JUNIPER SWITCHES PROVIDE SCALE AND SIMPLICITY FOR ANY SIZE DATA CENTER

Switching Architectures Leverage Juniper Data Center Switches to Accelerate Time to Value, Simplify Network Management

Challenge

Data center networks are struggling to support new applications, technologies, and traffic patterns. As enterprises decentralize, data centers have also become more geographically dispersed and distributed. Efforts to remedy these challenges with traditional architectures add complexity and compromise business agility.

Solution

Juniper's Ethernet switches, a key component of their data center switching architectures, support deployments that scale from dozens to thousands of ports. The switches also play a critical role in the MetaFabric Architecture, enabling simple, open, and smart data centers.

Benefits

- Scalable—from dozens to thousands of ports
- Time to value—accelerate deployment and delivery of applications within and across multiple sites and the cloud
- Simplified network management—multiple switches can be managed as a single device, streamlining monitoring and maintenance

Today's data centers are being pushed to their limit by new technologies, ever-increasing applications, and ever-changing traffic patterns. To improve business agility, they need to be built around switching architectures that reduce management complexity, accelerate deployment, and improve time to value. Juniper's Ethernet switching portfolio supports a number of innovative switching architectures that support deployments that scale from dozens to thousands of ports, delivering a highly flexible solution for virtually any data center environment.

The Challenge

The pressures on today's enterprise data center are unprecedented. Virtualized and cloud-based applications, big data, SDN, and an increasingly mobile workforce—using many disparate devices—are straining the data center network to the breaking point. In an effort to mitigate congestion, network architects attach more components to existing architectures that were not necessarily designed for scalability and flexibility. These additions may temporarily ease the problem at hand, but they create a more serious problem: network complexity. Complex networks can't adapt as quickly to changes in the business environment, severely compromising their agility.

Juniper Networks Data Center Switches

Juniper Networks® MetaFabric Architecture™ is a holistic blueprint for how to build a data center network that spans different technology areas, multiple data center sites and clouds—both physical and virtual. This solution brief presents an overview of Juniper Networks data center switching architectures—Virtual Chassis, Virtual Chassis Fabric, and Juniper Networks QFabric® System, as well as standard spine-and-leaf—which are at the heart of the MetaFabric Architecture. Acting as flexible building blocks for networks that scale from dozens to thousands of ports, Juniper data center switches—working with Juniper routing, security, SDN, and open ecosystem solutions—contribute to a comprehensive architecture that accelerates the deployment and delivery of applications within and across multiple sites and clouds.

The primary building blocks of Juniper's data center switching architectures include:

- **EX4300 Ethernet Switch**—a compact, fixed-configuration line of Ethernet switches that deliver a high-performance data center access solution
- **EX9200 Ethernet Switch**—a line of programmable Ethernet switches that simplify the deployment of cloud applications, server virtualization, and rich media collaboration tools in data center core and aggregation environments
- **QFX5100 Switch**—a flexible, high-performance, low-latency, and feature-rich line of Layer 2 and Layer 3 switches optimized for virtualized data center environments
- **Junos® Space Network Director**—network management software that lets network administrators visualize, analyze, and control their entire enterprise network—data center and campus, physical and virtual, wired and wireless—through a single pane of glass

Juniper's data center switches are flexible enough to be used in Juniper's Virtual Chassis, Virtual Chassis Fabric, and QFabric System architectures, as well as traditional spine-and-leaf fabric deployments. These technologies simplify any size data center and allow you to scale from dozens to thousands of ports.

Virtual Chassis

Virtual Chassis technology enables up to 10 interconnected switches to be monitored and managed as a single device. Using Virtual Chassis technology, network architects can separate physical topology from logical groupings of endpoints and drive more efficient resource utilization. They can create highly resilient topologies using the GbE or 10GbE uplink ports to extend the Virtual Chassis configuration across long distances spanning multiple wiring closets, floors, or even buildings. The operational simplicity and small form factors of the Virtual Chassis-enabled switches make the technology an excellent architecture for customers who want a flexible solution in small or medium-sized data centers.

Table 1. Virtual Chassis Supported Platforms

Juniper Switch	1/10GbE	10/40GbE
EX4300	✓	
QFX5100		✓

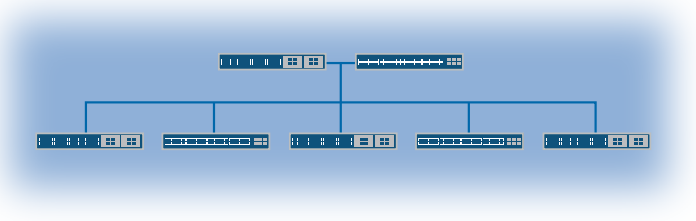

Figure 1: Virtual Chassis configuration

Virtual Chassis Fabric

Virtual Chassis Fabric enables up to 20 interconnected switches to operate as a low-latency, high-performance data center fabric that is managed as a single device. Plug-and-play capability and operational simplicity make Virtual Chassis Fabric an excellent architecture for customers who want a flexible, high-performance, top-of-rack solution in small or medium-sized data centers.

Table 2. Virtual Chassis Fabric Supported Platforms

Juniper Switch	1/10GbE	10/40GbE
EX4300	✓	
QFX5100		✓

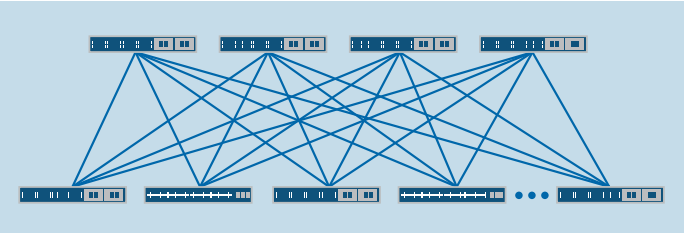

Figure 2: Virtual Chassis Fabric configuration

QFabric System

The QFabric System is composed of multiple components working together as a single switch to provide high performance, any-to-any connectivity, and management simplicity in the data center. QFabric System flattens the entire data center network to a single tier where all access points are equal, eliminating the effects of network locality and making it the ideal network foundation for cloud-ready, virtualized data centers. QFabric performance scales up to 40 Tbps, delivering unprecedented capacity at the access layer. Single-switch management greatly simplifies data center operations with less complexity and lower power, space, cooling, and operational costs. The QFabric System supports these platforms:

Table 3. QFabric System Supported Platforms

Juniper Switch*	1/10GbE
QFX5100 QFabric Node	✓

* QFX3500 and QFX3600 can also be used as QFabric Nodes

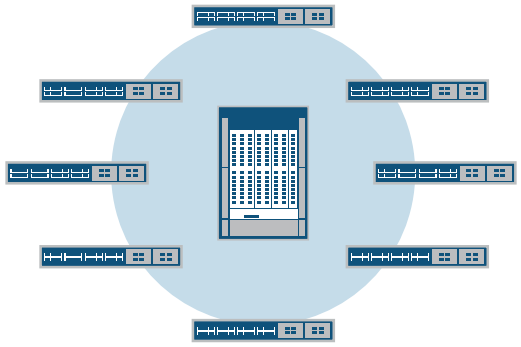

Figure 3: QFabric System deployment

Spine and Leaf

In a spine-and-leaf architecture, spine nodes interconnect with leaf nodes in an any-to-any topology, scaling from hundreds to more than 10,000 servers to support high traffic and application workflows. In a spine-and-leaf design, traffic can be forwarded on optimal paths between nodes at Layer 2 or Layer 3. Alternate paths may be utilized if an outage occurs, ensuring high performance and highly resilient operations. Cross-sectional interconnect bandwidth can be improved though link aggregation groups (LAGs) of 10GbE and by multipathing between leafs and spines.

Table 4. Spine-and-Leaf Supported Platforms

Juniper Switch	1/10GbE	10/40GbE	10/40/100GbE
EX4300	✓		
QFX5100		✓	
EX9200			✓

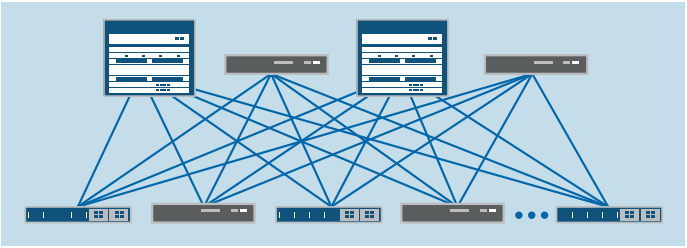

Figure 4: Spine-and-leaf configuration

Summary—A Portfolio of Juniper Data Center Switches for MetaFabric Deployments

If you are designing a data center architecture and want to reduce complexity, increase business agility, and improve time to value, Juniper data center switches belong in your toolkit. Operating as the heart of the Juniper Networks MetaFabric Architecture, these powerful solutions can meet even the toughest requirements for performance, scalability, and ease of management. More than that, Juniper data center switches simplify your network to accelerate time to market and provide the agility your organization needs to compete—and win—in today's challenging marketplace.

Next Steps

To learn more about the Juniper data center switching architectures, please visit www.juniper.net/us/en/solutions/enterprise/metafabric/dc-switching-architecture/

To learn more about the MetaFabric Architecture, please visit www.juniper.net/us/en/solutions/enterprise/metafabric/

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**.

Corporate and Sales Headquarters
Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, CA 94089 USA
Phone: 888.JUNIPER (888.586.4737)
or +1.408.745.2000
Fax: +1.408.745.2100
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

To purchase Juniper Networks solutions, please contact your Juniper Networks representative at +1-866-298-6428 or authorized reseller.

3510502-002-EN May 2014