VIRTUALIZED SERVICES PLATFORM

The Nuage Networks™ Virtualized Services Platform (VSP) is a comprehensive solution that makes the network as readily consumable as the compute resources. It does this by providing the missing link to ensure rapid and efficient delivery of highly customizable application services, in and across multi-tenanted datacenters (DCs). The Nuage Networks VSP enables the deployment of massively scalable cloud-based services with the agility and performance demanded by highly dynamic application environments.

What is the Nuage Networks VSP?
The Nuage Networks VSP is a Software-Defined Networking (SDN) solution that virtualizes any DC network infrastructure and automatically establishes connectivity between compute resources upon their creation. Leveraging programmable business logic and a powerful policy engine, the Nuage Networks VSP provides an open and highly responsive solution that scales to meet the stringent needs of massive multi-tenant DCs. The Nuage Networks VSP is a software solution that can be deployed over existing DC network fabrics.

THE NUAGE NETWORKS APPROACH: NETWORK CHOREOGRAPHY
The Nuage Networks VSP allows enterprise administrators to outline their networking requirements in application terms, without being burdened by network implementation details. Administrators can express security (firewall), load balancing and user access-right policies with domain and zone abstractions, instead of having to use tedious and error-prone IP address assignments. Such policies are subsequently used to dynamically govern network behavior on an as-needed basis, triggered by compute instance creation, migration or deletion.

By using an event-driven model with a policy pull approach, the Nuage Networks VSP reserves network resources as they are required, avoiding the need to maintain network topology details. This ensures that the demands of cloud-based applications and services can be met across thousands of users in an efficient and timely manner.

The Nuage Networks VSP also provides service insight by collecting and storing statistics on a per-tenant, per-VPN, and per-VM basis.

FIGURE 1. The Nuage Networks VSP Approach
Cloud deployment of complex applications requires more than simple L2 connectivity. To meet these needs, the Nuage Networks VSP deploys the full range of L2-L4 networking services on a per-tenant or per-application basis using overlay technologies. This ensures each application gets the services required, and is not forced into a basic L2 VLAN connectivity.

Unlike other solutions that are restricted to the administrative domain of a single DC, the Nuage Networks VSP enables seamless interoperability across administrative domains and with existing VPN services. It does this by leveraging the power of mature MP-BGP technologies.

Nuage Networks significantly improves server utilization by allowing virtual machines (VMs) to be freely placed wherever compute resources are available, within or across DCs.

Product Components

**Virtualized Services Directory**

The Virtualized Services Directory (VSD) is a programmable policy and analytics engine. It provides a flexible and hierarchical network policy framework that enables IT administrators to define and enforce resource policies in a user-friendly manner.

The VSD contains a multi-tenanted service directory that supports role-based administration of users, compute and network resources. It also manages network resource assignments such as IP and MAC addresses.

For the purpose of service assurance, the VSD allows the definition of sophisticated statistics rules such as collection frequencies, rolling averages and samples, as well as Threshold Crossing Alerts (TCAs). When a TCA occurs, it will trigger an event that can be exported to external systems through a generic messaging bus. Statistics are aggregated over hours, days and months and stored in a Hadoop® analytics cluster to facilitate data mining and performance reporting.

The VSD can be deployed as a stand-alone or clustered solution depending on scaling needs.

**Virtualized Services Controller**

The Virtualized Services Controller (VSC) is the industry’s most powerful SDN controller. It functions as the robust network control plane for DCs, maintaining a full view of per-tenant network and service topologies. Through the VSC, virtual routing and switching constructs are established to program the network forwarding plane using the OpenFlow™ protocol. Multiple VSC instances can be federated within and across DCs by leveraging MP-BGP — a proven and highly scalable network technology.

**Virtual Routing and Switching**

The Virtual Routing and Switching (VRS) component is an enhanced Open vSwitch (OVS) implementation that constitutes the network forwarding plane. It encapsulates and de-encapsulates user traffic, enforcing L2-L4 traffic policies as defined by the VSD. The VRS tracks VM creation, migration and deletion events in order to dynamically adjust network connectivity. The VRS supports multiple hypervisors in virtualized server environments. It can operate as a gateway for bare metal servers or service appliances.
Technical Specifications

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| Cloud Platforms                   | - Apache CloudStack™ 4.3 and later  
- OpenStack™ – Support plug-ins for Icehouse and Juno  
  - Supported vendor distributions: Canonical and RedHat  
  - Neutron project: Plug-in supported for open source OpenStack and all vendor distributions  
- VMware® vCenter 5.5 and later    |
| Hypervisors                       | KVM, Linux Containers, VMware ESXi, Xen                                                                                                    |
| Routing/Switching Hardware and Software | Any IP-capable device for datacenter networking  
(e.g., Nokia, Arista, Cisco, HP, and others)                                                                                                     |
| Firewalls, Load Balancers, and DNS/DHCP Servers | Open Ecosystem Support through CMS Programmable Framework  
(e.g., OpenStack, CloudStack, FWaaS, LBaaS)                                                                                                  |
| Linux                             | Compatible and tested with distributions from Red Hat, Ubuntu, and CentOS                                                                 |
| OSS/app integration               | Northbound API access through RESTful APIs and HTML5-based web portal for user self-service                                              |
| Support for Non-Virtualized (Bare Metal) Components | Industry-first Layer 3 bare metal gateway support with the Nuage Networks 7850 VSG. Enables non-virtualized components to be managed along with virtualized components. |
| Security                          | In addition to standard networking security, subset of additional functionality:  
- Access security includes a distributed policy-based L2-L4 firewall  
- Port Mirroring  
- OpenStack and CloudStack XaaS integration |