

Agile Automation with Juniper Networks OpenStack Neutron Plug-In

Automate, scale, and create an end-to-end MetaFabric architecture

Challenge

Enterprises and service providers across all industries are looking for ways to reduce operational expenses and provide strategic business advantages such as improved reliability, agility, time to deploy new services, and a better overall user experience.

Solution

Juniper Networks OpenStack Neutron plug-in delivers a complete automation and orchestration solution that leverages the high-performance capabilities of MX Series, SRX Series, and QFX Series platforms while simplifying the deployment of private, public, and hybrid clouds through a set of standard APIs.

Benefits

- Delivers business agility by automating the configuration of routing, switching, security, and SDN
- Improves efficiency by task automation and workflow orchestration while simplifying management of high-performance data centers
- Delivers an industry-only OpenStack bare-metal connectivity solution for building OpenStack-based data centers using Juniper MX Series, QFX Series and SRX Series platforms
- Provides end-to-end visibility into overlay and underlay networks through a single pane of glass

Today's high-performance data centers have grown immensely complex due to heavy virtualization combined with increasing demands on scale, security, and network availability. These increasingly complex networks are expected to support efficient application deployments and workload mobility in highly diverse and versatile environments.

Enterprise and service provider customers alike are always looking for a networking solution that will fit these dynamic requirements. The optimal solution should feature a simple architecture and deliver the operational excellence and agility required to meet the business needs of today's data center and cloud networks.

The Challenge

Many SDN solutions such as Juniper Networks® Contrail Networking platform address these challenges by building virtual overlay networks in an automated fashion, relying on the underlying physical network to provide the necessary stability.

For customers who are not using these virtual overlay networks, however, whenever virtual machines are created on any given server, corresponding VLANs, virtual network identifiers (VNIs), or firewall policies need to be implemented on the physical network so that these virtual machines (VMs) can talk to each other or communicate with other non-virtualized servers.

Oftentimes, although it has become the norm for VMs to be created in seconds, delays attributed to the manual configuration of network devices places tremendous pressure on the data center infrastructure. Customers are looking for ways to meet the demand for high-performance data centers while deploying networks that are as agile as their compute infrastructure. The network needs to provide an end-to-end solution using open protocols without vendor lock-ins.

Terminating Virtual Extensible LAN (VXLAN) tunnels on physical hosts results in additional compute resource consumption and increases overall configuration complexity. Using Juniper Networks switches as Layer 2 gateways for VXLAN tunneling simplifies the overall configuration and provides excellent performance. Auto provisioning VLANs using Juniper's plug-in for OpenStack Neutron also provides efficient use of limited VLAN IDs.

The Juniper Networks OpenStack Neutron Plug-In Solution

OpenStack is open-source management software that assists in deploying and operating public, private, and hybrid Infrastructure-as-a-Service (IaaS) clouds. Networking capabilities within OpenStack are handled by the Neutron module, which ensures that components of an OpenStack deployment can efficiently communicate with one another.

Juniper Networks MetaFabric™ architecture is a simple, open, and smart approach to networking that leverages a comprehensive portfolio of switching, routing, orchestration, SDN, and security solutions to accelerate the deployment and delivery of applications within and across multiple data centers. The MetaFabric architecture also provides location-independent coordination and management of devices across multiple sites, maximizing data center resources and ROI.

Juniper has developed an OpenStack Neutron plug-in that allows customers to build high-performance data centers based on the MetaFabric architecture, while enabling configuration of both physical and virtual networks deployed across multiple hosts. By supporting the latest OpenStack Neutron plug-in, Juniper addresses multiple use cases spanning both underlay and overlay networks.

VLAN Automation: Orchestrating Underlay Networks for L2 Connectivity in Private Clouds

The plug-in provides new features and flexibility for network connectivity by allowing automated VLANs, Layer 3 interfaces, and Virtual Router Redundancy Protocol (VRRP) configurations along with metadata configurations within OpenStack clusters.

Figure 1 details how Juniper’s OpenStack Neutron plug-in works. When the blue and green VMs are created on the network, the OpenStack Neutron plug-in automatically configures corresponding VLANs on the trunk ports, connecting the hypervisors on the VMs to the physical switches.

Since the blue and green VMs belong to different VLANs (VLAN1 and VLAN2, respectively), as soon as the tenant (or OpenStack user) creates a virtual router in OpenStack, Juniper’s plug-in for OpenStack Neutron creates a corresponding L3 interface on the aggregation switch for inter-VLAN routing. The tenant can optionally configure link aggregation group (LAG) or VRRP features as part of the plug-in configuration.

VXLAN Automation

OpenStack deals with all aspects of the cloud, including compute, storage, network, and security. There are several ways of configuring OpenStack networking; one is to use VMware NSX as its networking provider so that all operations from OpenStack—including create network, attach network, and create router—are redirected to VMware NSX, and equivalent logical entities are created in NSX.

VMware NSX is VMware software that provides overlay network technology to clouds, creating an abstraction on top of the physical network using VXLANs to help users create and manage networking services without modifying the physical network. These logical networking entities created by VMware NSX are referred to as overlay tunnels; typically, one overlay network is represented by one VXLAN in NSX. The physical network used by the network virtualization software (in this case, VMware NSX) is called the underlay.

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.

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

The Juniper OpenStack Neutron plug-in takes the existing Juniper NSX L2/L3 gateway solution to the next level by simplifying the individual steps involved in configuring underlay physical devices (Figure 2). The plug-in completely automates L2 and L3 gateway configurations, allowing seamless communication between virtualized and physical data centers.

The Juniper plug-in also provides an extension to the OpenStack Horizon user interface, facilitating bare-metal connectivity.

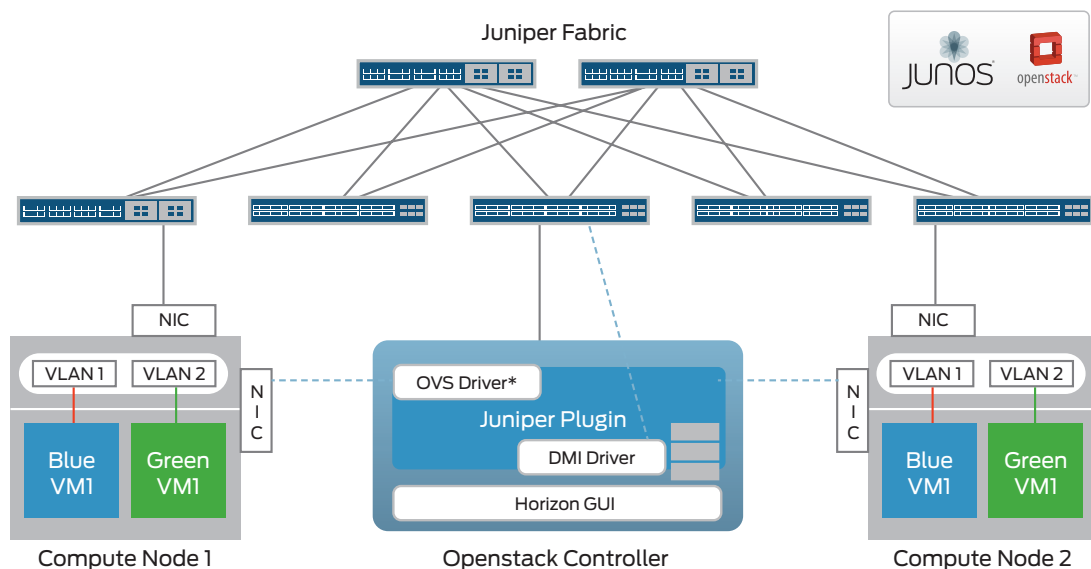


Figure 1: Virtual and physical network orchestration

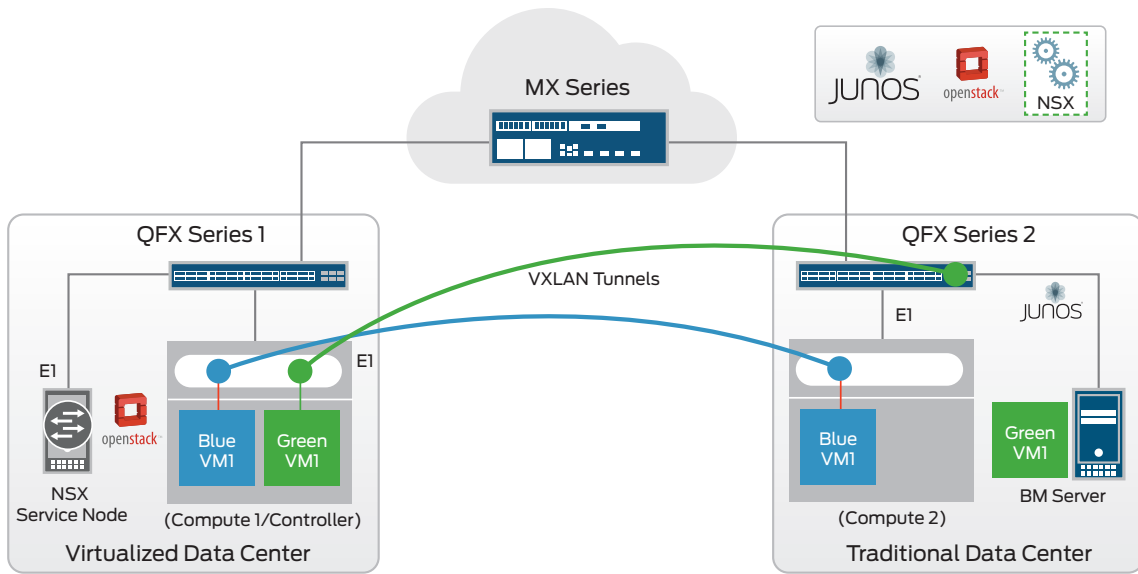


Figure 2: VXLAN L2/L3 gateway automation

Security Automation

Juniper’s Firewall as a Service (FWaaS) plug-in brings the power of high-performance, low latency, and highly scalable data center security to OpenStack virtual networks, supporting both physical and virtual form factors of Juniper Networks SRX Series Services Gateways. As shown in Figure 3, tenants can create and enable perimeter firewall protection for their OpenStack networks right from the OpenStack interface, enabling Neutron to configure firewall rules and policies on SRX Series and vSRX devices.

Simplified Operations and Management

Juniper Networks Junos® Space Network Director management software integrates with cloud infrastructure controlled by VMware NSX Multi Hypervisor SDN Controller environments and OpenStack, providing complete and correlated end-to-end visibility into virtualized overlay and physical networks, VMs, VXLANs, virtual tunnel endpoints, and OpenStack networks (Figure 4).

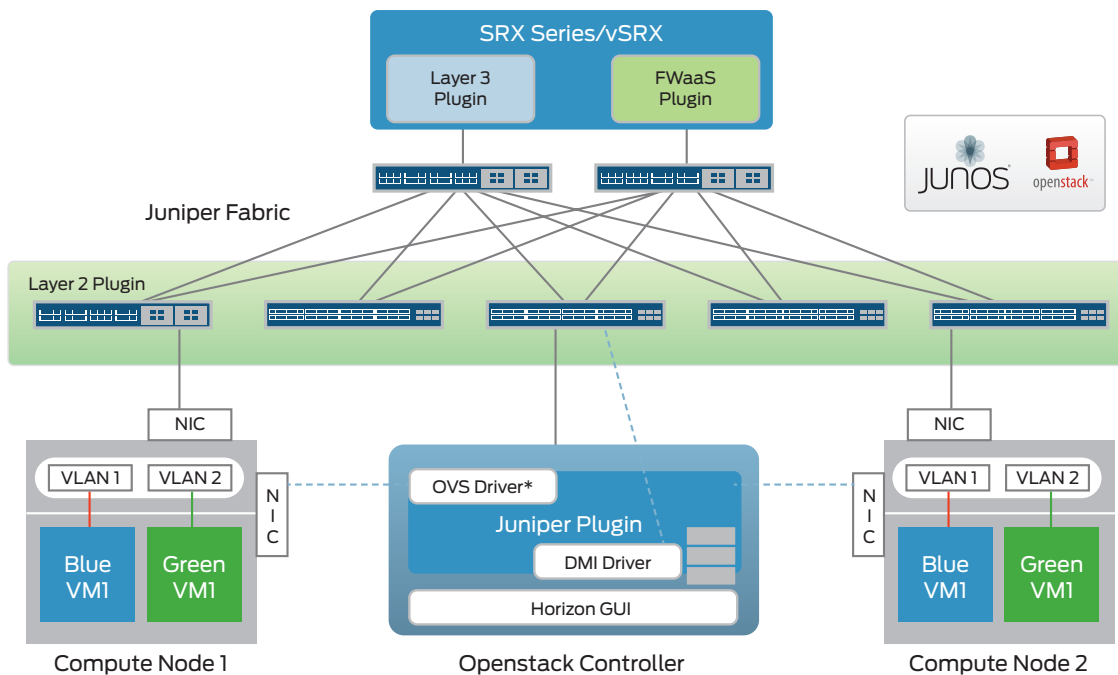


Figure 3: Firewall as a Service (FWaaS) automation

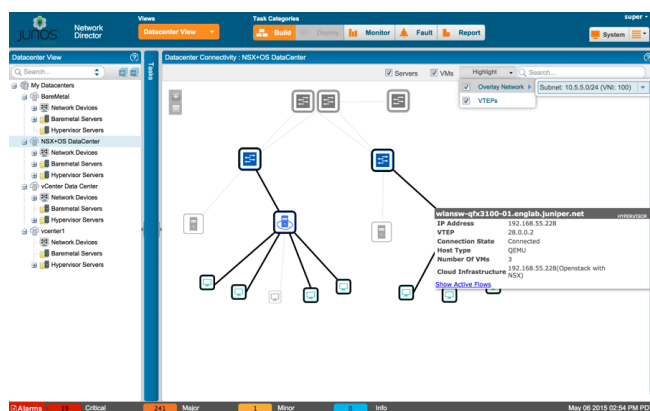


Figure 4: Overlay/underlay visibility using Junos Space Network Director

As part of the integration with OpenStack and NSX, Network Director provides the following benefits:

- Simplifies configuration of underlay network, making it simple for overlay troubleshooting
- Provides end-to-end visibility and path analysis between hosts or VMs in overlay networks
- Monitors overlay traffic load on physical networking devices
- Allows hardware and software maintenance on physical network devices

Features and Benefits

- Juniper and VMware jointly deliver VMware NSX L2 gateway services to bridge the virtual and physical network environments and allow optimal NSX deployments for all data center network topologies.
- The Juniper OpenStack Neutron plug-in simplifies the individual steps involved in configuring underlay physical devices.
- The plug-in completely automates L2 and L3 gateway configurations, allowing seamless communication between virtualized and physical data centers.
- Tenants can create and enable perimeter firewall protection for their OpenStack networks right from the OpenStack interface, enabling Neutron to configure firewall rules and policies on SRX Series and vSRX devices.

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Summary—Juniper’s Standards-Based OpenStack Neutron Plug-In for High-Performance Data Centers

By supporting open-source software automation, Juniper truly allows customers to build high-performance data centers. Based on the Juniper Networks MetaFabric architecture and using Juniper’s OpenStack Neutron plug-in, these simple, open, and smart networks can help eliminate human error from the network deployment process and maximize uptime, resulting in lower operational expenses, increased agility, and faster deployment time for services.

Next Steps

For more information or to download the OpenStack Neutron plug-in, please visit the Neutron Plug-In for OpenStack software download page on www.juniper.net.

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.