Junos Space Network Director API

Product Overview

Server, storage and network virtualization are creating constant change and complexity in the data center. Today, compute and storage can be provisioned and activated in minutes from cloud management interfaces, while network infrastructure still requires manual intervention to deploy a new service or application.

Junos Space Network Director API revolutionizes data center provisioning with a set of REST APIs that provide a consistent interface to all orchestration applications for visualizing, configuring, and managing the network. Deployed through a services model, Network Director API abstracts L2/L3 connectivity as well as security device configuration complexity, letting orchestration applications employ real-world, context-based terminology to enable services across Juniper infrastructure.

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Product Description

Juniper Networks® Junos® Space Network Director API offers open interfaces and easy programmability. A RESTful implementation of these APIs enables easy consumption and integration with third-party orchestration tools, including CloudStack and OpenStack. The Network Director API enables network management functions, including:

- Provisioning of secure multi-tenant networks in a shared network infrastructure
- Automation of tenant services in the data center
- Support for Layer 2 and Layer 3 security services
- Provision of a single point of integration with external cloud automation and DevOps orchestration tools

This approach enables cloud administrators and DevOps teams to rapidly roll out complex networking architectures in an easy, flexible, and self-service model, enabling the end user to:

- Provision a fully secured, segmented multi-tenant cloud (private, hybrid, or public) environment within seconds
- Eliminate manual operation errors through service automation and self-healing mechanisms
- Reduce complexity by abstracting complex networking topologies to simple models

With Junos Space Network Director API, end users model the network in their orchestration system based on requirements, which are automatically translated via extensible mediation logic and then activated programmatically by the orchestration system and provided on-demand without the need for manual operator intervention.

Some of the common use cases for Network Director API are shown in Table 1 below.

Table 1. Network Director API Use Cases

Use Case	Benefit
Enterprise IT as a Service (ITaaS)	Enterprise IT departments can easily leverage their private cloud automation toolsets (OpenStack, CloudStack, etc.) and roll out complex network topologies in their environment.
Multi-tenant Infrastructure as a Service (IaaS)	Cloud service providers can define network containers and expose them to tenants, who can activate these containers in a self-service manner.
DevOps automation	Network Director API exposes the infrastructure as abstract objects to the DevOps automation toolset, enabling DevOps teams to use their favorite scripting language to roll out networking infrastructure along with server and storage.

Architecture and Key Components

Complete Lifecycle Management

Network Director API will run installed on the Juniper Networks Junos Space platform (see Figure 1).

The Network Director API service model consists of the following components:

- Service Mediation: Translate service definition to network configuration
- Service Catalog: Define lists of services based on capabilities and publish them
- Service Model: Create an object hierarchy to represent services in device independent fashion
- Service Administration: Manage and administer how services are defined and implemented
- REST API Service: Support REST API for external consumption

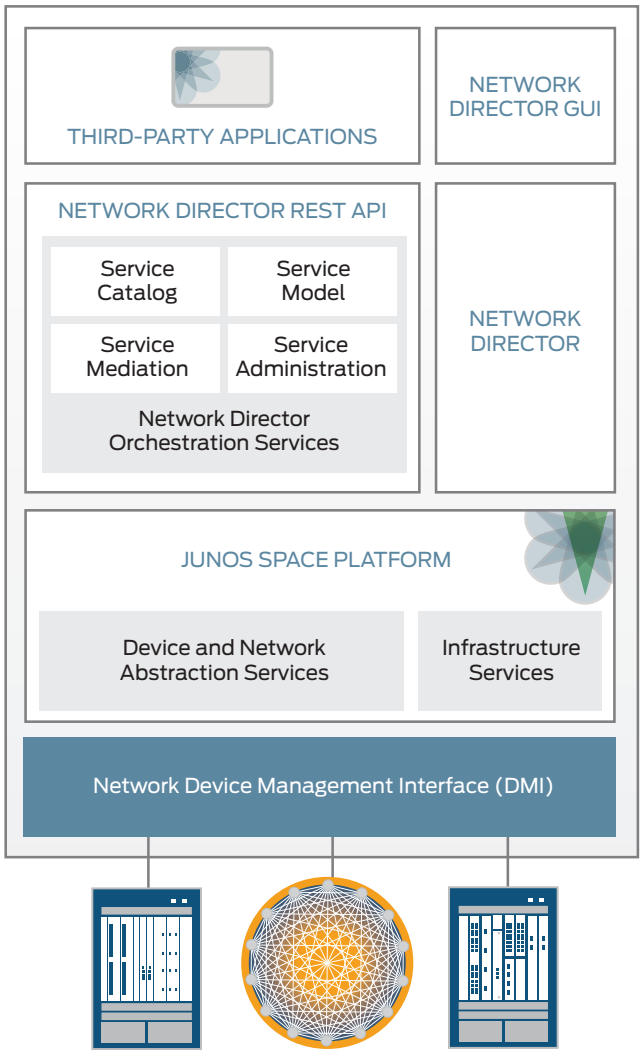

Figure 1: Network Director API architecture

Network Director API orchestration services provide:

- Support for a variety of predefined physical topology configurations, ranging from a single device to a complete complex data center infrastructure
- Flexible and extensible network service API that enables the definition of endpoints, connectivity between L2 and L3 endpoints, and policy applications, including those for security and class of service

Network Director API orchestration services are based on the Network as a Service (NaaS) model management system. NaaS consists of two logical components—NaaS server and NaaS domain.

- The NaaS server runs in the Junos Space infrastructure and manages the NaaS domain so that it appears to network administrators and tenants as a single device with a set of revenue ports, which are data ports on Juniper Networks devices. In a typical data center environment, compute servers are attached to revenue ports through which NaaS service is provided. Network Director API operations are performed using the NaaS service.
- The NaaS domain represents the network infrastructure that the NaaS server manages. All elements in the domain, both physical and logical, are represented internally as instances of model classes in the Network Director orchestration services repository. The state of the elements in the repository is synchronized with the state in the NaaS domain by way of read-and-write activities such as discovery, configuration, and other events that occur in the management network. Network Director orchestration services provide role-based access control for network administrators. The administrator has administrative and configuration privileges and can perform administrative operations, including:
  - Configuring the network infrastructure
  - Performing basic create, read, update, and delete (CRUD) operations on all elements of the service model such as tenants, endpoints, connectivity groups, policies, and rules
  - Activating and deactivating NaaS server

Network Director orchestration services expose a set of REST APIs that are accessible through standard web-based HTTP requests. APIs send requests to NaaS service resources to perform HTTP CRUD operations. The NaaS resources are represented in either the JavaScript Object Notification (JSON) or Extensible Markup Language (XML), and requests sent to the resource Universal Resource Identifier (URI) may be in either the JSON or XML format.

The NaaS resources or services are grouped into classes by the type of service. For example:

- ConnectivityGroup: Provides NaaS service for a connectivity group consisting of endpoints (endpoints could be ports, virtual machines, or applications)
- L2ConnectivityServices: Provides L2 connectivity services
- SecurityPolicies: Provides NaaS services to enable security policies

Sample Network Director API Deployment Scenario with OpenStack

Network Director API can automate complex topologies and enable cloud administrators to use uber-cloud orchestration elements such as OpenStack to easily deliver different network deployment models in a self-service manner. For example, once a network administrator conducting a standard Web client and Web server deployment has pushed the initial configuration via the Network Director API static configuration, it is possible to import the stable network topology into the API and proceed with repetitive operations. A sample repetitive deployment scenario would be as follows:

1. Create virtual machine: OpenStack Nova creates and schedules VMs (Web client and server).
2. Create network: Create_port ()on Juniper Neutron plugin to create L2 domains for both VMs invoking Juniper plugin.
3. Juniper Neutron plugin invokes Network Director API for L2: VLANs are created on the physical switch and open virtual switch.
4. Security policy: Network Director API creates security policy on Juniper Networks SRX Series Services Gateways, restricting Web client to only send http/https traffic to Web server.
5. Internet access: Network Director API creates integrated routing and bridging (IRB) to facilitate Layer 3 connectivity.

These complex deployments ensure the proper configuration of L2, L3, and security services, and are done within seconds—without operator intervention and achieving cloud scale.

Features and Benefits

Network Director API is a software application that simplifies the consumption of connectivity services, which are enabled by a rich set of Juniper device capabilities in the data center domain. It does this by decoupling service request specifications from service implementation (configuration) to enable:

1. Virtualization of cloud/data center network operations by providing location/device and technology independent definition, modification, activation, deactivation, and deletion of NaaS requests
2. Provisioning of multiple secure multi-tenant networks on a shared network infrastructure
3. A single point for integration with external cloud/data center orchestration tools

Table 2: Supported Devices, Topologies, and Services

Supported Devices	Topologies and Services
• Juniper Networks EX Series Ethernet Switches (EX4200, EX4550, and EX4550 with Virtual Chassis technology) • Juniper Networks QFabric Systems (QFX3000-G and QFX3000-M); Juniper Networks QFX Series (QFX3500 and QFX3600 switches)	Layer 2
• EX Series or QFX Series switch connected to a Juniper Networks MX Series 3D Universal Edge Router • QFabric System connected to an MX Series router	Layer 2 Layer 2 and Layer 3 with Internet access
• EX Series or QFX Series switch connected to an MX Series router and SRX Series gateway • QFabric System connected to an MX Series router and SRX Series gateway	Layer 2 Layer 2 and Layer 3 with firewall Layer 2 and Layer 3 with Internet access Layer 2 and Layer 3 with firewall and Internet access

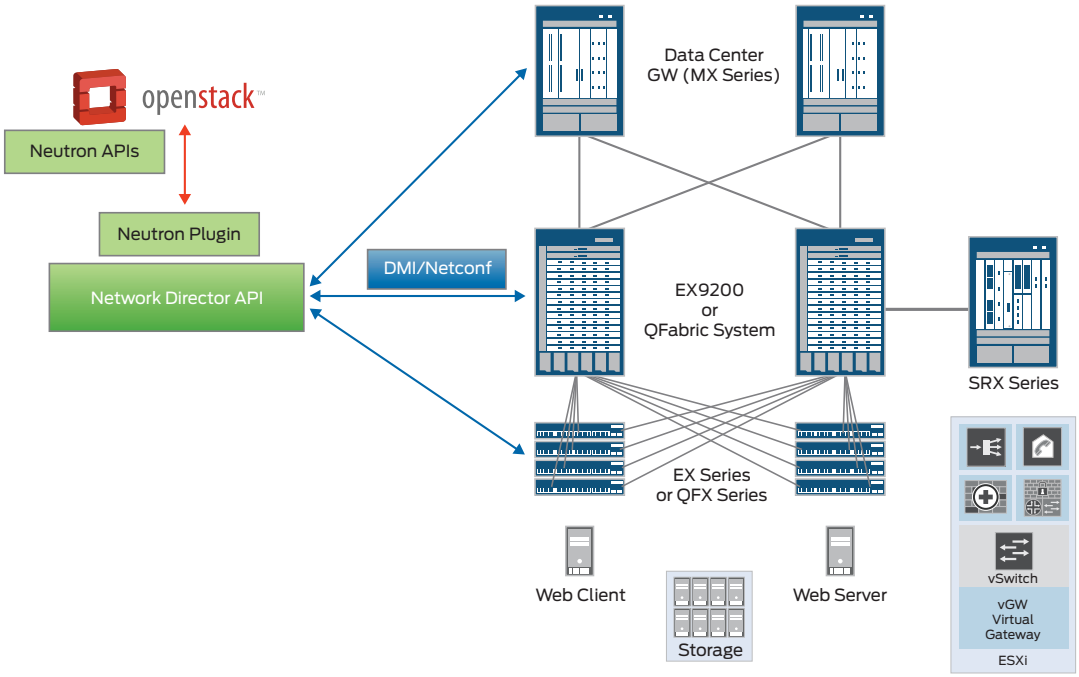

Figure 2: Network Director API integration with OpenStack

Juniper Networks Services and Support

Juniper Networks is the leader in performance-enabling services that are designed to accelerate, extend, and optimize your high-performance network. Our services allow you to maximize operational efficiency while reducing costs and minimizing risk, achieving a faster time to value for your network. Juniper Networks ensures operational excellence by optimizing the network to maintain required levels of performance, reliability, and availability. For more details, please visit www.juniper.net/us/en/products-services.

Ordering Information

To order Juniper Networks Testing Services or for additional information, please contact your Juniper account manager.

The Juniper Networks Testing Services can be ordered using the part number shown in the table below. Before Testing Services begin, a statement of work (SOW) will be established outlining the scope of effort to be performed.

Model Number	Name
PRO-DC-MIG-ASSESS	Data Center Migration and Risk Mitigation Assessment

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.

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