QFX3600-I QFabric Interconnect

Product Overview

The QFX3600-I QFabric Interconnect provides the high-speed transport that serves as the backplane of a QFX3000-M QFabric System, supporting data centers with up to 16 racks where each rack contains 48 10GbE compute and storage network ports. The QFX3000-M—consisting of QFX3500 and/or QFX3600 QFabric Nodes, the QFX3600-I QFabric Interconnect and the QFX3100 QFabric Director—operates and is managed as a single, logical device for supporting the next-generation virtualized and high-performance data center, lowering capital, management, and operational expenses.

Product Description

Juniper Networks® QFX3600-I QFabric Interconnect is a fixed, 1 U device that acts as the backplane of a Juniper Networks QFX3000-M QFabric System, connecting any combination of QFX3500 and QFX3600 QFabric Node edge devices in a full mesh topology in 6:1, 3:1, or non-oversubscribed configurations.

High availability features on the QFX3600-I QFabric Interconnect include three fan trays with a 2+1 redundancy model and redundant AC or DC power supplies. Featuring a switching capacity of 1.28 Tbps, the QFX3600-I offers 16 40 Gbps ports, providing data plane connectivity for the QFabric Nodes. Each QFabric Node connects to the QFX3600-I QFabric Interconnect via one to four 40 Gbps interfaces operating over standard OM3/OM4 multimode fiber optic cables. Similar to the fabric inside a modular switch, there are no connections between the QFX3600-I QFabric Interconnects in the data center; the QFabric Interconnect only provides transport between QFabric Node devices. Four fully populated QFX3600-I QFabric Interconnects can scale the QFabric architecture to support 768 10GbE customer-facing ports, with an aggregate capacity of 5.12 Tbps and average port-to-port latency of 3 micro-seconds. Each component within a QFX3000-M system data path has an average latency of 1 microsecond.

The QFX3600-I runs the same Juniper Networks Junos® operating system as other Juniper Networks switches, routers, and security devices. All provisioning and management is done via the Juniper Networks QFX3100 QFabric Director. The control plane between the QFX3600-I Interconnect and the QFabric Director is established over a redundant out-of-band copper or fiber control plane network using Juniper EX4200 switches. The QFX3600-I Interconnect has two copper 1GbE ports and two fiber 1GbE ports, either of which can be used to connect the Interconnect to the Director.

Your ideas. Connected.™

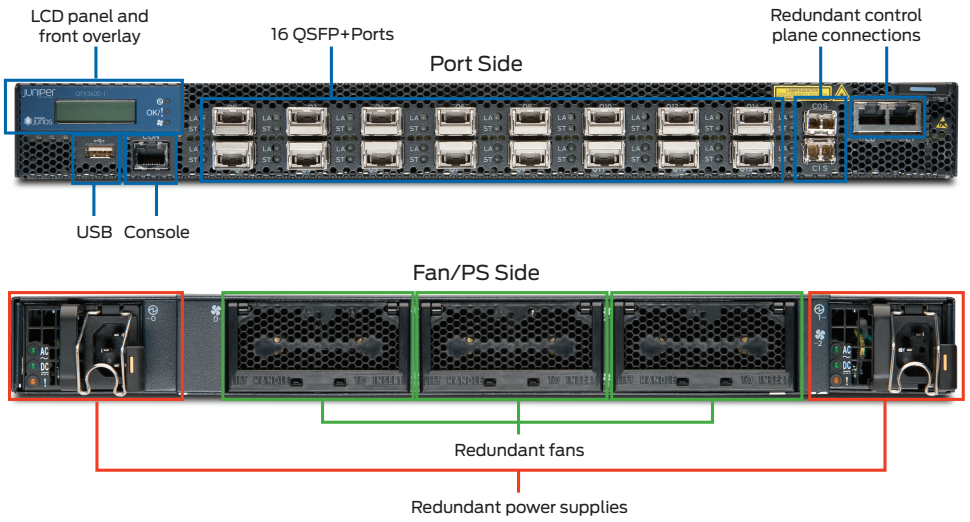

Figure 1: Juniper Networks QFX3600-I QFabric Interconnect

QFabric Architecture and Key Components

QFabric technology represents the "1" in Juniper's 3-2-1 data center architecture. It dramatically reduces complexity by delivering any-to-any connectivity while lowering capital, management, and operational expenses. The Juniper Networks QFabric architecture helps organizations realize the full benefit of their investments in server consolidation, virtualization, service-oriented architecture (SOA), distributed application architectures, and other technologies. The high-performance, non-blocking, and lossless QFabric architecture delivers much lower latency than traditional network architectures—crucial for the high-speed communications that define the modern data center. Rather than fragmented network and server capacity like traditional data center networks, QFabric technology implements a single, flexible architecture that enables organizations to achieve cloud-like efficiencies and create a more agile environment.

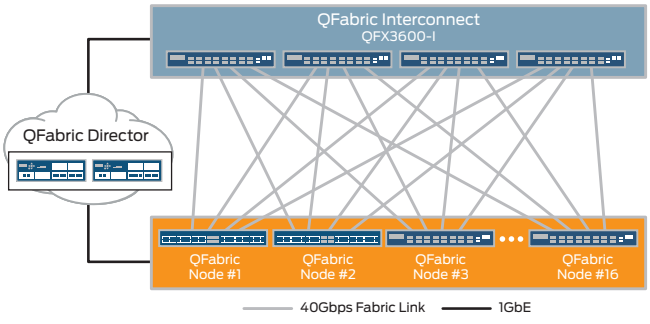

Figure 2: QFabric Interconnects connect QFabric Node edge devices in a full mesh topology (3:1 oversubscription or non-oversubscribed configurations)

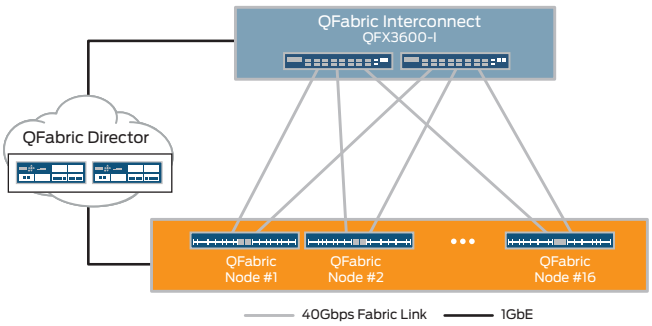

Figure 3: QFabric Interconnects connect QFabric Node edge devices in a full mesh topology (6:1, 3:1, or non-oversubscribed configurations)

The following configuration rules apply with respect to the QFX3600-I QFabric Interconnect:

- QFX3600 QFabric Nodes provide 32 10GbE ports in non-oversubscribed configurations, 48 10GbE ports in 3:1 or 6:1 oversubscription, or 56 10GbE ports in 7:1 oversubscription when used in a QFX3000-M QFabric System with QFX3600-I QFabric Interconnects.
- QFX3500 QFabric Nodes provide 16 10GbE ports in non-oversubscribed configurations and 48 10GbE ports in 3:1 or 6:1 oversubscription when used in a QFX3000-M QFabric System with QFX3600-I QFabric Interconnects.
- QFX3500 QFabric Nodes have four QSFP+ uplinks, two or four of which can be used to connect to QFX3600-I QFabric Interconnects. The number of uplinks in QFX3500 when used as a QFabric Node is not configurable.
- The QFX3600 has a configurable number of uplinks. Although the default number is four, a QFX3600 QFabric Node can be configured with two, four, or eight uplinks to a QFX3600-I QFabric Interconnect.
- The maximum number of QFX3600-I QFabric Interconnects that can be supported in a QFX3000-M QFabric System is four.

Features and Benefits

Table 1: QFX3600-I Features and Benefits

Features	Benefits
Performance and scale	The QFX3600-I allows for multi-terabit scaling of the QFabric System. Each system scales to 1.28 Tbps; four fixed QFX3600-I QFabric Interconnects in a QFX3000-M QFabric System architecture allow for a 5.12 Tbps data center fabric, creating an architecture that scales to 16 racks of converged compute and storage data center fabrics.
High availability and redundancy	The 1 U fixed configuration QFX3600-I QFabric Interconnect has power supplies that are 1+1 load-share redundant; if either power supply fails, the surviving power supply can provide full power to the QFX3600-I indefinitely. The QFX3600-I QFabric Interconnect cooling system is composed of three fan trays operating in a 2+1 redundant configuration. If any fan tray fails, the system will continue operating indefinitely. The temperature sensors in the QFX3600-I continuously monitor internal temperatures and will automatically shut the system down to protect from thermal overstress. When configured in high availability network architectures, parallel systems can operate in a 1:1 redundancy scheme. If either QFX3600-I fails, the surviving system can provide a network path indefinitely.
Online insertion and removal of components	The QFX3600-I is a highly available system. All components, including power supplies, fan trays, optics, and USB keys, can be removed or inserted into the system in a nondisruptive fashion, providing “five 9s” system availability.
Operational enhancements	Front-to-back and back-to-front cooling: The QFX3600-I supports front-to-back cooling where fan field-replaceable units (FRUs) and power supplies can be in the cold aisle, and ports where optics plug in can be in the hot aisle. Conversely, the QFX3600-I also supports back-to-front cooling where fan FRUs and power supplies can be in the hot aisle, while ports where optics plug in can be in the cold aisle.
Space-optimized form factor	The QFX3600-I QFabric Interconnect is designed for mid-tier, satellite and container data centers.

Specifications

Hardware

Dimensions (W x H x D)

- 17.0 x 1.74 x 19.4 in (43.2 x 4.4 x 49.3 cm)

Weight

- 30.8 lb (14 kg) fully populated

Power

- Power feed (voltage): 100-240 V AC (single phase) and 50/60 Hz
- Power feed (voltage): -42 to -72V DC
- Power consumption (maximum): 345 watts
- Power consumption (nominal): 255 watts

Heat Dissipation

- Maximum: 1,177 BTU
- Nominal: 870 BTU

Air Flow

- Front to back (also referred to as AFI airflow in): Ports facing hot aisle; power supplies and fan trays facing cold aisle
- Back to front (also referred to as AFO airflow out): Ports facing cold aisle; power supplies and fan trays facing hot aisle

Rack Mount Options

- Front-mount, rear-mount, or mid-mount on a two-post rack
- Four-post mount

Operational Mean Time Between Failures (MTBF)

- 87,000 hrs

Approvals

Safety

- CAN/CSA-C22.2 No. 60950-1 (2007) Information Technology Equipment - Safety
- UL 60950-1 (2nd Ed.) Information Technology Equipment - Safety
- EN 60950-1 (2006) Information Technology Equipment - Safety
- IEC 60950-1 (2005) Information Technology Equipment - Safety (All country deviations): CB Scheme report.
- EN 60825-1 +A1+A2 (1994) Safety of Laser Products - Part 1: Equipment Classification

EMC

- FCC 47CFR, Part 15 Class A (2009) USA Radiated Emissions
- EN 55022 Class A (2006)+ A1 2007 European Radiated Emissions
- VCCI Class A (2007) Japanese Radiated Emissions
- AS/NZS CISPR22:2009
- EN 300 386 V1.5.1 Telecom Network Equipment
- EN 55024:1998/A2:2003 Information Technology Equipment Immunity Characteristics

NEBs Compliance

- GR-63-Core (2006) Network Equipment, Building Systems (NEBS) Physical Protection
- GR-1089-Core Issues 3 (2011) EMC and Electrical Safety for Network Telecommunications Equipment
- SR-3580 (1995) NEBS Criteria Levels (Level 3)

Environmental Compliance

Restriction of Hazardous Substances (ROHS) 6/6

China Restriction of Hazardous Substances (ROHS)

Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

Waste Electronics and Electrical Equipment (WEEE)

Recycled material

80 Plus Silver PSU Efficiency

Telco

- Common Language Equipment Identifier (CLEI) code

Environmental Ranges

- Operating temperature: 32º to 104º F (0º to 40º C)
- Storage temperature: -40º to 158º F (-40º to 70º C)
- Operating altitude: up to 2,000
- Relative humidity operating: 5% to 90% (non-condensing)
- Relative humidity nonoperating: 0% to 95% (non-condensing)

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

Model Number	Description
Base Hardware	
QFX3600-I-16Q-AFI	QFX3600-I QFabric Interconnect with three fans (FRU side to port side air flow); power supplies (two required) and power cables (two required) not included
QFX3600-I-16Q-AFO	QFX3600-I Interconnect with three fans (port side to FRU side air flow); power supplies (two required) and power cables (two required) not included
QFX3600-I-16Q-ACR	QFX3600-I Interconnect with three fans (FRU side to port side air flow) and redundant AC power supplies
QFX3600-I-16Q-ACRB	QFX3600-I Interconnect with three fans (port side to FRU side air flow) and redundant AC power supplies
Optics and Transceivers	
QFX-QSFP-40G-SR4	QSFP+ 40GBASE-SR4 40 gigabit optics, 850nm for up to 150m transmission on multimode fiber (MMF)
QFX-QSFP-40G-ESR4	QSFP+ 40GBASE-ESR4 40 gigabit optics, 300m(400m) with OM3(OM4) MMF
Spares	
JPSU-650W-AC-AFI	650 W AC power supply for Juniper Networks EX4550 Ethernet Switch, QFX3500, and QFX3600 (PSU-side airflow intake)
JPSU-650W-AC-AFO	650 W AC power supply for EX4550, QFX3500, and QFX3600 (PSU-side airflow exhaust)
JPSU-650W-DC-AFI	650 W DC power supply for EX4550, QFX3500, and QFX3600 (PSU-side airflow intake)
JPSU-650W-DC-AFO	650 W DC power supply for EX4550, QFX3500, and QFX3600 (PSU-side airflow exhaust)
CBL-EX-PWR-C13-AR	AC Power Cable - Argentina (10 A/250 V, 2.5 m)
CBL-EX-PWR-C13-AU	AC Power Cable - Australia (10 A/250 V, 2.5 m)
CBL-EX-PWR-C13-BR	AC Power Cable - Brazil (10 A/250 V, 2.5 m)
CBL-EX-PWR-C13-C14	AC Power Cable - Patch Cord (10 A/250 V, 2.5 m) for EU only
CBL-EX-PWR-C13-CH	AC Power Cable - China (10 A/250 V, 2.5 m)
CBL-EX-PWR-C13-EU	AC Power Cable - Europe (10 A/250 V, 2.5 m)
CBL-EX-PWR-C13-IL	AC Power Cable - Israel (10 A/250 V, 2.5 m)
CBL-EX-PWR-C13-IN	AC Power Cable - India (6 A/250 V, 2.5 m)
CBL-EX-PWR-C13-IT	AC Power Cable - Italy (10 A/250 V, 2.5 m)
CBL-EX-PWR-C13-JP	AC Power Cable - Japan (12 A/125 V, 2.5 m)

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.
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

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

1000403-003-EN Mar 2015