

QFX5700 SWITCH DATASHEET

Product Overview

The QFX5700 Switch offers a high-density, cost-optimized, 5 U 400GbE, 8 slot fabric-less modular platform, ideal for data centers where capacity and cloud services are being added as business needs grow. These services require higher network bandwidth per rack, as well as flexibility, making the 10/25/40/50/100/200/400GbE interface options of the QFX5700 switch ideal for server and intra-fabric connectivity. The QFX5700 is an optimal choice for spine-and-leaf deployments in enterprise, service provider, and cloud provider data centers. Coupled with the widespread adoption of overlay technologies, the QFX5700 lays a strong foundation for your evolving business and network needs, offering deployment versatility to future-proof your network investment.

Product Description

The Juniper Networks® QFX5700 Switch is a next-generation, modular and fabric-less spine-and-leaf switch that offers flexibility, cost efficiency with lower-per-bit, high-density 400GbE, 200GbE*, 100GbE, 50GbE*, 40GbE, 25GbE, and 10GbE interfaces for server and intra-fabric connectivity.

A versatile, future-proven solution for today's data centers, the QFX5700 leverages the power of a fully programmable Broadcom's Trident 4 chipset to support and deliver a diverse set of use cases. It supports advanced Layer 2, Layer 3, and Ethernet VPN (EVPN)-Virtual Extensible LAN (VXLAN) features. For large public cloud providers—early adopters of high-performance servers to meet explosive workload growth—the QFX5700 supports very large, dense, and fast 400GbE IP fabrics based on proven Internet scale technology. For enterprise customers seeking investment protection as they transition their server farms from 10GbE to 25GbE, the QFX5700 switch also provides a high radix-native 100GbE/400GbE EVPN-VXLAN spine option at reduced power and a smaller footprint.

The QFX5700 supports diverse use cases such as Data Center Fabric Spine, EVPN-VXLAN Fabric, Data Center Interconnect/Border, Secure DCI, multi-tier campus, campus IP fabric, and connecting firewall clusters in the DC to the fabric. Delivering 25.6 Tbps of bidirectional bandwidth, the switch is optimally designed for spine-and-leaf deployments in enterprise, high-performance computing (HPC), service provider, and cloud data centers.

The QFX5700 is a modular merchant silicon-based chassis offering a wide variety of ports configurations, including 400GbE, 200GbE*, 100GbE, 50GbE*, 40GbE, 25GbE, and 10GbE. The QFX5700 is equipped with up to four AC or DC power supplies, providing N +N feed redundancy or N+1 PSU redundancy when all power supplies are present. Two hot-swappable fan trays offer front-to-back (AFO) airflow, providing N+1 fan rotor redundancy at Chassis. The platform also includes support for in-line MACsec* line cards.

The QFX5700 includes an Intel Hewitt Lake 6 core to drive the control plane, which runs the Junos® OS Evolved operating system software.

Product Highlights

The QFX5700 includes the following capabilities. Please refer to the Specifications section for current shipping features.

Native 400GbE Configuration

The QFX5700 offers 32 ports of 400GbE in a modular 8 slot 5 U form factor.

High-Density Configurations

The QFX5700 is optimized for high-density fabric deployments, providing options for 32 ports of 400GbE, 64 ports of 200GbE (using Breakout cable), 128 ports of 100GbE, and 40GbE, 144 ports of 50GbE/ 40GbE/ 25GbE/ 10GbE with the opportunity to scale-as-you-grow.

Flexible Connectivity Options

The QFX5700 offers a choice of interface speeds for server and intra-fabric connectivity, providing deployment versatility and investment protection.

Key Product Differentiators

Increased Scale and Buffer

The QFX5700 provides enhanced scale with up to 1.24 million routes, 80,000 firewall filters, and 160,000 media access control (MAC) addresses. It supports high numbers of egress IPv4/IPv6 rules by programming matches in egress ternary content addressable memory (TCAM) along with ingress TCAM.

132MB Shared Packet Buffer

Today's cloud-native applications have critical dependency on buffer size to prevent congestion and packet drops. The QFX5700 has 132 MB shared packet buffer that is allocated dynamically to congested ports.

Programmability

The QFX5700 revolutionizes performance for data center networks by providing a programmable software-defined pipeline in addition to the comprehensive feature set provided in the Juniper Networks QFX5120 Switch line. The QFX5700 uses a compiler-driven switch data plane with full software program control to enable and serve a diverse set of use cases, including in-band telemetry, fine-grained filtering for traffic steering, traffic monitoring, and support for new protocol encapsulations.

Power Efficiency

With its low power 7nm technology, a fully loaded and fully redundant QFX5700 consumes typically 2,870 W, bringing improvements in speed, less power consumption, and higher density on chip.

Features and Benefits

- **Automation and programmability**: The QFX5700 supports several network automation features for plug-and-play operations, including zero-touch provisioning (ZTP), Network Configuration Protocol (NETCONF), Juniper Extension Toolkit (JET), Junos telemetry interface, operations and event scripts, automation rollback, and Python scripting.
- **Cloud-level scale and performance**: The QFX5700 supports best-in-class cloud-scale L2/L3 deployments with a low latency of 630 ns and superior scale and performance. This includes L2 support for 160,000 MAC addresses and Address Resolution Protocol (ARP) learning, which scales up to 64,000 entries at 500 frames per second. It also includes L3 support for 1.24 million longest prefix match (LPM) routes and 160,000 host routes on IPv4. Additionally, the QFX5700 supports 610,000 LPM routes and 80,000 host routes on IPv6, 128-way equal- cost multipath (ECMP) routes, and a filter that supports 80,000 ingress and 18,000 egress exactly match filtering rules. The QFX5700 supports up to 128 link aggregation groups, 4096 VLANs, and Jumbo frames of 9216 bytes. Junos OS Evolved provides configurable options through a CLI, enabling each QFX5700 to be optimized for different deployment scenarios.
- **VXLAN overlays**: The QFX5700 is capable of both L2 and L3 gateway services. Customers can deploy overlay networks to provide L2 adjacencies for applications over L3 fabrics. The overlay networks use VXLAN in the data plane and EVPN or Open vSwitch Database (OVSDB) for programming the overlays, which can operate without a controller or be orchestrated with an SDN controller.
- **IEEE 1588 PTP Boundary Clock with Hardware Timestamping***: IEEE 1588 PTP transparent/boundary clock is supported on QFX5700, enabling accurate and precise sub-microsecond timing information in today's data center networks. In addition, the QFX5700 supports hardware timestamping; timestamps in Precision Time Protocol (PTP) packets are captured and inserted by an onboard field-programmable gate array (FPGA) on the switch at the physical (PHY) level.
- **Data packet timestamping***: When the optional data packet timestamping feature is enabled, select packets flowing through the QFX5700 are timestamped with references to the recovered PTP clock. When these packets are received by nodes in the network, the timestamping information can be mirrored onto monitoring tools to identify network bottlenecks that cause latency. This analysis can also be used for legal and compliance purposes in institutions such as financial trading, video streaming, and research establishments.
- **RoCEv2**: As a switch capable of transporting data as well as storage traffic over Ethernet, the QFX5700 provides an IEEE data center bridging (DCB) converged network between servers with disaggregated flash storage arrays or an NVMe-enabled storage-area network (SAN). The QFX5700 offers a full-featured DCB implementation that provides strong monitoring capabilities on the top- of-rack switch for SAN and LAN administration teams to maintain clear separation of management. The RDMA over Converged Ethernet version 2 (RoCEv2) transit switch functionality, including priority-based

flow control (PFC) and Data Center Bridging Capability Exchange (DCBX), are included as part of the default software.

- **Junos Evolved features**: The QFX5700 switch supports features such as L2/L3 unicast, EVPN-VXLAN, BGP add- path, RoCEv2 and congestion management, multicast, 128- way ECMP, dynamic load balancing capabilities, enhanced firewall capabilities, and monitoring.
- **Junos OS Evolved Architecture**: Junos OS Evolved is a native Linux operating system that incorporates a modular design of independent functional components and enables individual components to be upgraded independently while the system remains operational. Component failures are localized to the specific component involved and can be corrected by upgrading and restarting that specific component without having to bring down the entire device. The switches control and data plane processes can run in parallel, maximizing CPU utilization, providing support for containerization, and enabling application deployment using LXC or Docker.
- **Retained state**: State is the retained information or status pertaining to physical and logical entities. It includes both operational and configuration state, comprising committed configuration, interface state, routes, hardware state, and what is held in a central database called the distributed data store (DDS). State information remains persistent, is shared across the system, and is supplied during restarts.
- **Feature support**: All key networking functions such as routing, bridging, management software, and management plane interfaces, as well as APIs such as CLI, NETCONF, JET, Junos telemetry interface, and the underlying data models, resemble those supported by the Junos operating system. This ensures compatibility and eases the transition to Junos Evolved.

* Reserved for a future release

Deployment Options

The QFX5700 can be deployed as a universal device in cloud data centers to support 100GbE server access and 400GbE spine-and-leaf configurations, optimizing data center operations by using a single device across multiple network layers (see Figure 1). The QFX5700 can also be deployed in more advanced overlay architectures like an EVPN-VXLAN fabric. Depending on where tunnel terminations are desired, the QFX5700 can be deployed in either a centrally routed or edge-routed architecture.

Port Combinations	Switch	Deployment
32x400GbE	QFX5700	400GbE spine
64x200GbE	QFX5700	200GbE spine or leaf with breakout cables
128x100GbE	QFX5700	100GbE access or leaf
144x50GbE	QFX5700	50GbE access or leaf with 50GbE breakout cables
128x40GbE	QFX5700	40GbE access or leaf
144x25GbE	QFX5700	25GbE access or leaf
144x10GbE	QFX5700	10GbE access or leaf

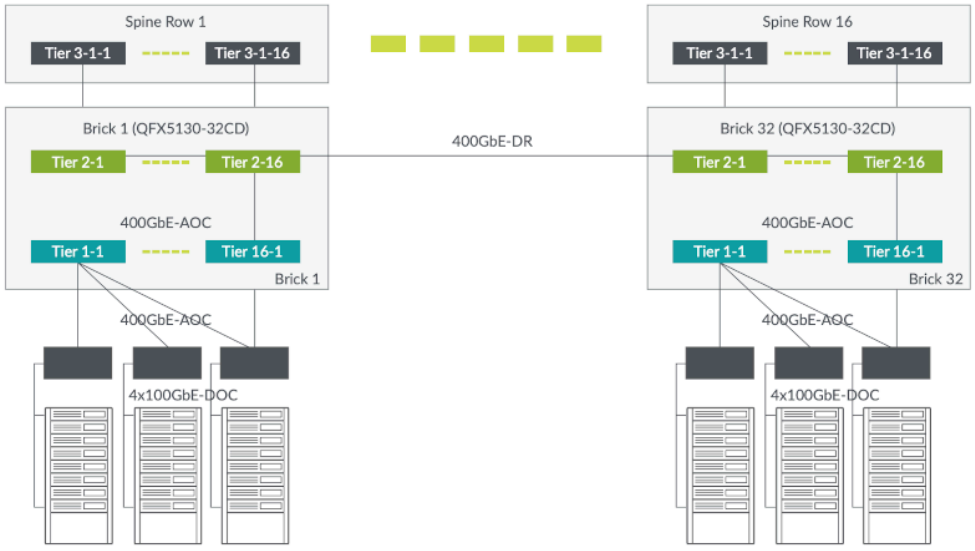


Figure 1: Typical cloud data center deployment for the QFX5700

Architecture and Key Components

The QFX5700 can be used in L2 fabrics and L3 networks. You can choose the architecture that best suits your deployment needs and easily adapt and evolve as requirements change over time. The QFX5700 serves as the universal building block for these switching architectures, enabling data center operators to build cloud networks in their own way.

Layer 3 fabric: For customers looking to build scale-out data centers, a Layer 3 spine-and-leaf Clos fabric provides predictable, nonblocking performance and scale characteristics. A two-tier fabric built with QFX5700 switches as leaf devices and Juniper Networks QFX10000 modular switches in the spine can scale to support up to 128 40GbE ports or 128 25GbE and/or 10GbE server ports in a single fabric.

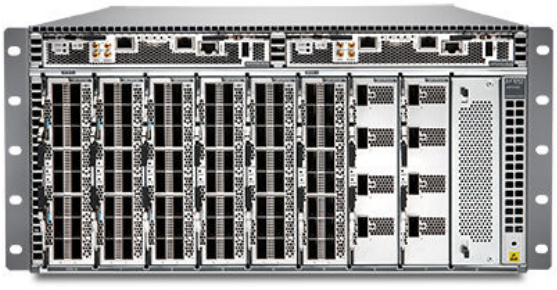
Junos OS Evolved ensures a high feature and bug fix velocity and provides first-class access to system state, allowing customers to run DevOps tools, containerized applications, management agents, specialized telemetry agents, and more.

Junos Telemetry Interface

The QFX5700 supports Junos telemetry interface, a modern telemetry streaming tool that provides performance monitoring in complex, dynamic data centers. Streaming data to a performance management system lets network administrators measure trends in link and node utilization and troubleshoot issues such as network congestion in real time.

Junos telemetry interface provides:

- Application visibility and performance management by provisioning sensors to collect and stream data and analyze the application and workload flow path through the network
- Capacity planning and optimization by proactively detecting hotspots and monitoring latency and microbursts
- Troubleshooting and root cause analysis via high frequency monitoring and correlating overlay and underlay networks



Specifications

Hardware

Table 1. QFX5700 System Capacity

Specification	QFX5700
System throughput	Up to 25.6 Tbps (bidirectional)
Forwarding capacity	5.68 billion packets per second
Port density	32 ports of QSFP56-DD 400GbE/ 128 Ports of QSFP28 100GbE

Table 2. QFX5700 System Specifications

Specification	QFX5700
Dimensions (W x H x D)	19.0 in x 8.74 in (5RU) x 32 in (48.2 x 22.2 x 81.5 cm)
Rack units	5 U
Weight	153.8 lbs. (69.8 kg) with all FRUs installed
Operating system	Junos OS Evolved
CPU	Intel Hewitt Lake, 32GB DDRAM
Power	• Redundant (N+N) hot-pluggable 3000 W AC/ DC power supplies (2n)
Cooling	• Two hot-pluggable Fan trays with Four Counter Rotating Fans in each Fan Tray • N+1 Fan rotor redundancy at Chassis level • Front to Back air cooling
Total packet buffer	132MB
Recommended Software Version	Junos OS Evolved 21.2R2 EVO+
Warranty	Juniper standard one-year warranty

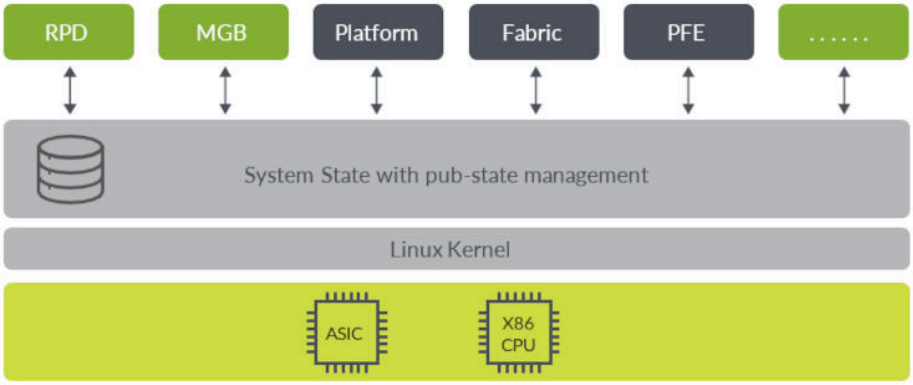


Figure 2: Cloud/Carrier-Class Junos OS Evolved Network Operating System

Software

- MAC addresses per system: 160,000
- VLAN IDs: 4000 (QFX5700)
- Number of link aggregation groups (LAGs): 128
- Number of ports per LAG: 64
- Firewall filters:

Filters—TD4	Pipe supported	Scale number
IPACL—profile1	Yes (except LAG)	Up to 80,000
EPACL	Yes (except LAG)	Up to 8,000
IPACL—profile1	Yes (except LAG and IRB)	Up to 80,000
ERACLv4, ERACLv6	Yes (except LAG and IRB)	Up to 4,000
IVACL—profile1	No	Up to 20,000
EVACL	No	Up to 2,000

- IPv4 unicast routes: 1.24 million* prefixes; 160,000 host routes
- IPv6 unicast routes: 610,000 prefixes; 80,000 host routes
- ARP entries: 32,000 (tunnel mode); 64,000 (non-tunnel mode)
- Neighbor Discovery Protocol (NDP) entries: 32,000 (tunnel mode); 64,000 (non-tunnel mode)
- Generic routing encapsulation (GRE) tunnels: 1000
- Jumbo frame: 9216 bytes
- Traffic mirroring: 8 destination ports per switch

Layer 2 Features

- STP—IEEE 802.1D (802.1D-2004)
- Rapid Spanning Tree Protocol (RSTP) (IEEE 802.1w); MSTP (IEEE 802.1s)*
- Bridge protocol data unit (BPDU) protect*
- Loop protect*
- Root protect*
- RSTP and VLAN Spanning Tree Protocol (VSTP) running concurrently*
- VLAN—IEEE 802.1Q VLAN trunking
- Routed VLAN interface (RVI)
- Port-based VLAN
- MAC address filtering*
- Static MAC address assignment for interface
- MAC learning disable
- Link Aggregation and Link Aggregation Control Protocol (LACP) (IEEE 802.3ad)
- IEEE 802.1AB Link Layer Discovery Protocol (LLDP)

Link Aggregation

- LAG load sharing algorithm—bridged or routed (unicast or multicast) traffic:
  - IP: Session Initiation Protocol (SIP), Dynamic Internet Protocol (DIP), TCP/UDP source port, TCP/UDP destination port
  - L2 and non-IP: MAC SA, MAC DA, Ether type, VLAN ID, source port

Layer 3 Features

- Static routing
- OSPF v1/v2
- OSPF v3
- Filter-based forwarding
- Virtual Router Redundancy Protocol (VRRP)*
- IPv6
- Virtual routers
- Loop-free alternate (LFA)
- BGP (Advanced Services or Premium Services license)
- IS-IS (Advanced Services or Premium Services license)
- Dynamic Host Configuration Protocol (DHCP) v4/v6 relay
- VR-aware DHCP
- IPv4/IPv6 over GRE tunnels (interface-based with decap/encap only)

Multicast*

- Internet Group Management Protocol (IGMP) v1/v2
- Multicast Listener Discovery (MLD) v1/v2
- IGMP proxy, querier
- IGMP v1/v2/v3 snooping
- Intersubnet multicast using IRB interface*
- MLD snooping*
- Protocol Independent Multicast PIM-SM, PIM-SSM, PIM- DM, PIM-Bidir*
- Multicast Source Discovery Protocol (MSDP)*

Security and Filters

- Secure interface login and password
- Secure boot
- RADIUS
- TACACS+
- Ingress and egress filters: Allow and deny, port filters, VLAN filters, and routed filters, including management port filters and loopback filters for control plane protection
- Filter actions: Logging, system logging, reject, mirror to an interface, counters, assign forwarding class, permit, drop, police, mark
- SSH v1, v2
- Static ARP support
- Storm control, port error disable, and autorecovery
- Control plane denial-of-service (DoS) protection
- Image rollback

Quality of Service (QoS)

- L2 and L3 QoS: Classification, rewrite, queuing
- Rate limiting:
  - Ingress policing: 1 rate 2 color, 2 rate 3 color
  - Egress policing: Policer, policer mark down action
  - Egress shaping: Per queue, per port
- 12 hardware queues per port (8 unicast and 4 multicast)
- Strict priority queuing (LLQ), shaped-deficit weighted round-robin (SDWRR), weighted random early detection (WRED)
- 802.1p remarking
- Layer 2 classification criteria: Interface, MAC address, Ether type, 802.1p, VLAN
- Congestion avoidance capabilities: WRED
- Trust IEEE 802.1p (ingress)
- Remarking of bridged packets

* Reserved for a future release

EVPN-VXLAN*

- EVPN support with VXLAN transport
- EVPN pure type-5 route support with symmetric inter-irb routing
- All-active multihoming support for EVPN-VXLAN (ESI-LAG aka EVPN-LAG)
- Multiple EVI (EVPN instances) aka multiple MAC-VRF for Mac advertisement
- MAC-VRF (EVI) multiple EVPN service-type support: vlan-based, vlan-aware, vlan-bundle
- ARP/ND suppression aka proxy-arp/nd
- Ingress multicast Replication
- IGMPv2 snooping support fabric wide: using EVPN route type 6,
- IGMPv2 snooping support for L2 multihoming scenarios: EVPN route type-7 and type-8
- IP prefix advertisement using EVPN with VxLAN encapsulation

Data Center Bridging (DCB)*

- Explicit congestion notification (ECN)
- Priority-based flow control (PFC)—IEEE 802.1Qbb*

High Availability

- Bidirectional Forwarding Detection (BFD)
- Uplink failure detection (UFD)*

Visibility and Analytics

- Switched Port Analyzer (SPAN)
- Remote SPAN (RSPAN)
- Encapsulated Remote SPAN (ERSPAN)
- sFlow v5
- Junos telemetry interface

Management and Operations

- Role-based CLI management and access
- CLI via console, telnet, or SSH
- Extended ping and traceroute
- Junos OS Evolved configuration rescue and rollback
- SNMP v1/v2/v3
- Junos OS Evolved XML management protocol
- High frequency statistics collection
- Automation and orchestration
- Zero-touch provisioning (ZTP)
- Python
- Junos OS Evolved event, commit, and OP scripts

Standards Compliance

IEEE Standards

- IEEE 802.1D
- IEEE 802.1w
- IEEE 802.1
- IEEE 802.1Q
- IEEE 802.1p
- IEEE 802.1ad
- IEEE 802.3ad
- IEEE 802.1AB
- IEEE 802.3x
- IEEE 802.1Qbb*
- IEEE 802.1Qaz
- T11 Standards
- INCITS T11 FC-BB-5

Environmental Ranges

Parameters	QFX5700
Operating temperature	32° to 104° F (0° to 40° C)
Storage temperature	-40° through 158° F
Operating altitude	Up to 6000 feet (1828.8 meters)
Relative humidity operating	5 to 90% (noncondensing)
Relative humidity nonoperating	5 to 95% (noncondensing)
Seismic	Designed to meet GR-63, Zone 4 earthquake requirements

Thermal Output

Parameters	QFX5700
Redundant System: Maximum power (without optics)	2830W
Redundant System: Typical power (without optics)	2193W
Non-redundant System: Maximum power (without optics)	2425W
Non-redundant System: Typical power (without optics)	1847W

Safety and Compliance

Safety

- CAN/CSA-C22.2 No. 60950-1 Information Technology Equipment—Safety
- UL 60950-1 Information Technology Equipment—Safety
- EN 60950-1 Information Technology Equipment—Safety
- IEC 60950-1 Information Technology Equipment—Safety (All country deviations)
- EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification
- UL 62368-1 Second Edition
- UL IEC 62328-1 Second Edition

Security

- FIPS/CC*
- TAA*

* Reserved for a future release

Electromagnetic Compatibility

- FCC 47 CFR Part 15
- ICES-003 / ICES-GEN
- EN 300 386 V1.6.1
- EN 300 386 V2.1.1
- EN 55032
- CISPR 32
- EN 55024
- CISPR 24
- EN 55035
- CISPR 35
- IEC/EN 61000 Series
- AS/NZS CISPR 32
- VCCI-CISPR 32
- BSMI CNS 13438
- KN 32 and KN 35
- KN 61000 Series
- TEC/SD/DD/EMC-221/05/OCT-16
- TCVN 7189
- TCVN 7317

Telco

- Common Language Equipment Identifier (CLEI) code

Environmental Compliance

Restriction of Hazardous Substances (ROHS) 6/6

China Restriction of Hazardous Substances (ROHS)

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

Waste Electronics and Electrical Equipment (WEEE)

Recycled material

80 Plus Silver PSU Efficiency

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 https://www.juniper.net/us/en/products.html.

Ordering Information

Product Number	Description
QFX5700 Hardware	
QFX5700-CHAS	QFX5700 Spare Chassis
QFX5700-BASE-AC	QFX5700 (hardware only; software services sold separately), with 1 FEB, 1 RCB, redundant fans, 2 AC power supplies, front-to- back airflow
QFX5700 Line Cards	
QFX5K-FPC-4CD	4X400G line card for QFX5700 chassis
QFX5K-FPC-20Y	10G/25G(SFP) line card for QFX5700 chassis
QFX5K-FPC-16C	16X100G line card for QFX700 chassis
QFX5700 Power Supply	
JNP-3000W-AC-AFO	AC PS 3000W, AFO
JNP-3000W-DC-AFO	DC PS 3000W, AFO
Software Licenses SKUs	
S-QFX5KC3-MACSEC-3	MACsec Software feature license for QFX5700, 16(100G) ports + 20(10G/25G) ports, 3 Year
S-QFX5KC3-MACSEC-5	MACsec Software feature license for QFX5700, 16(100G) ports + 20(10G/25G) ports, 5 Year
S-QFX5KC3-MACSEC-P	MACsec Software feature license for QFX5700, 16(100G) ports + 20(10G/25G) ports, Perpetual
S-QFX5K-C3-A1-X (X=3,5)	Base L3 Software Subscription (X Years; X=3,5) License for QFX5700
S-QFX5K-C3-A2-X (X=3,5)	Advanced Software Subscription (X Years; X=3,5) License for QFX5700
S-QFX5K-C3-P1-X (X=3,5)	Premium Software Subscription (X Years; X=3,5) License for QFX5700

Product Number	Description
Cable SKUs	
CBL-JNP-SDG4-JPL	Cable Specific, Japan
CBL-JNP-SDG4-TW	Cable Specific, Taiwan
CBL-JNP-SDG4-US-L6	Cable Specific, US/North America, L6
CBL-JNP-PWR-EU	Cable Specific, EU,Africa,China
CBL-JNP-SDG4-US-L7	Cable Specific, US/North America, L7
CBL-JNP-SDG4-IN	Cable Specific, India
CBL-JNP-SDG4-SK	Cable Specific, South Korea
Additional SKUs	
JNP5K-FEB-BLNK	Blank cover for empty FEB slot
JNP5K-FPC-BLNK	Blank cover for empty FPC (Line card) slot
JNP5K-RCB-BLNK	Blank cover for empty RCB (Routing Control Board) slot
JNP5K-RMK-4POST	4-Post Rack Mount Kit
QFX5K-EMI	Cable Manager
JNP5700-FAN	Airflow out (AFO) front-to-back airflow fans for QFX5700

Optics and Transceivers

QFX5700 supports varying port speeds at 400G, 100G, 50G, 40G, 25G, 10G with different transceiver options of DAC, AOC, BO. Up-to-date information on supported optics can be found at https://apps.juniper.net .

About Juniper Networks

At Juniper Networks, we are dedicated to dramatically simplifying network operations and driving superior experiences for end users. Our solutions deliver industry-leading insight, automation, security and AI to drive real business results. We believe that powering connections will bring us closer together while empowering us all to solve the world's greatest challenges of well-being, sustainability and equality.

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