

JUNOS FUSION TECHNOLOGY

Product Overview

With Junos Fusion technology, network administrators can reduce network complexity and operational expenses by collapsing underlying network elements into a single, logical point of management using MX Series 3D Universal Edge Routers and QFX Series and EX Series switches running the Junos operating system. Based on the IEEE 802.1BR standard, Junos Fusion technology is a rich, open framework that makes networks more versatile, extensible, and responsive in multivendor environments.

Product Description

Growing network complexity continues to burden network administrators across networking layers, in service provider access networks, in data center networks, and in enterprise campus networks. This complexity is driving network administrators to staff large operations teams in order to configure and manage enormous numbers of endpoints through the network, increasing the operational, administrative, and management burden while driving TCO higher.

The problem is compounded in heterogeneous environments, where network administrators have to integrate multiple network management systems (NMS), element management systems (EMS) and operations support systems (OSS), as well as deal with potential discrepancies in troubleshooting and provisioning between systems, creating opportunities for human error.

Network administrators need a cost-effective methodology to virtualize the large number of endpoints found in cloud data centers with top-of-rack switches, enterprise campus access networks with switches in wiring closets, mobile networks with micro- and macro-cell site routers, and high-density aggregation sites requiring thousands of low-speed connections. Virtually fusing endpoint operation, administration, and management into the aggregation layer eliminates the complexity of scaling-out the ever growing number of endpoints in the network.

Junos Fusion Technologies

Junos Fusion technology helps reduce network complexity and operational expenses by enabling multiple distributed devices to be managed as a single, logical device. Three different Junos Fusion architectures are available: Junos Fusion Provider Edge, Junos Fusion Data Center, and Junos Fusion Enterprise.

Junos Fusion Provider Edge

For service providers, Junos Fusion Provider Edge is a technology enabler that overcomes optical pluggable physical limitations by delegating low-speed optical interfaces to a cost-appropriate switch, virtually expanding connectivity to thousands of ports from a single Juniper Networks MX Series 3D Universal Edge Router.

Junos Fusion Data Center

Junos Fusion Data Center provides automated network configuration and operational simplicity for medium to large data centers with up to four QFX10000 switches deployed in the spine layer and any combination of up to 64 QFX5100, QFX5110-48S, QFX5200-32C, and EX4300 top-of-rack switches deployed as satellite devices.

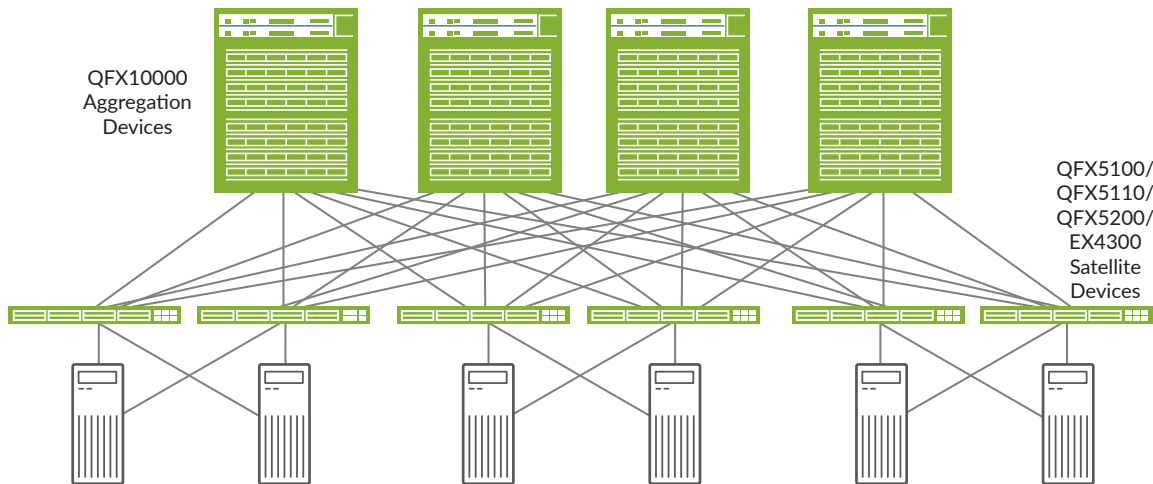


Figure 1: Junos Fusion Data Center deployment.

Junos Fusion Enterprise

For enterprise networks, Junos Fusion Enterprise provides automated network configuration and simplifies scalability for medium to large enterprise networks with the Juniper Networks EX9200 line of Ethernet switches and EX4300, EX3400, EX2300, and EX2300-C switches. Junos Fusion Enterprise technology can be deployed across a building, or multiple buildings, to connect large numbers of devices in a fabric that can be managed as a single device.

based EVPN technology, multiple buildings configured with Junos Fusion Enterprise technology can be interconnected with Junos Fusion Data Center fabrics to form an IP fabric. In such a configuration, all enterprise buildings and data centers can follow uniform VLANs, configurations and policies rather than each building having separate VLANs and policies.

With Junos Fusion technology, service providers and enterprises can reduce network complexity and operational costs by collapsing underlying network elements into a single, logical point of control from Junos OS-based Juniper routing and switching platforms. It is designed for customers who need to cost-effectively deploy many 1GbE/10GbE/40GbE/100GbE switch ports in a data center, business edge, or access and aggregation network that can be managed from a central device. In addition, existing switches and routers can be easily migrated to a Junos Fusion architecture with a simple software upgrade, offering full investment protection.

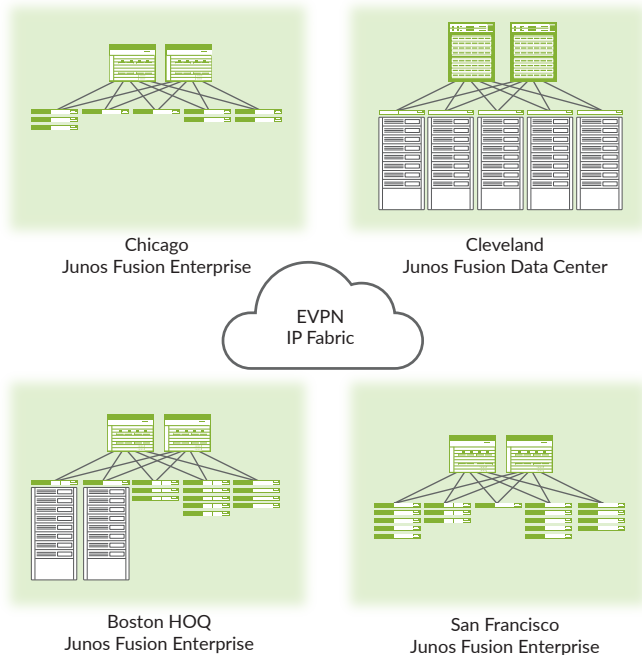


Figure 2: Junos Fusion Enterprise and Junos Fusion Data Center fabrics across multiple buildings.

In Junos Fusion Data Center and Junos Fusion Enterprise environments, Junos Space Network Director provides a single-pane-of-glass solution for managing the entire network, enabling network agility and reducing costs. Using standards-

Key Components

The Junos Fusion architecture consists of two major components: “Aggregation” devices and “Satellite” devices.

- **Aggregation devices:** Aggregation devices serve as the core of a Junos Fusion fabric. One or two aggregation devices can be used in a single Junos Fusion fabric. All configurations take place from the Aggregation device.
- **Satellite devices:** Satellite devices form the access layer of a Junos Fusion fabric. These devices, which are connected via uplinks to the Aggregation devices, need not be individually managed as the control plane resides on the Aggregation device.

Depending on the technology, different products can be used as Aggregation or Satellite devices in a particular Junos Fusion Fabric (see Table 1).

Table 1. Junos Fusion Supported Platforms

Junos Fusion Technology	Aggregation Device	Satellite Device	Satellite Device Mode
Junos Fusion Provider Edge	MX Series	QFX5100, EX4300	Port-extended and distributed forwarding
Junos Fusion Data Center	QFX10000	QFX5100, QFX5110-48S, QFX5200-32C, EX4300	
Junos Fusion Enterprise	EX9200	EX4300, EX3400, EX2300, EX2300-C	Port-extended

These components work together as a single switching system, flattening the network to a single tier without compromising resiliency. Network administrators can build individual Junos Fusion fabrics comprised of a pair of Aggregation devices and a set of Satellite devices; each fabric is a discrete unit, managed as a single device. Fabrics can be small—for example, a pair of Aggregation devices and a handful of Satellites—or large, with up to 64 Satellite devices supporting thousands of ports, based on the needs of the network operator.

In Junos Fusion Enterprise deployments, Satellite devices do not need to be individually connected to Aggregation devices. Up to 10 Satellite devices can be interconnected via standard 10GbE/40GbE interfaces to form a “cluster,” which in turn can be connected to the Aggregation devices over a pair of fiber uplinks. Satellite devices or clusters can also be dual-homed or single-homed to the Aggregation devices.

Junos Fusion Deployment Mode Options

Junos Fusion technology can be deployed in a variety of modes, depending on the desired deployment scenario.

- **Port-Extended Mode:** In port-extended mode, ports on the Junos Fusion Aggregation devices are extended to the

Junos Fusion Satellite devices, virtually maintaining feature functionality of the Aggregation device's port. All L2 and L3 decisions are processed on the Aggregation device, as the Satellite device provides simple connectivity back to the Aggregation device. A likely scenario for Junos Fusion extended and programmable mode on MX Series routers, EX Series switches or QFX Series switches would be in a multitenant data center environment used to connect a large number of servers running different applications owned by different tenants, as none of the servers or tenants need to communicate with one another.

- **Distributed Forwarding Mode:** Junos Fusion can also be deployed with distributed forwarding on Satellite devices for high-performance and low-latency applications.

Only port-extended mode is supported by Junos Fusion Enterprise, so Satellite devices simply forward all traffic to the Aggregation device, enabling network administrators to monitor and manage the entire enterprise campus building from a single device. Features such as Power over Ethernet Plus (PoE+), LLDP-MED and 802.1x are also supported in Junos Fusion Enterprise architectures to help meet enterprise campus requirements.

Features and Benefits

Table 2: Junos Fusion Features and Benefits

Feature	Benefit
New service models	<ul style="list-style-type: none"> • New service models are enabled for deployments of data center, business edge, and access/aggregation networks.
Flexible deployment modes	<ul style="list-style-type: none"> • Junos Fusion delivers a flexible model for deploying virtual Satellite devices from a single aggregation control point. • Physical optical interface limitations are overcome in order to support a larger number of ports not possible on a physical chassis.
Centralized management	<ul style="list-style-type: none"> • A single device-based point of management is provided that uses capabilities embedded in Junos OS for provisioning, operations, monitoring, maintenance, logs, and platform discovery for many network devices connected as Satellite devices to a hub device. • Many lower-cost device types are centrally managed, overcoming chassis limitations on port counts and reducing cabling costs for port fan-out and port multiplexing deployments. • Junos Fusion provides for centralized management of fabric devices while maintaining standalone device functionality, including L2 switching and L3 routing on Satellite devices. • Junos Space Network Director provides a smart, comprehensive, and automated network management solution that enables network and cloud administrators to visualize, analyze, and control their entire enterprise network—data center and campus, physical and virtual infrastructure, and wired and wireless—through a single pane of glass.
Intelligent network services	<ul style="list-style-type: none"> • Junos Fusion enables the deployment of rich services on Satellite devices by maintaining their full individual device feature sets while in the fabric mode. • Included are L2 switching on the Satellite device for server port aggregation and L3/MPLS routing on satellites for business access and mobile backhaul.
Intelligent deployment model	<ul style="list-style-type: none"> • Unlike simple port multiplexer/demultiplexer designs, Junos Fusion Data Center and Junos Fusion Provider Edge optimize connection types and ensure high performance for multiple traffic types.
Extensibility	<ul style="list-style-type: none"> • A framework is provided to support future third-party devices.

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

Junos Fusion is offered as a part of platform fees. For details on how to order the controller or Satellite platforms, please refer to www.juniper.net or contact your sales representative.

About Juniper Networks

Juniper Networks brings simplicity to networking with products, solutions and services that connect the world. Through engineering innovation, we remove the constraints and complexities of networking in the cloud era to solve the toughest challenges our customers and partners face daily. At Juniper Networks, we believe that the network is a resource for sharing knowledge and human advancement that changes the world. We are committed to imagining groundbreaking ways to deliver automated, scalable and secure networks to move at the speed of business.

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