BROCADE FCX SERIES SWITCHES

ENTERPRISE LAN SWITCHING

Enterprise-Class Stackable Switches for the Network Edge

HIGHLIGHTS

- Delivers enterprise-class Layer 2/3 switching in a compact, stackable form factor, combining chassis-like capabilities with an economical fixed-port solution
- Includes IPv4 and IPv6 Layer 3 capabilities as a standard feature on all models
- Provides non-stop availability with hitless stacking failover, hot insertion/removal of stacked units, and internal redundant hot-swappable power supplies and fans
- Offers complete visibility into network activity with hardware-based sFlow traffic monitoring
- Provides peace of mind with the Brocade Assurance® Limited Lifetime Warranty

The Brocade® FCX Series of switches provides new levels of performance, scalability, and flexibility required for today's enterprise campus and data center networks. With advanced capabilities, these switches deliver performance and intelligence to the network edge in a flexible 1U form factor that helps reduce infrastructure and administrative costs.

Designed for wire-speed and non-blocking performance, the Brocade FCX Series includes 24- and 48-port models, in both Power over Ethernet (PoE) and non-PoE versions. Utilizing Brocade stacking technology, organizations can stack up to eight switches into a single logical switch with up to 384 ports.

The Brocade FCX Series offers a comprehensive line of switches with specific models optimized for campus and data center deployments.

BUILT FOR NEXT-GENERATION ENTERPRISE NETWORKS

The Brocade FCX Series can deliver both power and data across network connections, providing a single-cable solution for edge devices such as Voice over IP (VoIP) phones, video surveillance cameras, and wireless Access Points (APs). The switches are compatible with industry-standard VoIP equipment as well as legacy IP phones.

BROCADE

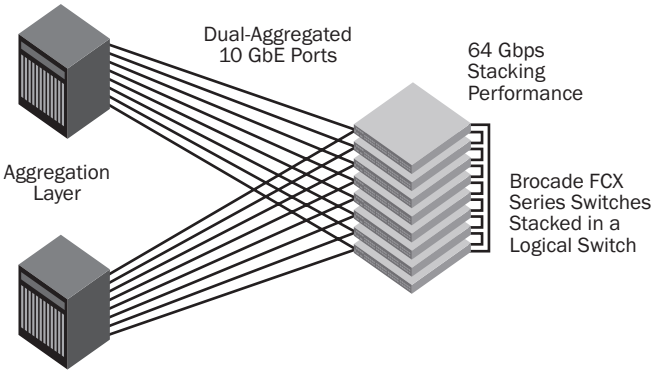

Figure 1.
Brocade FCX Series switches can be stacked into a single logical switch and then redundantly connected to the aggregation layer using aggregated 10 GbE ports.

These switches support the emerging PoE Plus (PoE+) standard (802.3at) to provide up to 30 watts of power to each device. This high-powered solution simplifies wiring for next-generation solutions such as video conferencing phones, pan/tilt surveillance cameras, and 802.11n wireless APs. The PoE capability reduces the number of power receptacles and power adapters while increasing reliability and wiring flexibility.

The 24-port Brocade FCX PoE model can supply full Class 3 (15.4 watts) or full PoE+ (30 watts) power to every port, and the 48-port model can supply full Class 3 power to every port or full PoE+ power to 26 ports. The switches can power a combination of PoE and PoE+ devices while staying within the switches' 820-watt power budget.

Plug-and-Play Operations for Powered Devices

The Brocade FCX Series supports the IEEE 802.1AB Link Layer Discovery Protocol (LLDP) and ANSI TIA 1057 Link Layer Discovery Protocol-Media Endpoint Discovery (LLDP-MED) standards that enable organizations to deploy interoperable multivendor solutions for Unified Communications (UC).

Configuring IP endpoints such as VoIP phones can be a complex task requiring manual and time-consuming configuration. LLDP and LLDP-MED address this challenge, providing a standard, open method for configuring, discovering, and managing network infrastructure. The LLDP protocols help reduce operational costs by simplifying and automating network operations. For example, LLDP-MED provides an open protocol for configuring Quality of Service (QoS), security policies, Virtual LAN (VLAN) assignments, PoE power levels, and service priorities.

INCREASED FLEXIBILITY AND SCALABILITY

The Brocade FCX Series provides a wide range of flexibility and scalability advantages for dynamic and growing enterprise networks.

Simplified, High-Performance, High-Availability Stacking

Leveraging Brocade stacking technology, up to eight Brocade FCX Series switches can be stacked into a single logical switch, providing simple and robust expandability for future growth at the network edge. This stacked switch has only a single IP address to simplify management. When new members are added to the stack, they automatically inherit the stack's existing configuration file, enabling true plug-and-play network expansion.

Brocade stacking technology delivers high availability, performing real-time state synchronization across the stack and enabling instantaneous hitless failover to a standby controller if the master stack controller fails. In addition, organizations can use hot-insertion/removal of stack members to avoid interrupting service.

Brocade FCX-S switch models offer two dedicated full-duplex 16 Gbps stacking ports that provide 64 Gbps of stacking bandwidth, essentially eliminating the need to work around inter-switch bottlenecks (see Figure 1). These dedicated stacking ports free up the 10 Gigabit Ethernet (GbE) ports for high-speed connectivity to the aggregation or core layers—providing maximum flexibility in a compact access switch. Additionally, all Brocade FCX Series switches can be stacked through their optional 10 GbE ports.

The 10 GbE ports can also be trunked from different members of the stack to optimize performance and availability. For added flexibility, Brocade stacking technology also supports the use of 10 GbE ports with fiber-optic cabling for stacking across racks, floors, and buildings.

Optional 10 GbE Module

Brocade FCX-S switch models accept an optional 10 GbE module containing either two SFP+ ports or two XFP ports, enabling high-bandwidth connectivity to the aggregation or core layers, or extended switch stacking across long distances. Up to eight 10 GbE links can be aggregated in a stack, providing 80 Gbps of bandwidth between the wiring closet and the aggregation layer.

Brocade FCX Series Models with Four Optional 10 GbE Uplinks

Brocade FCX 624 and Brocade FCX 648 switch models accept an optional 10 GbE module containing four Small Form-Factor Pluggable (SFP+) ports, enabling high-bandwidth connectivity to the aggregation or core layers, or creating a switch stack horizontally across a row of servers. Utilizing the SFP+ port form factor enables higher density, more flexible cabling options, and better energy efficiency. The ability to use short-range and long-range optics, along with copper Twinax cables, supports flexible and cost-effective network architectures.

Industry-leading 4-port 10 GbE density in a 1U switch provides up to 40 Gbps of uplink bandwidth to the aggregation or core layers of the network. Even with the high-density 48-port model, this bandwidth enables a near 1:1 subscription ratio throughout the network. As a result, organizations can deploy highly utilized networks to avoid congestion during peak hours.

Figure 2.
Brocade FCX 624 and Brocade FCX 648 switch models feature reversible front-to-back airflow, internal redundant hot-swappable power supplies, and a swappable fan assembly.

Flexible Cooling Options

The Brocade FCX 624 and Brocade FCX 648 are the first Brocade Ethernet switches with reversible front-to-back airflow options. This design improves mounting flexibility in server racks, while adhering to the cooling guidelines of the data center. Organizations can specify airflow direction at the time of order and can reverse the direction after deployment by swapping the power supplies and the fan assembly.

REDUCED POWER CONSUMPTION

In today's rapidly growing business environments, organizations need to minimize power consumption throughout the entire IT infrastructure. The Brocade FCX Series is designed to intelligently manage power usage, extending "green" initiatives to the wiring closet.

Power to connected devices is automatically negotiated using the LLDP-MED protocol, providing the powered devices with exactly the amount of power they need. If devices go into sleep mode, they can request less power from the network, minimizing power usage in the campus environment. At as low as 1.22 watts/Gbps for non-PoE models and 1.41 watts/Gbps for PoE models, Brocade FCX Series switches consume minimal power for the performance and functionality they provide.

HIGH RELIABILITY IN A COMPACT FORM FACTOR

In addition to stack-level high-availability capabilities such as hitless failover and hot insertion and removal of stacked units, Brocade FCX Series switches include system-level high-availability features such as optional dual hot-swappable, load-sharing, redundant power supplies (see Figures 2 and 3). The modular design also has a removable fan assembly. These features provide another level of availability for the campus wiring closet and the data center in a compact form factor.

Additional design features include intake and exhaust temperature sensors and fan spin detection to aid in fast identification of abnormal or failed operating conditions to help minimize mean time to repair.

COMPREHENSIVE ENTERPRISE-CLASS SECURITY

The Brocade FCX Series utilizes the Brocade FastIron® software operating system, providing a rich security suite for Layer 2 and Layer 3 services, Network Access Control (NAC), and Denial of Service (DoS) protection. FastIron software security features include protection against TCP SYN and ICMP DoS attacks; Spanning Tree Root Guard and BPDU Guard to protect network spanning tree operations; and broadcast and multicast packet rate limiting. Additional security features include dynamic ARP inspection, DHCP snooping, and IP source guard to protect against address spoofing and man-in-the middle attacks.

Network Access Control (NAC)

Organizations can rely on key features such as multi-device port authentication and 802.1X authentication with dynamic policy assignment to control network access and perform targeted authorization on a per-user level. In addition, the Brocade FCX Series supports enhanced Media Access Control (MAC) policies with the ability to deny traffic to and from MAC addresses on a per-VLAN basis. This powerful tool helps organizations control access policies per endpoint device.

Standards-based NAC also facilitates best-in-class solutions for authenticating network users and validating the security posture of connecting devices. Support for policy-controlled MAC-based VLANs provides additional control of network access, enabling policy-controlled assignment of devices to Layer 2 VLANs.

Traffic Monitoring and Lawful Intercept

Organizations might need to set up lawful traffic intercept due to today's heightened security environment. For example, in the United States, the Communications Assistance for Law Enforcement Act (CALEA) requires organizations to be able to intercept and replicate data traffic directed to a particular user, subnet, port, and so on. This capability is particularly essential in networks implementing VoIP phones. Brocade FCX Series switches provide the capability to meet this requirement through Access Control List (ACL)-based mirroring, MAC filter-based mirroring, and VLAN-based mirroring.

Figure 3.
Brocade FCX-S switch models feature internal redundant hot-swappable power supplies and a swappable fan assembly, in addition to dedicated stacking ports and a rear-facing out-of-band management port.

Fiber to the Desktop for Security-Sensitive Applications

The Brocade FCX 624S-F provides 24 SFP 100/1000 Mbps fiber-optic ports for government and military network initiatives or for applications requiring additional security and resiliency. For these types of network environments, fiber-optic cable is the ultimate transmission medium, because it does not emit electromagnetic signals that can be intercepted. And, unlike copper wires, optical fiber cannot be tapped without detection. Fiber-optic network links are also immune to Radio Frequency Interference (RFI) and Electro-Magnetic Interference (EMI).

Threat Detection and Mitigation

The Brocade FCX Series utilizes embedded hardware-based sFlow traffic sampling to extend Brocade IronShield 360 security to the network edge. This unique and powerful closed-loop threat mitigation solution uses best-in-class intrusion detection systems to inspect traffic samples for possible network attacks. In response to a detected attack, Brocade Network Advisor can automatically apply a security policy to the compromised port, stopping network attacks in real time without administrator intervention.

Advanced Multicast Features

The Brocade FCX Series supports a rich set of Layer 2 multicast snooping features that enable advanced multicast services delivery. Internet Group Management Protocol (IGMP) snooping for IGMP version 1, 2, and 3 is supported. Support for IGMPv3 source-based multicast snooping improves bandwidth utilization and security for multicast services. To enable multicast services delivery in IPv6 networks, the Brocade FCX Series supports Multicast Listener Discovery (MLD) version 1 and 2 snooping—the multicast protocols used in IPv6 environments.

NETWORK RESILIENCY THROUGH FAULT DETECTION

Software features such as Virtual Switch Redundancy Protocol (VSRP), Brocade Metro-Ring Protocol (MRP) v1 and v2, Rapid Spanning Tree Protocol (RSTP), protected link groups, 802.3ad Link Aggregation, and trunk groups provide alternate paths for traffic in the event of a link failure. Sub-second fault detection utilizing Link Fault Signaling (LFS) and Remote Fault Notification (RFN) helps ensure fast fault detection and recovery.

Enhanced spanning tree features such as Root Guard and BPDU Guard prevent rogue hijacking of a spanning tree root and maintain a contention- and loop-free environment, especially during dynamic network deployments. In addition, the Brocade FCX Series supports port-loop detection on edge ports that do not have spanning tree enabled. This capability protects the network from broadcast storms and other anomalies that can result from Layer 1 or Layer 2 loopbacks on Ethernet cables or endpoints.

Protected link groups minimize disruption to the network by protecting critical links from loss of data and power. In a protected link group, one port in the group acts as the primary or active link, and the other ports act as secondary or standby links. The active link carries the traffic and, if it goes down, one of the standby links takes over.

UniDirectional Link Detection (UDLD) monitors a link between two Brocade FCX Series switches and brings down the ports on both ends of the link if the link fails at any point between the two devices.

The Brocade FCX Series also supports stability features such as port flap dampening, single-link Link Aggregation Control Protocol (LACP), and port loop detection.

ADVANCED CAPABILITIES

To meet a wide range of requirements, the Brocade FCX Series provides full Layer 3 capabilities, along with metro features for connecting buildings and campuses.

Full Layer 3 Capabilities

All Brocade FCX switches come standard with powerful Layer 3 IPv4 and IPv6 switching capabilities. Organizations can use Layer 3 features such as OSPF and RIP routing, policy-based routing, VRRP, and Protocol-Independent Multicast (PIM) to reduce complexity and enhance the reliability of large enterprise networks by bringing Layer 3 capabilities to the network edge.

Advanced (-ADV) models include BGP routing capabilities, enabling remote offices to connect Brocade FCX Series switches to service provider networks. BGP routing can also be added to any Brocade FCX Series switch model through software key-based activation.

Metro Features Connecting Buildings and Campuses

Because Brocade FCX Series switches include Metropolitan Area Network (MAN) features, organizations can use them to connect a distributed enterprise. In this type of environment, Brocade FCX Series switches provide rich services using MRP (v1 and v2) for building resilient ring-based topologies, VLAN stacking (Q-in-Q), and advanced multicast capabilities—including IGMP v1/v2/v3 and Multicast Listener Discovery (MLD) v1/v2 snooping for controlling multicast traffic for high-bandwidth content delivery.

SIMPLIFIED, SECURE MANAGEMENT BASED ON OPEN STANDARDS

The Brocade FCX Series provides simplified, standards-based management capabilities that help organizations reduce administrative time and effort while securing their networks.

Simplified Deployment with Auto-Configuration

The Brocade FCX Series supports auto-configuration, simplifying deployment with a truly plug-and-play experience. Organizations can use this feature to automate IP address and feature configuration of the switches without requiring a highly trained network engineer onsite. When the switches power up, they automatically receive an IP address and configuration from DHCP and Trivial File Transport Protocol (TFTP) servers. At this time, the switches can also automatically receive a software update to be at the same code revision as already installed switches.

Open-Standards Management

The Brocade FCX Series includes an industry-standard Command Line Interface (CLI) and supports Secure Shell (SSHv2), Secure Copy (SCP), and SNMPv3 to restrict and encrypt management communications to the system. In addition, support for Terminal Access Controller Access Control System (TACACS/TACACS+) and RADIUS authentication helps ensure secure operator access.

Out-of-Band Management The Brocade FCX Series includes a 10/100/1000 Mbps RJ-45 Ethernet port dedicated to out-of-band management, providing a remote path to manage the switches, regardless of the status or configuration of the data ports.

UNIFIED WIRED/WIRELESS NETWORK MANAGEMENT WITH BROCADE NETWORK ADVISOR

Managing enterprise campus networks continues to become more complex due to the growth in services that rely on wired and wireless networks. Services such as Internet, e-mail, video conferencing, real-time collaboration, and distance learning all have specific configuration and management requirements. At the same time, organizations face increasing demand to provide uninterrupted services for high-quality voice and UC, wireless mobility, and multimedia applications.

To reduce complexity and the time spent managing these environments, the easy-to-use Brocade Network Advisor discovers, manages, and deploys configurations to groups of IP devices. By using the Brocade Network Advisor Device Configuration Manager tool, organizations can configure VLANs within the network, manage wireless AP realms, or execute CLI commands on specific IP devices or groups of IP devices. sFlow-based proactive monitoring is ideal for performing network-wide troubleshooting, generating traffic reports, and gaining visibility into network activity from the edge to the core. Brocade Network Advisor centralizes management of the entire family of Brocade wired and wireless products, including the Brocade FCX Series.

BROCADE GLOBAL SERVICES

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 15 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, network monitoring services, and education, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

MAXIMUM OPERATIONAL EFFICIENCY AND INVESTMENT PROTECTION

To further improve operational efficiency, Brocade FCX Series Switches come with 90 days of free technical support from the Brocade Technical Assistance Center and free software updates. With these capabilities, organizations gain peace of mind while freeing up IT budget and resources to grow their businesses.

WARRANTY

The Brocade FCX Series is covered by the Brocade Assurance Limited Lifetime Warranty. For details, visit www.brocade.com/warranty.

CLOUD-OPTIMIZED NETWORK ACQUISITION

Brocade helps organizations easily address their information technology requirements by offering flexible network acquisition and support alternatives to meet their financial needs. Organizations can select from purchase, lease, and Brocade Network Subscription options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.Brocade.com/CapitalSolutions.

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

BROCADE FCX SERIES FEATURE COMPARISON

	BROCADE FCX		BROCADE FCX-S (Dedicated Stacking Ports)				
	624	**648**	**624S**	**648S**	**624S-F**	**624S-HPOE**	**648S-HPOE**
Switching bandwidth (data rate, full duplex)	128 Gbps	176 Gbps	152 Gbps	200 Gbps	152 Gbps	152 Gbps	200 Gbps
Forwarding bandwidth (data rate, full duplex)	96 Mpps	132 Mpps	114 Mpps	150 Mpps	114 Mpps	114 Mpps	150 Mpps
Stacking bandwidth (data rate, full duplex)	40 Gbps (with optional 10 GbE ports)	40 Gbps (with optional 10 GbE ports)	64 Gbps	64 Gbps	64 Gbps	64 Gbps	64 Gbps
10/100/1000 Mbps RJ-45 ports	24	48	24	48	N/A	24	48
100/1000 Mbps SFP ports	N/A	N/A	N/A	N/A	20	N/A	N/A
1000 Mbps combo ports	4 (optional)	4 (optional)	4	4	4	4	4
10 Gigabit Ethernet ports	4 SFP+ (optional)	4 SFP+ (optional)	2 SFP+ or 2 XFP (optional)	2 SFP+ or 2 XFP (optional)	2 SFP+ or 2 XFP (optional)	2 SFP+ or 2 XFP (optional)	2 SFP+ or 2 XFP (optional)
16 Gbps CX4 stacking ports	N/A	N/A	2	2	2	2	2
Maximum PoE Class 3 ports	N/A	N/A	N/A	N/A	N/A	24	48 (two power supplies)
Maximum PoE+ ports	N/A	N/A	N/A	N/A	N/A	24 (two power supplies)	26 (two power supplies)
Internal power supplies	2×210 W removable (second optional)	2×210 W removable (second optional)	2×210 W removable (second optional)	2×210 W removable (second optional)	2×210 W removable (second optional)	2×620 W removable (second optional)	2×620 W removable (second optional)
Optional FRUs							
1000 Mbps combo module	FCX-4G	FCX-4G	N/A	N/A	N/A	N/A	N/A
10 Gigabit Ethernet module	FCX-4XG	FCX-4XG	FCX-2XG/ FCX-2SFPP	FCX-2XG/ FCX-2SFPP	FCX-2XG/ FCX-2SFPP	FCX-2XG/ FCX-2SFPP	FCX-2XG/ FCX-2SFPP
Second power supply	RPS13/ RPS13-I	RPS13/ RPS13-I	RPS13	RPS13	RPS13	RPS14	RPS14
Replacement fan unit	FCX-FAN-E/ FCX-FAN-I	FCX-FAN-E/ FCX-FAN-I	FCX-S-FAN	FCX-S-FAN	FCX-S--FAN	FCX-S-POE-FAN	FCX-S-POE-FAN
Advanced Layer 3 software upgrade adds BGP	FCX-ADV-LIC-SW	FCX-ADV-LIC-SW	FCX-ADV-LIC-SW	FCX-ADV-LIC-SW	FCX-ADV-LIC-SW	FCX-ADV-LIC-SW	FCX-ADV-LIC-SW

BROCADE FCX SERIES SPECIFICATIONS

System Architecture	
Connector options	10/100/1000 Mbps ports: RJ-45 (fixed) 1 Gbps SFP combo ports: SX, LX, LHA, LHB, 1000Base-BX 10 Gbps XFP ports: 1310-MM, SR, LR, ER, ZR, ZRD 10 Gbps SFP+ ports: Direct-attached copper (Twinax), SR, LR Stacking ports: fixed CX4 (fixed) Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45 (fixed) Console management: DB9
Maximum MAC addresses	32,000
Maximum VLANs	4096
Maximum STP (spanning trees)	255
Maximum routes (in hardware)	16,000

Trunking	Maximum ports per trunk: 8 Maximum trunk groups: 128
Maximum jumbo frame size	9000 bytes
IEEE standards compliance	• 802.1AB LLDP/LLDP-MED • 802.1D-2004 MAC Bridging • 802.1p Mapping to Priority Queue • 802.1s Multiple Spanning Tree • 802.1w Rapid Spanning Tree • 802.1X Port-based Network Access Control • 802.3 10 Base-T • 802.3ab 1000 Base-T • 802.3ad Link Aggregation (Dynamic and Static) • 802.3ae 10 Gigabit Ethernet • 802.3af Power over Ethernet • 802.3ak CX4 • 802.3u 100Base-TX • 802.3x Flow Control • 802.3z 1000Base-SX/LX • 802.3 MAU MIB (RFC 2239) • 802.1Q VLAN Tagging

Layer 2 switching	• 802.1s Multiple Spanning Tree • 802.1X Authentication • Auto MDI/MDIX • BPDU Guard, Root Guard • Dual-Mode VLANs • Dynamic VLAN Assignment • Dynamic Voice VLAN Assignment • Fast Port Span • Flexible Static Multicast MAC Address Configuration • GARP VLAN Registration Protocol • IGMP Snooping (v1/v2/v3) • Link Fault Signaling (LFS) • MAC Address Locking • MAC-Layer Filtering • MAC Learning Disable; Port Security • MLD Snooping (v1/v2) • Multi-device Authentication • Per VLAN Spanning Tree (PVST/PVST+/PVRST) • PIM-SM Snooping • Policy-controlled MAC-based VLANs • Port-based Access Control Lists • Port-based, ACL-based, MAC Filter-based, and VLAN-based Mirroring • Port Loop Detection • Port Speed Downshift and Selective Auto-negotiation • Private VLAN • Private VLANs and Uplink Switch • Protected Link Groups • Protocol VLAN (802.1v), Subnet VLAN • Remote Fault Notification (RFN) • Single-instance Spanning Tree • Single-link LACP • Trunk Groups • Trunk Threshold • UniDirectional Link Detection (UDLD)
Layer 3 routing	• ECMP • Host routes • IPv4 Static Routes • Layer 3/Layer 4 ACLs RIP v1/v2 announce • OSPF v2, OSPF v3 (IPv6) • PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality) • PBR • RIP v1/v2, RIPng (IPv6) • Routed Interfaces • Route-only Support • Routing Between Directly Connected Subnets • Virtual Interfaces • Virtual Route Redundancy Protocol (VRRP) • VRRP, VRRP-E (IPv4 and IPv6)
Advanced functionality (included with -ADV models)	• GRE • BGP4 and BGP4+ (IPv6) • IPv6 over IPv4 tunnels • VRF (IPv4 and IPv6)
Metro features	• Metro-Ring Protocol (v1, v2) • Virtual Switch Redundancy Protocol (VSRP) • VLAN Stacking (Q-in-Q) • Topology Groups
Quality of service	• ACL Mapping and Marking of ToS/DSCP • ACL Mapping to Priority Queue • ACL Mapping to ToS/DSCP • Classifying and Limiting Flows Based on TCP Flags • DHCP Relay • DiffServ Support • Honoring DSCP and 802.1p • MAC Address Mapping to Priority Queue • QoS Queue Management using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP
High availability	• Redundant hot-swappable internal power supplies • Hot-swappable fan assembly • Layer 3 VRRP protocol redundancy • Real-time state synchronization across the stack • Hitless failover from master to standby stack controller • Protected link groups • Hot insertion and removal of stacked units
Traffic management	• ACL-based inbound rate limiting and traffic policies • Broadcast, multicast, and unknown unicast rate limiting • Inbound rate limiting per port • Outbound rate limiting per port and per queue

Management

Management and control	• Auto Configuration • Configuration Logging • Digital Optical Monitoring • Display Log Messages on Multiple Terminals • Embedded Web Management • Embedded DHCP Server • Foundry Discovery Protocol (FDP) • Industry-Standard Command Line Interface (CLI) • Key-based activation of optional software features • Integration with HP OpenView for Sun Solaris, HP-UX, IBM AIX, and Windows • Brocade Network Advisor • IronView Network Manager (INM) Version 3.2 or later • MIB Support for MRP, Port Security, MAC Authentication, and MAC-based VLANs • Out-of-band Ethernet Management • RFC 783 TFTP • RFC 854 TELNET Client and Server • RFC 1157 SNMPv1/v2c • RFC 1213 MIB-II • RFC 1493 Bridge MIB • RFC 1516 Repeater MIB • RFC 1573 SNMP MIB II • RFC 1643 Ethernet Interface MIB • RFC 1643 Ethernet MIB • RFC 1724 RIP v1/v2 MIB • RFC 1757 RMON MIB • RFC 2068 Embedded HTTP • RFC 2131 DHCP Server and DHCP Relay • RFC 2570 SNMPv3 Intro to Framework • RFC 2571 Architecture for Describing SNMP Framework • RFC 2572 SNMP Message Processing and Dispatching • RFC 2573 SNMPv3 Applications • RFC 2574 SNMPv3 User-based Security Model • RFC 2575 SNMP View-based Access Control Model SNMP • RFC 2818 Embedded HTTPS • RFC 3176 sFlow • SNTP Simple Network Time Protocol • Support for Multiple Syslog Servers
Embedded security	• 802.x Accounting • MAC Authentication • Bi-level Access Mode (Standard and EXEC Level) • EAP pass-through support • IEEE 802.1X username export in sFlow • Protection against Denial of Service (DoS) attacks
Secure management	• Authentication, Authorization, and Accounting (AAA) • Advanced Encryption Standard (AES) with SSHv2 • RADIUS/TACACS/TACACS+ • Secure Copy (SCP) • Secure Shell (SSHv2) • Username/Password • Web authentication

Mechanical	
Enclosure	Brocade FCX 624 and 648: front-to-back airflow (reversible) Brocade FCX 624S, 624S-F, 648S, 624S-HPOE, 648S-HPOE: side-to-back airflow 1U, 19-inch EIA-compliant, power from non-port side
Size	Brocade FCX 624 and 648 switch models: Width: 44.0 cm (17.3 in.) Height: 4.4 cm (1.7 in.) Depth: 43.5 cm (17.2 in.) Brocade FCX 624S, 624S-F, and 648S switch models: Width: 44.0 cm (17.3 in.) Height: 4.4 cm (1.7 in.) Depth: 38.6 cm (15.2 in.) Brocade FCX 624S-HPOE and 648S-HPOE switch models: Width: 44.0 cm (17.3 in.) Height: 4.4 cm (1.7 in.) Depth: 44.0 cm (17.3 in.)
Weight	Brocade FCX 624: 5.35 kg (11.79 lb) Brocade FCX 648: 5.71 kg (12.59 lb) Brocade FCX 624S, 624S-F, and 648S switch models: 4.0 kg (8.8 lb) Brocade FCX 624S-HPOE and 648S-HPOE switch models: 4.5 kg (9.9 lb)
Environment	
Temperature	Operating temperature: 32°F to 104°F (0°C to 40°C) Storage temperature: –23°F to 158°F (–25°C to 70°C)
Humidity	Relative humidity: 5% to 95%, non-condensing
Altitude	Storage altitude: 10,000 ft (3000 m) maximum
Acoustic	51 to 63 dB

Power	
Power supplies	Up to two internal, redundant, field-replaceable, load-sharing AC power supplies
Power inlet	C13
Input voltage	Typical 100 to 240 VAC
Input line frequency	50 to 60 Hz
Compliance/Certification	
Electromagnetic emissions	FCC Class A (Part 15); EN 55022/CISPR-22 Class A; VCCI Class A; ICES-003 Electromagnetic Emission; AS/NZS 55022; EN 61000-3-2 Power Line Harmonics; EN 61000-3-3 Voltage Fluctuation and Flicker; EN 61000-6-3 Emission Standard (Supersedes: EN 50081-1)
Safety	CAN/CSA-C22.2 NO. 60950-1-07; UL 60950-1 2nd Edition; IEC 60950-1 2nd Edition; EN 60950-1:2006 Safety of Information Technology Equipment; EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification, Requirements and User's Guide; EN 60825-2 Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems
Immunity	EN 61000-6-1 Generic Immunity and Susceptibility (this supersedes EN 50082-1); EN 55024 Immunity Characteristics (this supersedes EN 61000-4-2 ESD); EN 61000-4-3 Radiated, Radio Frequency, Electromagnetic Field; EN 61000-4-4 Electrical Fast Transient; EN 61000-4-5 Surge; EN 61000-4-6 Conducted Disturbances Induced by Radio-Frequency Fields; EN 61000-4-8 Power Frequency Magnetic Field; EN 61000-4-11 Voltage Dips and Sags
Environmental regulatory compliance	RoHS-compliant (6 of 6); WEEE-compliant

BROCADE FCX SERIES POWER AND THERMAL SPECIFICATIONS

Brocade FCX/FCX-S Model	Max Current at 100 VAC (Amps)	Max Current at 200 VAC (Amps)	Max Total Power Draw[3] (Watts)	Max System Power Draw[4] (Watts)	Max Thermal Output[5] (BTU/Hr)	Energy Efficiency[2] (Watts/Gbps)
624[1]	0.9	0.6	92	92	312.8	1.4
648[1]	1.2	0.7	112	112	421.6	1.3
624S	1.09	0.51	94	94	319	1.23
624S-F	1.00	0.58	102	102.1	348	1.34
648S	1.39	0.63	122	122	416	1.22
624S-HPOE[6]	1.09	0.58	509	107	365	1.41
648S-HPOE[6]	1.72	0.94	970	167	570	1.67

[1] *With 4-port 10 GbE module installed and one power supply.*

[2] *Calculated using switch data rate.*

[3] *Total power drawn from the source and consumed by the switch and attached PoE devices. Class 3 devices assumed on all ports.*

[4] *Power drawn from the source and consumed only by the switch.*

[5] *Thermal output of the switch.*

[6] *With two power supplies installed.*

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