

# Layer 2 Gateway Services with VMware NSX

Juniper Integrates with NSX to Programmatically Connect Physical and Virtual Environments

## Challenge

Businesses need to seamlessly bridge their physical and virtual data center networks to provide unbroken connectivity, greater agility and scale.

## Solution

Juniper and VMware deliver Layer 2 gateway services leveraging VMware's NSX on select Juniper switches and edge routers to bridge virtual and physical environments in any data center network.

## Benefits

- Enables programmatic connection of VLANs to logical overlay networks
- Offers choice of NSX L2 gateway services across select switches and edge routers to bridge virtual and physical networks in any data center topology or multi-hypervisor environment
- Provides foundation for hardware accelerated virtual extensible LAN (VXLAN) routing to support virtualized network multi-tenancy and enable virtual machine mobility either within or across data centers
- Integrated support for automation flexibility significantly improves agility
- Allows flexible workload placement and workload mobility
- NSX API configures logical networks across hypervisors and physical switches
- Eliminates need for IP multicast for physical networks



VMware NSX, the industry's leading networking and security virtualization platform, decouples the virtual network from the underlying physical network to allow enterprises to rapidly deploy virtual networks securely for any application.

With network virtualization, simplified logical networking devices and services are abstracted from the physical network and exposed as logical networking objects across a fully distributed virtualization layer, consumable by third-party applications through northbound APIs. VMware NSX exposes these logical networking devices and services as logical ports, logical switches, logical routers, distributed virtual firewalls, and virtual load balancers, all with monitoring, quality of service (QoS), and security built in.

Juniper Networks leverages the NSX distributed service framework to integrate with the NSX platform. This integration delivers Layer 2 gateway services that allow virtual networks to be bridged to any physical network environment to provide a unified user experience. It also provides the ability to seamlessly integrate with any cloud management platform for greater data center agility and scale.

## The Challenge

Virtual networks must connect to a physical device at some point, along with legacy physical applications and database servers, in order to reach the client application. In addition, most data center environments consist of multiple virtualized Layer 2 networks, whether to support separate production and development environments, business continuity/disaster recovery efforts, multiple tenants, or other unique business needs. "Bridges" are required between physical and virtual networks, as well as between separate virtual networks. Agility and performance are impacted when bridges are placed in the wrong tier of the data center network. The placement of bridges is critical to delivering agility and performance and, if placed in the wrong tier of the network, will impact both. Ideally, bridges are placed as close to the physical element as possible—server, storage, or client application—to provide the greatest data center agility and scale.

Separate add-on bridges such as dedicated gateways increase operational complexities and expenses. Seamlessly bridging physical and virtual networks to optimize application and operational efficiencies requires physical-to-virtual gateways to be integrated into the physical network. In addition, the physical infrastructure must be flexible enough to provide physical-to-virtual Layer 2 gateway services at any point in the data center network to provide on-demand connectivity between physical and virtual workloads.

## Juniper Networks Layer 2 Gateway Services with VMware NSX

The VMware NSX network virtualization platform delivers the operational model of a virtual machine for the network. Similar to virtual machines for computing, virtual networks are programmatically provisioned and managed independent of the underlying networking hardware. NSX reproduces the entire network model in software, allowing diverse network topologies to be created and provisioned in seconds. However, the challenge of connecting to the physical environment remains.

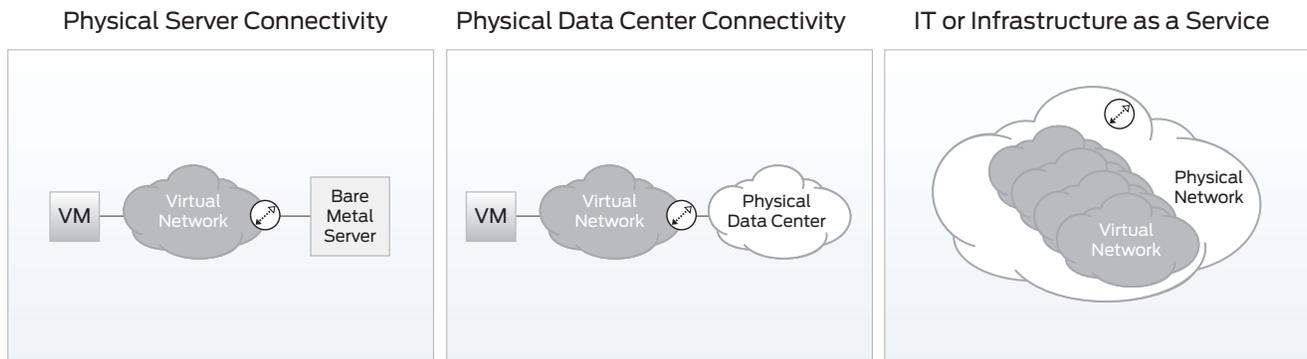


Figure 1. Juniper VMware NSX L2 gateway use cases

Juniper and VMware jointly address this challenge by delivering VMware NSX L2 gateway services to bridge the virtual and physical network environments on select access switches, core/aggregation switches, and edge routers to allow optimal NSX deployments for all data center network topologies.

There are three typical use cases for the VMWare NSX L2 gateway, as shown in Figure 1.

**Use Case 1: Physical Server Connectivity** The NSX L2 gateway service on a top-of-rack (ToR) access switch delivers a unified L2 domain experience by bridging between virtual machines and physical servers, allowing applications on these servers to talk to each other. For example, one tier in a multi-tier application architecture could consist of physical or bare-metal servers that host databases. The Juniper NSX L2 gateway ToR access switch bridges communication between the servers and the database applications in the physical tier with the virtualized servers and applications in the other tiers. Reliability is greatly enhanced by In Service Software Upgrade (ISSU) capabilities and by multi-homing connections for both virtual and physical servers required to terminate an overlay tunnel connection (VXLAN VTEP) for NSX.

**Use Case 2: Physical Data Center Connectivity** The NSX L2 gateway capabilities on select Juniper switches or edge routers provide the necessary bridging between physical and virtual data center segments, assets or services for workload mobility. While businesses evolve towards a private or hybrid cloud model, they can have a mix of physical and virtual data centers; they must be able to connect between or within these data centers and also move workloads. Juniper's NSX L2 gateway can bridge and enable workload migration between physical and virtual assets, services or applications both within and across data centers. These core switch- or edge router-based NSX L2 gateways can stretch local physical VLAN or logical VXLAN segments across data centers for seamless connectivity. The ToR access switch can provide local physical-to-virtual bridging within the data center.

**Use Case 3: IT or Infrastructure as a Service (ITaaS)** Deploying the NSX L2 gateway on the edge router or select switches in the network allows a single physical environment to be shared between multiple virtual networks. Traffic that enters

the data center is directed to the appropriate virtual network, optimizing utilization and costs while maintaining a separation of virtual domains. Such a scenario is well suited for an ITaaS environment.

## Features and Benefits

The combination of Juniper and VMware optimizes applications and data center operational efficiencies by:

- Enabling programmatic connection of VLANs to logical networks
- Offering the choice of NSX L2 gateway services across access switches such as the QFX5100, core/aggregation switches such as the EX9200, and edge routers such as the MX Series to bridge virtual and physical networks in any data center topology, multi-hypervisor environment or fabric architectures
- Providing foundation for hardware accelerated VXLAN routing to support virtualized network multi-tenancy and enable virtual machine mobility within or across data centers for business continuity/disaster recovery and resource pooling
- Enabling automation through Zero-Touch Provisioning (ZTP), Junos scripting, Python scripts, and integration with Puppet and Chef significantly increases agility
- Allowing flexible workload placement and workload mobility
- Delivering a single pane of glass (NSX API) for configuring logical networks across hypervisors and physical switches
- Eliminating the need for IP multicast for physical networks

## Solution Components

Juniper is delivering VMware NSX Layer 2 gateway services on the QFX5100 access switches, as well as for the EX9200 line of programmable core/aggregation switches and MX Series 3D Universal Edge Routers via a Juniper Networks Junos® operating system software release upgrade scheduled for mid-2014.

The joint solution offers seamless physical-to-virtual connectivity via integration with NSX through the data plane (VXLAN) and control plane (OVSDDB) while unifying the management plane. NSX acts as a single pane of glass for managing and operating IT workloads that span virtual and physical systems.

Whether bridging between the virtual network and physical hosts, between remotes sites, or between external networks, Juniper L2 gateway services for VMware NSX provide programmatic connections of VLANs to logical VXLAN networks throughout the data center, providing support for different fabric architectures such as Virtual Chassis Fabric and IP CLOS, optimizing applications and data center operational efficiencies.

The Juniper NSX L2 gateway supports high availability through mechanisms such as ISSU and multi-homing beyond two ToR access switches.

## Summary

Virtual networks created through VMware's NSX allow enterprises to rapidly deploy networking and security for any application by enabling the fundamental abstraction of networks from networking hardware.

Juniper Networks leverages the NSX distributed service framework and SDK to integrate with the NSX platform and provide Layer 2 gateway services that allow the virtual network to be bridged to any physical network environment. This integration provides a unified user experience and the ability to seamlessly integrate with any cloud management platform.

## Next Steps

To learn more about bridging physical and virtual data center environments, or about other Juniper solutions for VMware environments, please contact your Juniper Networks or VMware representative.

## About VMware

VMware is the leader in virtualization and cloud infrastructure solutions that enable businesses to thrive in the Cloud Era. Customers rely on VMware to help them transform the way they build, deliver and consume Information Technology resources in a manner that is evolutionary and based on their specific needs. With 2012 revenues of \$4.61 billion, VMware has more than 500,000 customers and 55,000 partners. The company is headquartered in Silicon Valley with offices throughout the world and can be found online at [www.vmworld.com](http://www.vmworld.com).

## 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).

### Corporate and Sales Headquarters

Juniper Networks, Inc.  
1133 Innovation Way  
Sunnyvale, CA 94089 USA  
Phone: 888.JUNIPER (888.586.4737)  
or +1.408.745.2000  
Fax: +1.408.745.2100  
[www.juniper.net](http://www.juniper.net)

### APAC and EMEA Headquarters

Juniper Networks International B.V.  
Boeing Avenue 240  
1119 PZ Schiphol-Rijk  
Amsterdam, The Netherlands  
Phone: +31.0.207.125.700  
Fax: +31.0.207.125.701