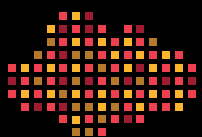




# EXTENSIBLE WIDE AREA NETWORKING

Leverage Software Defined Networking to deliver flexible network services to branch offices



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From Nokia

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Your clients and end users want instant access to their chosen applications — anytime, anywhere. To meet this demand, you have undoubtedly investigated cloud services. You know that with cloud services you should be able to turn up applications very quickly. You also expect cloud services will help you simplify operations and control costs. However, for cloud services to meet your expectations, the networks that serve your employees must evolve to become as virtualized and readily available as the compute infrastructure driving your business information systems. Today's wide area networks (WANs) are not like this. In fact, while business application turn-up on virtual compute platforms takes only minutes, the network configurations to connect your employees at the branch to these applications can take weeks or even months to rollout!

At Nuage Networks™ we're dedicated to fixing that problem. Our innovative Nuage Networks Virtualized Network Services (VNS) solution removes the constraints from the WAN so it too can operate at lightning speed. A Software Defined Networking (SDN) solution, the Nuage Networks VNS enables you to build a robust and scalable wide area networking infrastructure that delivers the cloud-based branch networking — Cloud IT — your business needs.



“Enterprises are now seeing SDN applicability and value extending beyond the data center to their WAN and branch locations. With its Virtualized Network Services (VNS), Nuage Networks is addressing this demand, offering enterprises a new operational model for delivering and consuming cloud services consistently from private & public data centers to their branch locations and distributed users.”

**Brad Casemore, Research Director, Datacenter Networks, IDC**



## CLOUD-BASED IT — ONLY AS FAST AS THE SLOWEST NETWORK ENVIRONMENT

Cloud computing is changing the way enterprises access and consume data. To remain competitive, you know you must be able to react quickly to market changes. Cloud IT addresses this need for speed, agility and responsiveness. Unfortunately, today's WANs aren't keeping pace. In fact, they're struggling to deliver consistent, on-demand connectivity. As more business information systems move to the cloud, things are only going to get more challenging.

Cloud IT can keep up with the dynamic pace of today's businesses and adapt to fluctuations in networking requirements. Additional virtual compute resources can be called on to meet peak demand and then removed once the workload reverts to normal. This flexibility and responsiveness are why so many enterprises are well down the path to "cloudify" their IT environments.

You can achieve massive improvements in efficiency by moving business information applications to the cloud. However, those gains may be significantly undercut if the network that connects your applications and users (employees in remote branches) underperforms.

Traditionally the wide area networking that connects applications to end users has been based on a generic network service from the Telecommunications Service Provider. The service may be in the form of dedicated circuits or more recently a virtualized offering based on IP Virtual Private Networking (IP-VPN). These IP-VPN services are based on fixed functionality that can be deployed across the widest enterprise customer base with little room for per-enterprise customization.

This approach has forced enterprises into the complex world of customized branch networking to achieve network capabilities that match their specific business needs. Customization increases the complexity of the WAN and reduces the flexibility of the network. It hampers the network's ability to keep up in a dynamic business environment. Although sub-optimal for their business needs most enterprises have accepted this as an unavoidable inconvenience, inherent to wide area networking. After all, you have had few options available that provide the service levels you require.



## NETWORK AGILITY: THE LAST STUMBLING BLOCK

Within IT, the WAN is a shared infrastructure under a system of strict change controls. These controls are in place to ensure that changes for a single application or branch location don't affect the performance for other users on the network. Any augmentation or configuration change on the WAN must follow a defined process to eliminate this risk.

Generally, this process involves a project team from the business formally requesting assistance from the IP network team to adapt the WAN for the new application or branch location. Several different teams within the overall business structure may be involved including the applications group for new application rollout or in the case of location changes the facilities team. The interactions between the project and network teams will follow a defined change control process and formal "ticket request" via the help desk.

These processes require the allocation of the appropriate network personnel including the various technology teams that own IP addresses, VLAN addresses, switch/router and firewall configurations, and in some cases the physical plant/installation team. A security team must also be involved to ensure that the new application or site is not exposing information to unauthorized users, in accordance with industry regulations.

It's a complex process and involves multiple teams across multiple disciplines. In most cases it results in an extended project being implemented to action the request. This naturally slows things down, limiting the effectiveness of moves, adds and changes on the WAN for planned and reactive IT changes.



# BUILDING A FLEXIBLE AND AGILE WIDE AREA NETWORK

Nuage Networks™ closes the gap between the WAN and the cloud-based application model by transforming the way your IT group can build and use your network. Nuage Networks ensures your wide area network environment is as efficient and flexible as your cloud computing. The result is a choreographed environment where the compute resources and network work seamlessly.

**Imagine the possibilities when WAN resources are as easily consumable as the virtual compute resources that drive your business applications**

Nuage Networks VNS is a fresh approach to wide area networking that seamlessly links your enterprise locations regardless of size or geography while reducing the requirement for customized networking.

Nuage Networks VNS provides a comprehensive networking service that removes the limitations that exist with traditional VPN service offerings, including:

- Limited service functionality and inflexibility of standard VPN offerings
- Geographic reach limitations of a single service provider VPN service
- Inability to adapt to the dynamic business environment and respond quickly to simple move, add and change requests
- Need to augment the VPN service with additional hardware (firewalls and routers) and associated professional services

With a Nuage Networks VNS-based WAN, the conversation within your business changes from, “We need to reconfigure the network, I’ll need to start a new project up” to “Sure we can do that, I’ll make the change right now.” **Nuage Networks VNS is wide area networking on your terms.**

## The key benefits of Nuage Networks VNS are:

- You can choose the best-fit connection to each of your locations from all the service providers in the market
- Moves, adds and changes are under your complete control and are centrally driven on a per-site or whole-of-network basis
- Customizable network functions are included in the solution, reducing the need for dedicated elements such as firewalls and security
- Service manageability improves and the complexity around auditing and compliance for industry bodies and regulators decreases

# NUAGE NETWORKS VIRTUALIZED NETWORK SERVICES

Nuage Networks VNS is a new approach to private wide area networking services based on the SDN framework. The primary driver for Nuage Networks VNS is the need to deliver a business service that provides instant networking capability to the remote sites of any enterprise regardless of their locations.

To achieve this, Nuage Networks adopts the leading technologies from the cloud service environment that are benefiting from SDN to create a comprehensive solution for wide area networking. These technologies include centralized policy management and common-off-the-shelf (COTS) x86 hardware at the branch.

There are three key components to Nuage Networks VNS:

## Virtualized Services Directory (VSD)

This is the centralized policy engine for the WAN, which defines, deploys and enforces the overall WAN environment. To add a new site, you use the point and click functionality of the VSD to configure the branch policy and ship equipment to the branch. Once this equipment is connected to the network, it is authenticated and its specific configurations are downloaded, verified and then connected to your Cloud IT environment.

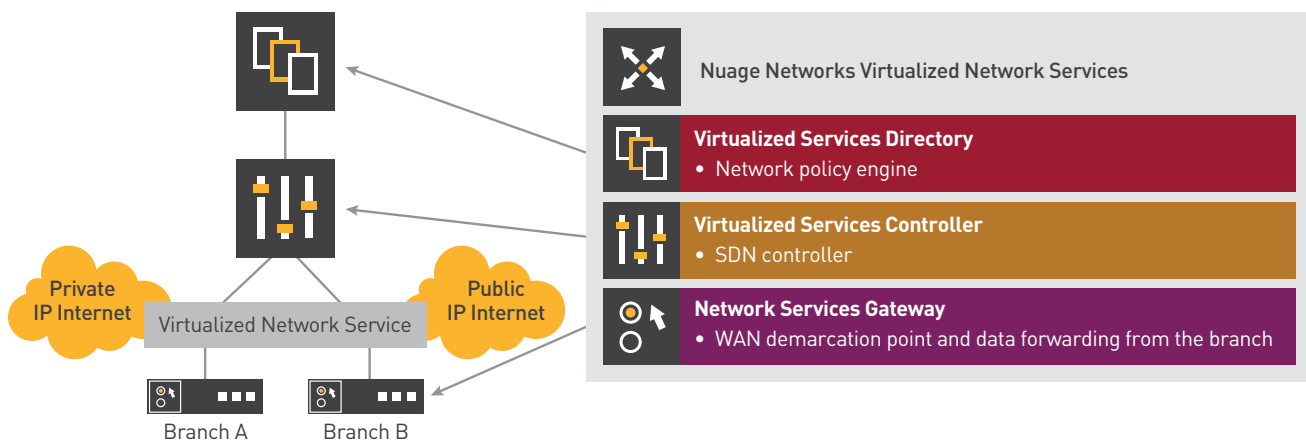
## Virtualized Services Controller (VSC)

The SDN network controller programs the branch equipment with the network overlay paths to form the topology for your WAN.

## Network Services Gateway (NSG)

The gateway (branch equipment) provides WAN demarcation and network functionality at the branch. It can be installed on the Nuage Networks 7850 Network Services Gateway or COTS x86 server.

FIGURE 1. Nuage Networks Virtualized Network Services

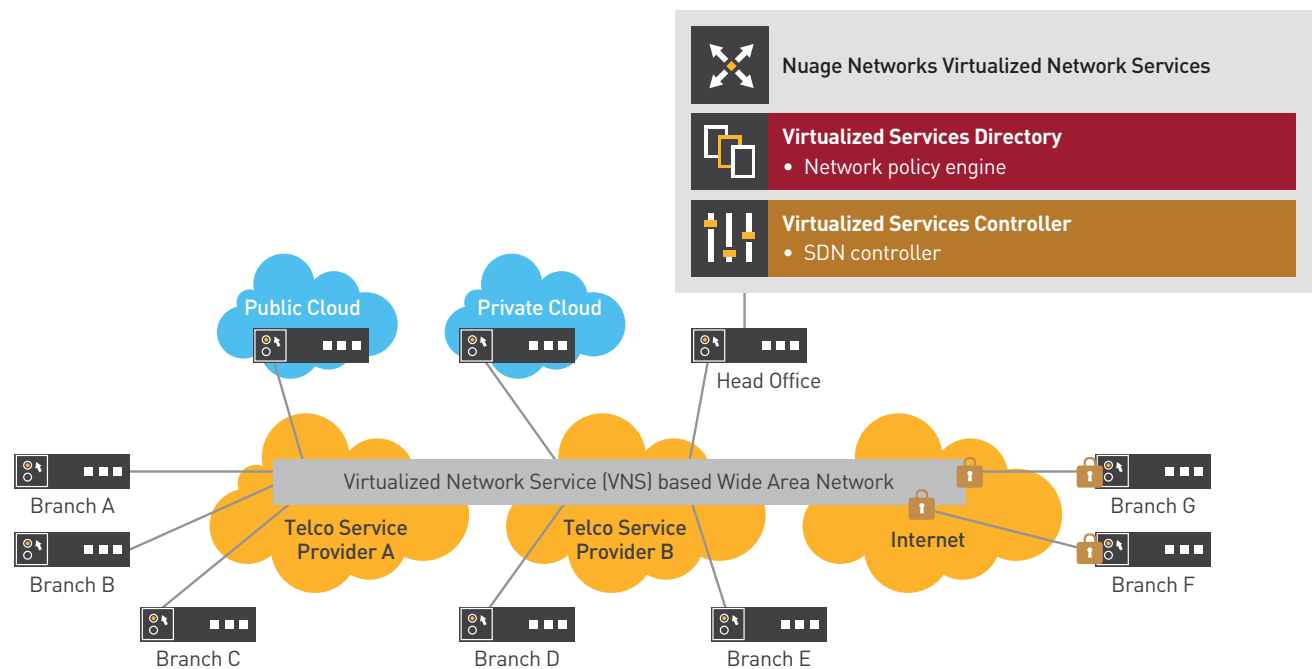


Traditional VPN services are tightly connected to dedicated network infrastructure from a service provider. Nuage Networks VNS is based on an overlay model that uses any IP network to provide underlay connectivity between your branches. This gives you maximum flexibility for your locations and the support of multiple access/last-mile technologies including copper, fiber or mobile broadband. With Nuage Networks VNS, you have the flexibility to mix and match available networks from multiple providers and to use any available access technologies. This gives you the freedom to use whatever technologies are most available in any particular location, so you can get a service where and when you need it.

For instance, if you need a temporary location set up and that site does not have immediate access to fiber or copper circuits, you can use a 4G mobile connection or even Wi-Fi® in the interim until fixed connectivity can be sourced. Nuage Networks VNS only requires an IP connectivity service to operate, so you have complete freedom to choose from multiple network infrastructure options.

Depending on the bandwidth you need into the site, you select the best match IP underlay service. For example, if the most cost-effective network to get the required bandwidth into the site is Internet you can select from the tiered service offerings of all Internet Service Providers within the region. You decide which offering is best for your needs — from basic Internet to a higher grade business class Internet service. With Nuage Networks VNS the sites that are connected over public IP networks, such as the Internet, can be centrally configured to encrypt all traffic in and out of the location.

**FIGURE 2. Nuage Networks VNS-based wide area network**





## THE CLOUD IT ERA IS HERE

Over the past five years, server virtualization has triggered a revolutionary shift in computing. The ability to turn up applications and move workloads instantaneously has made compute and storage infrastructure readily consumable on demand, which is fueling the transformation to Cloud IT.

In the midst of enterprises making a rapid shift to compute-driven cloud consumption models, the WANs that provide the connectivity between users and their business applications must evolve. Moving to the cloud has implications for the network that span not only the datacenter, but the WAN as well. The gap in agility between applications and the networks that serve them must be bridged. The capabilities of the wide area network need to be abstracted and presented to the IT department in a way that application owners can simply consume.

Your WAN must evolve to be more dynamic and responsive to the needs of your users and their applications. In a world where applications can be spun up on virtual machines in seconds, you must be able to establish network connectivity for your branch employees in an equally transparent and expedient manner.

Nuage Networks will help you deliver exactly that.



Learn more about the Nuage Networks Virtualized Network Services at [www.nuagenetworks.net/vns](http://www.nuagenetworks.net/vns)