

# Juniper Networks Solutions for VMware NSX

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Enabling Businesses to Deploy Virtualized Data Center Environments

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## Executive Summary

Over the past decade, data center agility has dramatically increased with the virtualization of compute and storage resources. Applications have transitioned from client/server architectures where each application was tied to a specific physical server, to virtualized architectures where software abstracts the application from the physical server, allowing the application to reside literally anywhere. Storage, meanwhile, has transitioned from physical resources dedicated to specific applications or servers to shared pools.

Today, it is possible to further increase data center agility by using software to abstract the network. VMware Network and Security Virtualization (NSX), a software-based network virtualization platform announced at VMworld in August 2013, decouples the virtual network from the underlying physical network, allowing enterprises to rapidly and securely deploy virtual networks for any application. NSX exposes physical network elements as both logical networking devices and as services such as logical switches, logical routers, and distributed virtual firewalls.

## Introduction

As data centers migrate to virtualized networks, new challenges emerge. Non-virtualized assets must be incorporated into this new network paradigm. And virtualized workflows must connect to, and interact with, legacy applications on bare metal servers, storage systems, and Layer 4-7 appliances.

In addition, most data center environments will operate multiple virtual Layer 2 network segments, whether to support separate production and development environments or multiple tenants, and will need workflows to cross these segments. Finally, IT will need to route workflows across data centers or to the public cloud, or to end users in private and public IP networks for business continuity/disaster recovery, resource pooling, and application delivery.

Juniper Networks is addressing these challenges through a partnership with VMware, coupled with a tight technical integration of Juniper solutions with the new NSX platform.

## VMware NSX

VMware NSX paves the way for enterprises to rapidly deploy networking and security for any application by enabling networks to be fundamentally abstracted from physical hardware, creating a virtual network.

Through network virtualization, networking devices and services can be abstracted and exposed as logical objects across a fully distributed virtualization layer, and they are consumable through northbound APIs. These networking devices and services include logical ports, logical switches, logical routers, distributed virtual firewalls, and virtual load balancers.

VMware's logical network abstraction, called Virtual eXtensible Local Area Network, or VXLAN, is similar in principle to the way server virtualization abstracts and exposes simplified elements of virtual CPU, memory, and storage, assembled in any combination to create a virtual machine (VM). Like server virtualization, any combination of logical network devices and security policies can be assembled into any topology to create a virtual network, deployed programmatically through APIs. A complete and feature-rich virtual network can be defined at will, liberated from the constraints imposed by physical switching infrastructure features, topologies, and resources.

## Physical Network Foundation

The physical network provides the foundation for virtual network deployments. In order to ensure predictable performance, application behavior, and quality of service, special consideration needs to be given to the design and deployment of the switching and routing equipment used.

For successful virtual network deployments, the physical network must:

1. Provide deterministic performance, regardless of where the application and virtual network are running in the physical data center environment.
2. Easily scale to increase or decrease data center capacity without disrupting applications or the virtual network.
3. Offer ease of deployment, configuration, and provisioning.
4. Minimize power consumption and cabling complexity.
5. Correlate the virtual and physical network to provide:
  - Seamless virtual machine mobility to remove barriers between virtual and physical environments
  - Common security policies across virtual and physical networks to avoid gaps and risk
  - Common management across virtual and physical networks, delivering the visibility and analytics required to simplify operations, troubleshooting, and maintenance through automation and orchestration
  - Gateway services between virtual and physical networks across the LAN and WAN

Juniper Networks is working with VMware to deliver just such a network. As a VMware Technology Alliance Partner and a contributing member of VMware's Platform Extensibility Program, Juniper delivers solutions that provide seamless virtual machine mobility, harmonized security policies across the virtual and physical networks, and gateway connectivity between virtual and physical networks.

## Juniper Solutions for VMware Environments

### Current Solutions

Juniper and VMware enjoy a highly collaborative and tightly aligned relationship. Juniper is a VMware Technology Alliance Partner, while VMware is a Juniper Technology Partner. Both organizations share a common vision of the virtualized data center providing increased business agility and flexibility to enterprises.

Juniper solutions for VMware virtualized data center environments include:

- **Junos Space Network Director** (formerly Junos Space Virtual Control): Running on the Juniper Networks® Junos® Space platform, Network Director integrates with VMware vSphere to provide access to the VMware virtual switch (vSwitch) framework (both vNetwork Distributed Switch and vNetwork Standard Switch). Using Network Director, users can discover, manage, and monitor the entire virtual network (vNetwork) consisting of vSphere Hosts, vSwitches, and virtual machines from multiple VMware vCenter Server instances, ensuring consistency between the virtual and physical networks.
- **vGW Virtual Gateway**: Juniper Networks vGW Virtual Gateway delivers total virtual data center protection and cloud security through visibility into the virtualized environment, multiple layers of protection, and a complete set of compliance tools.

### Layer 2 Gateway Services for VMware NSX

Juniper Networks NSX Layer 2 gateway services uniquely enable VXLAN-to-VLAN gateway capabilities at any tier of the data center network, from server access to the data center edge.

The Juniper solution integrates with NSX through data plane (VXLAN) and control plane (OVSDDB) protocols while unifying the management plane. This integration delivers L2 gateway services that discover non-virtualized assets in the data center, enabling seamless communication with virtualized assets by linking VXLAN tunnels to VLANs in the physical network. Users can also manage and operate IT workloads spanning virtual and non-virtualized systems from NSX as a single pane of glass.

VMware NSX Layer 2 gateway services will be available on Juniper Networks QFX Series access switches, EX9200 line of programmable core/aggregation Ethernet switches, and MX Series 3D Universal Edge Routers in mid-2014. Deployed as a Virtual Tunnel End Point, or VTEP, each platform registers with VMware's NSX controller and can be configured to provide Layer 2 gateway services to any virtual network. This allows the NSX controller to coordinate the creation of VXLAN tunnels between the hypervisor and the physical switch.

This combined Juniper-VMware solution delivers:

- Flexible workload placement and mobility
- Single pane-of-glass management for configuring and programming virtual-to-physical network connectivity
- Operational simplicity through the programmatic connection of VXLAN tunnels to VLANs in the physical network
- Choice of deploying NSX Layer 2 gateway services at the data center access, aggregation, core, or edge tiers of the network
- Strong degree of multitenancy and traffic separation for each tenant in Layer 2

### Seamless Virtual Machine Mobility Through VXLAN Routing

Juniper is delivering VXLAN routing capabilities on key platforms that allow virtual machines (VMs) to communicate with other IP subnets and/or other IP networks.

VXLAN routing allows application decisions to be centralized and managed independent of individual switches, routers, and other data center devices in a VMware NSX environment. Applications can be dynamically spun up, turned down, or moved to support business needs without encountering network barriers or constraints.

Juniper plans to offer VXLAN routing on the EX9200 and MX Series platforms by mid-2014. Both platforms are capable of operating independent of VMware NSX with standard routing tables utilizing the capabilities of routing information bases (RIBs) and/or forwarding information bases, also known as forwarding tables (FIBs), or by registering with VMware's NSX controller to provide external routing services. When registered with the NSX controller, the EX9200 and MX Series platforms can be configured to provide Layer 3 gateway services via the VMware NSX API, allowing the NSX controller to coordinate the creation of VXLAN tunnels.

## Virtual Security

A wide range of security capabilities and solutions is required to minimize risk and protect virtual data center assets. Juniper is working with VMware to further extend development of its leading virtual security product portfolio to ensure future integration with VMware NSX and new security and networking application programming interfaces (APIs).

## Conclusion

Juniper Networks delivers solutions that provide a rock solid networking and security foundation for the virtual data center, helping companies achieve success in fast changing business environments. Organizations can focus on improving the business, whether that requires deploying new applications, entering new markets, or expanding a product portfolio with a data center infrastructure that can support business growth and unexpected demands without adding complexity or expense.

Whether providing connectivity between the virtual network and physical hosts, between remote sites, or between external networks, Juniper delivers flexible solutions for VMware NSX environments, providing seamless connectivity between physical and virtual networks and network services throughout the data center.

This combined Juniper-VMware offering optimizes applications and increases data center agility by delivering:

- Flexible workload placement and mobility
- A single pane of glass for logical-to-physical network connectivity
- Operational simplicity and ease of management

## About Juniper Networks

Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at [www.juniper.net](http://www.juniper.net).

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