

Virtualized Network Services

SDN solution for service providers

Nuage Networks™ Virtualized Network Services (VNS) is a fresh approach to business networking that seamlessly links your enterprise customers' locations regardless of size or geography while reducing the requirement for custom networking.

With Nuage Networks VNS the network that underpins customer locations is unshackled to deliver services where enterprises need them, when they need them. Your customers gain the flexibility and functionality they need to drive their business into the cloud era.

Nuage Networks VNS provides a comprehensive networking service that removes the limitations that exist with traditional Virtual Private Networks (VPNs). Solution benefits include:

- Customer self-service management and control of the network service tailored to the individual requirements of their businesses
- Separation of the network service from the network transport, which provides you with flexibility to utilize any access network within your footprint
- Customer-driven quick and simple move, add and change requests to ensure their network service matches their dynamic business environment
- Advanced functionality that can reduce the requirement for specialist security and network devices at customers' locations
- Enhanced customer monitoring and service visibility to reduce the costs associated with service assurance

What are Virtualized Network Services?

Software Defined Networking (SDN) has delivered significant benefits to datacenter networks unleashing the true power of the cloud.

Nuage Networks brings the same benefits to business connectivity services with Virtualized Network Services. Nuage Networks VNS is a new wide area network service construct. It allows you to offer customers the flexibility to adapt their network services as needed to suit their ever-changing business environments.

HIGHLIGHTS

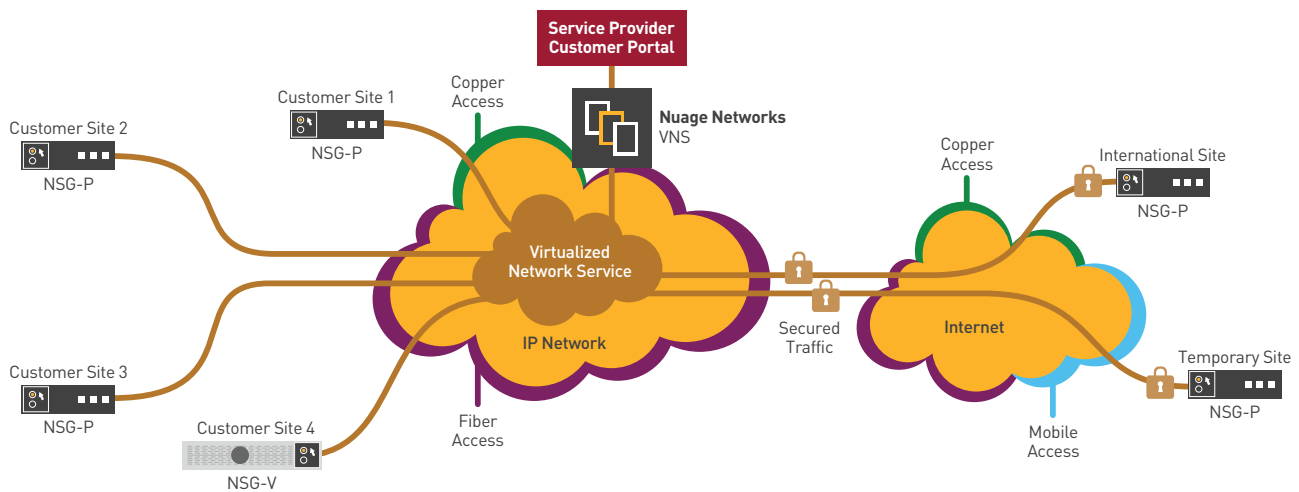
- Completely self managed via intuitive GUI making moves, adds and changes instantaneous and completely reactive to your customers' changing business environment
- The network service is independent of the transport utilized, which provides maximum flexibility in terms of service reach and access technology
- Network complexity is reduced by embedding advanced network functions such as firewalling directly into customers' services
- Improved service management visibility assists your customer with any applicable regulated auditing and compliance

Traditional VPN services are based on set functionality that can be deployed across the widest customer base with little room for per-enterprise customization. This has forced enterprises into the complex world of custom branch networking to achieve network capabilities that match their specific business needs.

Nuage Networks VNS enterprises have the power to self-manage and deploy their own network services. The comprehensive solution puts enterprises in charge of all aspects of service creation and ongoing management. This reduces the provisioning process and your need for complex service configuration teams to support the service.

The solution includes three key functions that work in concert to lower operational overhead while increasing the network's ability to respond to customers' demanding business needs.

FIGURE 1. Nuage Networks Virtualized Network Services



Solution components



Virtualized Services Directory

The Virtualized Services Directory (VSD) is a programmable policy and analytics engine. It provides a flexible network policy framework that enables your customers' network administration teams to define and enforce the business policies being applied across their network service in a user-friendly manner.

The VSD contains a network service directory that supports role-based administration of network resources. It is where network configuration including moves, adds and changes are centrally managed via an intuitive graphical user interface.

From within the VSD customers can centrally view and change the running policies on their network service including deployment of new policies on a single site, multiple sites or network-wide basis. The VSD is also the point for network traffic collection where site-specific and service-wide trending reports are available.

For the purpose of service assurance, the VSD allows the definition of sophisticated rules such as collection frequencies, rolling averages and samples, as well as Threshold Crossing Alerts (TCA) to provide access to the current and historic information on the network performance. Statistics are aggregated over hours, days and months and stored in a Hadoop® analytics cluster to facilitate data mining and performance reporting.

Information security and compliance functions are also completed through the VSD. This reduces the overhead for your customers associated with network compliance and auditing for industry regulation such as the Sarbanes-Oxley Act.

Network functions for the service are selected via the VSD's Network Functions Store. This provides a comprehensive set of common network functions, such as firewalling, load balancing, IP address management, and domain name services that can be selected by your customers and inserted directly into the network service as tiered service options. This reduces the requirement for dedicated network elements to be deployed at their remote locations and increases your revenue opportunity by reducing the need for third-party provided network appliances.

Through its partner program, Nuage Networks is working with leading network function suppliers to add functions which you can then "on-sell" as part of your network service offerings.

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

The Nuage Networks VNS solution in 7 points

The Nuage Networks Virtualized Network Services solution:

- Provides SDN-enabled networking with support for Layer 2 to Layer 4 services
- Allows advanced network functions to be deployed as part of the core service, reducing complexity and dedicated hardware
- Gives your customers full control of moves, adds and changes which reduces the requirement for high-touch complex provisioning/engineering teams
- Relies on network services that are transparent to underlying transport connectivity, which provides per-site flexibility in the selection of access technology and increases service reach
- Integrates with public and private cloud services
- Includes extensive traffic analytics and performance monitoring capabilities
- Supports open compute systems based on x86 common-off-the-shelf hardware



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 the network services, maintaining a full view of the 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 the network by leveraging Multi-Protocol Border Gateway Protocol (MP-BGP) — a proven and highly scalable network technology that allows the network service to grow with the requirements of your customers' business whether they are operating across the country or around the globe.



Network Services Gateway

The Network Services Gateway (NSG) constitutes the network-forwarding plane for customers' network services at their locations.

With support for both a hardware and software image deployment, the NSG provides maximum flexibility to meet the demands of your customers' sites.

The hardware-based option includes form-factors to meet the diverse throughput, network interface and network functionality requirements of their locations.

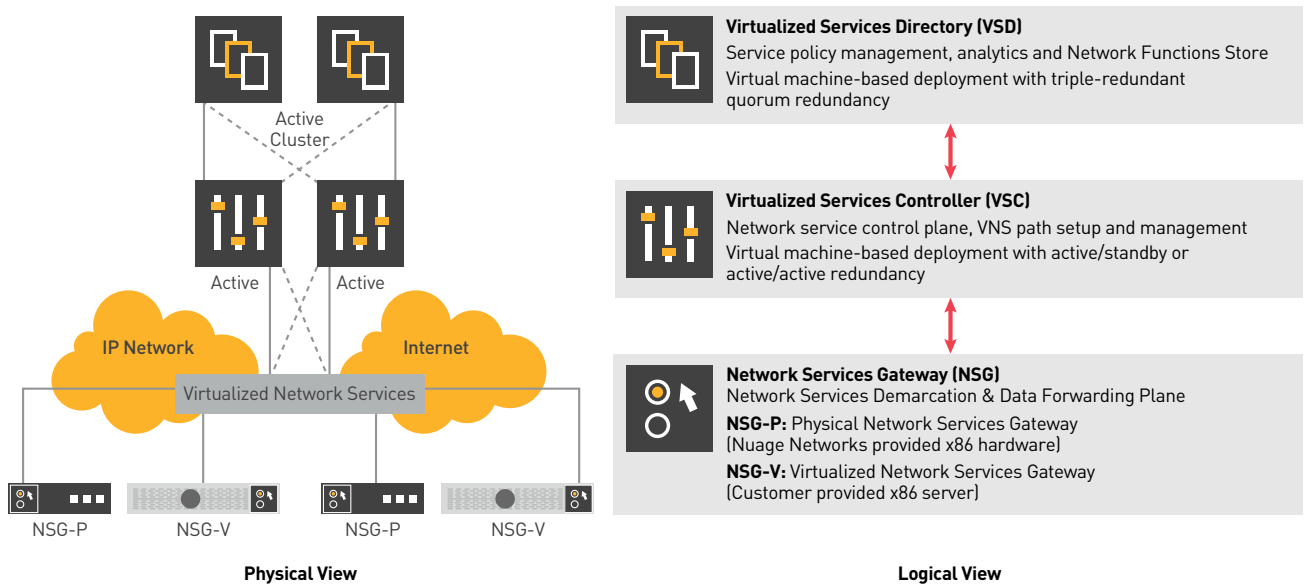
The software image utilizes the available x86-based virtualized compute platforms customers may have at their sites or can be run on Nuage Networks recommended common-off-the-shelf x86-based network devices procured via your own channels or directly procured by the customer.

The NSG encapsulates user traffic, enforcing Layer 2 to Layer 4 network policies as defined by the VSD. Advanced services including network functions such as load balancing, firewall, NAT/PAT and security protocols, such as IPSec, can be enabled via the Network Functions Store within the VSD. These services can be applied to the NSGs centrally on a service-wide or location-specific deployment model. This ensures that your customers' network services are always configured with their standard policies and functionality applicable to their business.

Deployment of the NSG is provided by the innovative bootstrapping functionality of the Nuage Networks VNS solution. When a new NSG is connected to the network, it calls home to the VSC and is authorized by the VSD. From there a two-step authentication process is initiated to bring the new site on to the network service.

The automated nature of this bootstrap function reduces the requirement for specialist networking resources at your remote locations. In most cases the customer's branch staff can unbox and plug in the NSG themselves, which lowers the costs of service deployment and greatly reduces the requirement for truckrolls.

FIGURE 2. Nuage Networks Virtualized Network Service components



Technical specifications

SPECIFICATIONS	
Centralized service definition and endpoint management	<ul style="list-style-type: none"> ■ Centralized service policy definition and auditing for all endpoints ■ Template-based service definition for intelligent endpoints ■ Root and organization level permission-based multitenant systems ■ Time-based automated endpoint configuration update ■ Centralized software lifecycle management ■ Auto-discovery of intelligent endpoints ■ Secure automated bootstrap of endpoints
OSS/BSS integration	Northbound API access through RESTful APIs for all VSD functions
Architecture scalability	<ul style="list-style-type: none"> ■ Federated controller scale-out architecture based on MP-BGP ■ Routing engine powered by robust Nokia Service Router Operating System (SR OS)
Network services	<ul style="list-style-type: none"> ■ Inet, L2-managed, L2-unmanaged, L3 and L4 VPN support ■ VLAN, VXLAN or MPLSoGRE encapsulation options ■ Ingress QoS with configurable rate limiting parameters and DSCP re-write options ■ Egress shaping for network and access ports with hierarchical QoS classes ■ DHCP services ■ Static routes ■ 1:1 Network Address Translation ■ IPv4 PAT on uplink IP or a configured IP from a PAT address pool ■ Automatic VPN creation between different entities belonging to a security domain ■ Hub-and-spoke or full mesh security through VXLANoIPSEC with centralized secure key generation and distribution* ■ Secure control plane connections ■ Service chaining to virtualized network functions ■ Application-aware traffic redirect capability ■ Full mesh, hub and spoke, and hybrid connectivity models ■ Control plane and data plane interoperability with provider edge devices
Authentication	<ul style="list-style-type: none"> ■ LDAP integration for user authentication ■ Endpoint authentication through certificates
L2 – L4 security	<ul style="list-style-type: none"> ■ Ingress and egress access control list (ACL) ■ Reflexive ACL with dynamic policy creation in both directions for UDP
Analytics and reporting	<ul style="list-style-type: none"> ■ Fully programmable and extensible engine based on Hadoop clusters with real-time analytics support ■ TCA-based analysis engine with configurable collection timers ■ Drilldown capabilities into individual elements, ideal for troubleshooting and capacity planning based on historical event correlation ■ Encrypted channel for stats collection ■ Port mirroring to remote location ■ Export logs to external logging servers
Deployment models	<ul style="list-style-type: none"> ■ Software image running on reference hardware ■ Software image deployed as virtual machine

* Roadmap