.

Integration with HPE NFV Director

Network Functions Virtualization (NFV) is allowing cloud service providers (CSPs) to dramatically reduce the time required to introduce new services. NFV, like SDN, relies on application and network virtualization as well as process automation across large heterogeneous environments.

HPE NFV Director delivers NFV orchestration for telco and carrier-class service providers, much like CSA delivers cloud process automation for enterprise datacenters. HPE NFV Director provides a common point of orchestration to ensure consistent management and behavior of virtualized services, regardless of vendor or underlying physical hardware.

FIGURE 4. HPE NFV Director provides process automation for virtual services in carrier-class environments. (source: HPE NFV Director brochure)



Much like HPE CSA works with HPE Helion OpenStack to provide infrastructure automation, HPE NFV Director relies on HPE Helion OpenStack Carrier Grade for the same purpose. As an NFV-ready cloud management system, HPE Helion OpenStack Carrier Grade addresses carrier grade requirements for management, performance, and reliability. HPE Helion Carrier Grade is built upon carrier grade Linux operating system from Wind River, as well as other service provider-oriented components.

Nuage Networks VSP is itself a highly scalable, carrier-class SDN and virtual networking platform. Through integration with HPE Helion OpenStack Carrier Grade, the VSD can also build policy-based network templates and automate the provisioning of large multi-tenant cloud networks. One additional key point of integration in carrier grade deployments is Nuage Networks integration with HPE Helion Lifecycle Management (HLM), which automates the deployment of all

required components of a large OpenStack environment. HLM uses Ansible runbooks and scripting to provide turnkey installation for not only the OpenStack components, but also the virtual compute environment, including virtual switches, as well as the Nuage Networks SDN controller itself. HLM ensures that the HPE Helion Carrier Grade installation is deployed in such a way that there is no single point of failure that can bring down the cloud operations.

This simplified installation and management of HPE Helion Carrier Grade and the Nuage Networks virtual network infrastructure delivers redundancy and fast recovery capabilities in a highly efficient manner.

Integration with HPE ArcSight Security Monitoring Solution

Security and health monitoring of the Nuage Networks and HPE Helion environment is provided by the HPE Arcsight Security Information and Event Manager. Many enterprises already use HPE ArcSight as part of their security-monitoring infrastructure in their datacenter. As they modernize their IT infrastructure to move to the cloud, HPE ArcSight products can be incorporated into their HPE Helion OpenStack environment. These products will provide a unified real-time view of their cloud along with traditional IT environments for managing and monitoring security threats and breaches.

HPE ArcSight provides real-time security monitoring of the HPE Helion OpenStack infrastructure including servers, storage, routers, switches and the Nuage Networks SDN overlay networks. HPE ArcSight can quickly help identify and remediate brute force attacks, unauthorized access, and accidental or intentional cloud service outages.

Summary

Nuage Networks provides a highly scalable powerful SDN and overlay networking infrastructure for OpenStack deployments, far more than OpenStack distributions are able to provide natively. Through integration with HPE Helion OpenStack, Nuage Networks is able to provide a common platform for HPE, as well as other OpenStack distributions, and a common SDN infrastructure for bare-metal applications and Docker containers.

Nuage Networks has extended the integration with HPE Helion OpenStack to cover carrier grade deployments. The Company has also incorporated other HPE advanced solutions for cloud automation, deployment and lifecycle management, and security and event monitoring and analysis.

For more information

HPE Helion OpenStack: www.hp.com/go/openstack

HPE Cloud Service Automation: www.hp.com/go/csa

HPE Operations Orchestration: www.hp.com/go/oo

HPE NFV Director:

www8.hp.com/h20195/v2/GetDocument.aspx?docname=4AA5-1082ENW

HPE ArcSight SIEM: www.hp.com/go/arcsight

Nuage Networks Virtualized Services Platform:

www.nuagenetworks.net/products/virtualized-services-platform/

Nuage Networks Management and Orchestration Partnerships:

www.nuagenetworks.net/partners/management-orchestration



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