

Brocade ICX 7450 Switch



HIGHLIGHTS

- Offers ultimate flexibility and “pay as you grow” scalability in a modular design with three expansion slots for a choice of 1 GbE, 10 GbE, or 40 GbE uplinks, and a service module
- Supports next-generation 802.11ac Wave 2 wireless enterprise access points with 2.5 GbE ports
- Delivers market-leading stacking scalability of up to 12 switches per stack, 960 Gbps of aggregated stacking bandwidth, and long-distance stacking to enable single point management
- Provides OpenFlow support in true hybrid port mode, enabling a gradual transition to Software-Defined Networking (SDN) without disruption
- Offers Power over HDBaseT (PoH), to power video surveillance and video conferencing equipment, VDI terminals, and HD displays
- Meets compliance and data confidentiality requirements across corporate networks and cloud deployments by extending IPsec VPN to the wiring closet

Enterprise Stackable Switch Delivers Premium Capabilities and Ultimate Flexibility

The Brocade® ICX® 7450 Switch delivers the performance, flexibility, and scalability required for enterprise Gigabit Ethernet (GbE) access deployment. It offers market-leading stacking density with up to 12 switches (576 1 GbE and 48 1/10 GbE ports) per stack and combines chassis-level performance and reliability with the flexibility, cost-effectiveness, and “pay as you grow” scalability of a stackable solution. The mid-market stackable switch is one of the first in its class to offer 40 GbE uplinks, enabling enterprises to dramatically increase their network capacity while using their existing optical wire infrastructure. In addition, the Brocade ICX 7450 is the industry’s first stackable switching solution to combine the performance and flexibility of network switching with the advantages of site-to-site IPsec VPN security to ensure end-to-end data integrity without the need for dedicated encryption appliances.

The unique design of the Brocade ICX 7450 provides three modular slots, offering up to 12 1/10 GbE SFP/SFP+ ports, 12 10GBASE-T ports, or up to three 40 GbE QSFP+ ports for uplink or stacking. As a result, the Brocade ICX 7450 can easily deliver sufficient bandwidth between the edge and aggregation layers to support expanding video traffic, VDI adoption, and high-speed wireless 802.11ac deployment. Additionally, the Brocade ICX 7450 delivers high performance across all ports for flawless support of latency-sensitive applications.

The Brocade ICX 7450 is an ideal network solution for campus network 1 GbE and 2.5 GbE access or small aggregation deployment with 10 GbE or 40 GbE uplinks to the core. The Brocade ICX 7450 also makes a very suitable data center Top-of-Rack (ToR) solution, delivering a mix of 1 GbE and 10 GbE server connectivity ports with 10 GbE or 40 GbE uplinks to the data center aggregation or core.

BROCADE CAMPUS FABRIC TECHNOLOGY

Brocade Campus Fabric technology brings campus networks into the modern era to better support seamless wireless mobility, security, and ease of application deployment. This innovative technology collapses multiple network layers into a single logical switch, flattening the network and eliminating deployment complexity while simplifying network management and reducing operating costs.

Brocade Campus Fabric technology enables organizations to build networks that deliver:

- **Consolidated management:** *Reduces unnecessary network layers to create large management domains that eliminate individual switch touch points, reducing maintenance time and costs.*
 - **Shared network services:** *Allows premium and entry-level switches to mesh together into a single logical switch and share advanced Layer 2/3 services, delivering lower price-per-port functionality without compromising performance.*
 - **Scale-out networking:** *Integrates high-performance, fixed form-factor switches to create a single distributed logical switch that is independent of physical location and allows organizations to add ports whenever and wherever needed across the campus without adding complexity.*
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Figure 1. Up to 12 Brocade ICX 7450 switches can be stacked together using two full-duplex QSFP+ 40 Gbps ports that provide a fully redundant backplane with 960 Gbps of stacking bandwidth.

Scaling Out Ports as Demand Grows

The Brocade ICX 7450 is easy to deploy, manage, and integrate into both new and existing networks. Organizations can buy only what they need today, and easily scale out as demand grows and new technologies emerge.

With three modular slots, the Brocade ICX 7450 enables organizations to grow their networks when necessary. Organizations can initially deploy 1 GbE or 10 GbE uplink ports and upgrade to 40 GbE ports on-demand with a new, high-speed module.

The Brocade ICX 7450 also offers a low-cost entry point. By providing the flexibility of a stackable switch, the Brocade ICX 7450 saves organizations from having to invest in a costly chassis upfront and tie up valuable capital. Instead, they can buy a single Brocade ICX 7450 Switch to get started and add new Brocade ICX 7450 Switches to the stack as their business grows.

Integrating High-Performance IPsec Service

As organizations move to a hybrid cloud architecture with geographically dispersed business partners, concerns about security breaches are increasing. Many organizations seek to better meet compliance and protect their data in transit—whether across the Internet or the enterprise network. Brocade offers an industry-first stackable switching solution that delivers encryption from the wiring closet, providing a cost-effective way to ensure data security and integrity across the premises without needing to purchase dedicated encryption appliances.

The Brocade ICX 7450 switch with the integrated IPsec VPN service module consolidates network switching and encryption to provide unprecedented VPN deployment flexibility and cost savings. By initiating an IPsec tunnel from the Brocade ICX 7450 for transporting selected traffic, organizations save the time and reduce the costs from having to install and manage encryption software on individual computers or deploy purpose-built encryption appliances.

The Brocade ICX 7450 Service Module provides hardware-based acceleration for IPsec VPNs using Advanced Encryption Standards (AES). It leverages programmable hardware technology to future-proof data protection, enabling more capabilities to be added as business needs evolve.

Brocade Campus Fabric Technology: Extending Options and Scalability

Brocade Campus Fabric technology, available on the Brocade ICX 7150¹, 7250, 7450, and 7750 Switches, extends network options and scalability. It integrates premium Brocade ICX 7750 with Brocade ICX 7450, Brocade ICX 7250, and Brocade ICX 7150 Switches, collapsing network access, aggregation, and core layers into a single logical switch. This logical device shares network services while reducing management touch points and network hops through

a single-layer design spanning the entire campus network. These powerful deployments deliver equivalent or better functionality than large, rigid modular chassis systems, but with significantly lower costs and smaller carbon footprints.

Brocade ICX switches support a distributed chassis deployment model that uses standards-based optics and cabling interface connections to help ensure maximum distance between campus switches—up to 10 km—and minimum cabling costs. This gives organizations the flexibility to deliver ports wherever they are needed on campus at a fraction of the cost.

BROCADE ICX 7450 SWITCH AND CONTROLLER INTEROPERABILITY

The Brocade ICX 7450 Switch operates seamlessly with the Brocade SDN Controller and the applications running on the controller. This gives organizations the flexibility to move toward a dynamic infrastructure, benefiting from network application developments that help meet the operational or regulatory requirements of their industries.

Table 1: Brocade ICX 7450 models.

Brocade ICX 7450 Product Family

All Brocade ICX 7450 models offer three modular slots for interchangeable uplink/stacking modules (one in the front, two in the back), dual power supply slots, dual fan trays, one RJ-45 network management port, one mini USB serial management port, and one USB storage port on the front panel.



Brocade ICX 7450-24 Switch

24×10/100/1000 Mbps RJ-45 ports



Brocade ICX 7450-24P Switch

24×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W)



Brocade ICX 7450-32ZP Switch

24×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W) and 8×100/1000 Mbps/2.5 GbE RJ-45 PoE+ ports



Brocade ICX 7450-48 Switch

48×10/100/1000 Mbps RJ-45 ports



Brocade ICX 7450-48P Switch

48×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W)



Brocade ICX 7450-48F Switch

48×100/1000 Mbps SFP ports



Figure 2: Brocade ICX 7450 rear view shown with two optional Brocade ICX7400-1X40GQ QSFP+ uplink/stacking modules, two AC power supplies, and two fan trays.

¹ Support on the Brocade ICX 7150 to be available in a future release.

The distributed chassis design future-proofs campus networks by allowing networks to easily and cost-effectively expand in scale and capabilities.

Flexible, Long-Distance Stacking for the Most Demanding Enterprise Environments

Brocade Ethernet switch stacking technology makes it possible to stack up to 12 Brocade ICX 7450 Switches together into a single logical switch using standard QSFP+ or SFP+ stacking ports. This allows the Brocade ICX 7450 to deliver a class-leading 960 Gbps of aggregated stacking bandwidth and offer simple and robust expandability for future growth at the network edge (see Figure 1).

A selection of standard QSFP+ or SFP+ copper cables or standard QSFP+ or SFP+ optics can be used to stack Brocade ICX 7450 Switches together, enabling stacking over distance and thereby eliminating the need for stacked switches to be colocated in the same wiring closet. This stacked

logical switch also has only a single IP address to simplify management and offers transparent STP-free traffic forwarding and shared Link Aggregation Groups (LAG) across a pool of up to 576 1 GbE ports and 48 10 GbE ports. When new switches join the stack, they automatically inherit the stack's existing configuration file, enabling plug-and-play network expansion.

Brocade stacking technology also delivers high availability, enabling instantaneous hitless failover to a standby stack controller if the master stack controller fails. In addition, organizations can use hot-insertion and removal of stack members to avoid interrupting network services.

Simplified, Open-Standards-based Management and Monitoring

The Brocade ICX 7450 provides simplified, standards-based management capabilities that help organizations reduce administrative time and effort while securing their networks.

sFlow-based “Always-On” Network Monitoring

sFlow is a modern, standards-based network export protocol (RFC 3176) that addresses many of the challenges that network managers face today. By embedding sFlow hardware support into the Brocade ICX 7450, Brocade delivers an “always-on” technology that operates with wire-speed performance. sFlow dramatically reduces implementation costs compared to traditional network monitoring solutions that rely on mirrored ports, probes, and line-tap technologies. Moreover, sFlow gives organizations full, enterprise-wide monitoring capability for every port in the network.

Simplified, Automated Deployment with Auto-Provisioning

The Brocade ICX 7450 supports Zero Touch Provisioning, 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 currently installed switches.

Open-Standards Management

The Brocade ICX 7450 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.

Table 2: Port and service module options for the Brocade ICX 7450.

Brocade ICX 7450 Port and Service Module Options

Five different optional modules are offered for the Brocade ICX 7450. These modules are interchangeable and can be inserted in the three modular slots within the Brocade ICX 7450.²

Brocade ICX7400-4X1GF Module	4-port 100 Mbps/1 GbE SFP
Brocade ICX7400-4X10GF Module	4-port 1/10 GbE SFP/SFP+ for uplink or stacking
Brocade ICX7400-4X10GC Module	4-port 1/10 GbE 10GBASE-T copper
Brocade ICX7400-1X40GQ Module	1-port 40 GbE QSFP+ for uplink or stacking
Brocade ICX7400-SERVICE-MOD Module	Service module for IPsec VPN encryption



Figure 3: Five different optional port modules are offered for the Brocade ICX 7450 with a choice of 1 GbE SFP, 10 GbE SFP/SFP+, 10GBASE-T, and 40 GbE QSFP+ options and an IPsec VPN service module.

² The Brocade ICX7400-1X40GQ module cannot be installed in the front-facing slot of the 48-port Brocade ICX 7450 models (Brocade ICX 7450-48, 7450-48P, 7450-48F, 7450-32ZP). The Brocade ICX7400-4X1GF module cannot be installed in the rear slots of any model of the Brocade ICX 7450 Switch and is not supported by the Brocade ICX 7450-32ZP model.

Table 3: Power supply options for the Brocade ICX 7450.

Brocade ICX 7450 Power Supply Options

The Brocade ICX 7450 offers a selection of PoE/non-PoE and AC/DC power supply options with front-to-back or back-to-front airflow cooling options. The DC power supply can be installed in either PoE or no-PoE switches.

RPS15-E power supply	Non-PoE 250 W AC with front-to-back airflow
RPS15-I power supply	Non-PoE 250 W AC with back-to-front airflow
RPS16-E power supply	PoE 1,000 W AC with front-to-back airflow
RPS16-I power supply	PoE 1,000 W AC with back-to-front airflow
RPS16DC-E power supply	PoE 510 W DC with front-to-back airflow
RPS16DC-I power supply	PoE 510 W DC with back-to-front airflow



Figure 4: The Brocade ICX 7450 offers the choice of 250 W AC, 1,000 W AC, or 510 W DC power supply options. All power supplies are available with front-to-back or back-to-front airflow.

Out-of-Band Management

The Brocade ICX 7450 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.

SDN-Enabled Programmatic Control of the Network

Software-Defined Networking (SDN) is a powerful new network paradigm designed for the world's most demanding networking environments and promises breakthrough levels of customization, security, and efficiency. The Brocade ICX 7450 enables SDN by supporting the OpenFlow 1.3 protocol, which facilitates communication between the Brocade SDN Controller and the underlying network infrastructure.

In today's increasingly mobile world, organizations are looking to OpenFlow and SDN to achieve programmability in the campus LAN. The business needs driving SDN deployment are improved Quality of Service (QoS), enhanced security, and management simplification. With new policies such as BYOD significantly impacting campus networks, SDN is a powerful solution that better prioritizes and forwards traffic based on the context of a flow and to easily enforce granular policies for regulatory compliance or security reasons.

With hybrid-port mode on the Brocade ICX 7450 and all other Brocade ICX 7000 series switches, organizations can run traditional protocols and OpenFlow-directed flows at the same time. The Brocade ICX family supports the Brocade

SDN Controller and other OpenDaylight-based controllers, enabling organizations to benefit from programmatic control through gradual transition of their network into the controller domain without disruption. Brocade ICX 7450 hardware support for OpenFlow ensures these traffic flows at line-rate speeds.

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 Unified Communications (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 Brocade Network Advisor, organizations can configure Virtual LANs (VLANs) within the network, manage wireless access points, and execute 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 also centralizes the management of the entire family of Brocade wired products and [Ruckus wireless products](#).

Ready for Next-Generation Wireless Technology

Between the phenomenal expansion of wireless networks and the fast-paced evolution of enterprise wireless technology, wired networks are being pushed to their limits. At the same time, the current lifecycle for wireless network technologies is much shorter than it is for wired Ethernet networks, meaning that today's wireless networks will likely be upgraded two or three times over the life of the wired network. It is therefore critical that organizations choose a wired network solution capable of supporting next-generation wireless technology.

The Brocade ICX 7450 is designed to handle next-generation 802.11ac Wave 2 wireless access points. The Brocade ICX 7450-32ZP offers 8x2.5 GbE ports to connect multigigabit wireless access points. Moreover, the switch's non-blocking architecture offers up to 240 Gbps of uplink bandwidth with up to 3x40 GbE uplink ports, ensuring smooth end-to-end traffic flow from the wireless edge to the core.

EEE Power Savings

The Brocade ICX 7450 Switch supports the IEEE 802.3az standard for Energy Efficient Ethernet (EEE), reducing power consumption during periods of low utilization. Ports are placed into a low power mode when no data is being transmitted.

Enterprise-Class Availability

When every second matters, Brocade ICX 7450 switches help deliver continuous availability to optimize the user experience. Brocade stacking technology delivers high availability, performing real-time state synchronization across the stack and enabling instantaneous hitless failover to a standby controller in the unlikely event of a failure of the master stack controller. Organizations also can use hot-insertion/removal of stack members to avoid interrupting service when adding a switch to increase the capacity of a stack or replacing a switch that needs servicing.

In addition to stack-level high availability, Brocade ICX Switches also support stack-level In Service Software Upgrade (ISSU), a unique capability that enables a stack of Brocade ICX Switches to go through a software upgrade without service interruption.

Brocade ICX 7450 Switches include system-level high-availability features, such as dual hot-swappable, load-sharing, and redundant power supplies. The modular design also has dual hot-swappable fan trays. These features provide another level of availability for the campus wiring closet, all in a compact form factor.

Support for PoH to Power Next-Generation Edge Devices

The Brocade ICX 7450 can deliver both power and data across network connections, providing a single-cable solution for the latest edge devices. In addition to supporting the Power over Ethernet (PoE/PoE+) standards, the Brocade ICX 7450 also supports Power over HDBaseT (PoH). This new, high power standard delivers up to 95 watts per port through a standard Ethernet cable, simplifying the wiring of next-generation Ethernet-connected devices such as large HD displays, video surveillance equipment, and VDI thin terminals, enabling data and power to be carried by a single Ethernet wire. The PoE/PoE+ and PoH capabilities reduce the number of required power receptacles and power adapters while increasing reliability and wiring flexibility.

With a 1,500-watt power budget per switch (with two power supplies), the Brocade ICX 7450 24- and 48-port PoE models can supply up to Class 4 PoE+ power (30 watts) to every port and PoH power (95 watts) on eight dedicated ports.

Full Layer 3 Capabilities

Brocade ICX 7450 Switches offer powerful IPv4 and IPv6 Layer 3 switching capabilities. Organizations can use optional premium Layer 3 features (available as an option)—such as IPv4/IPv6 OSPF and RIP routing, Policy-Based Routing (PBR), 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 and/or aggregation layer. Premium Layer 3 capabilities include BGP routing, enabling remote offices to connect Brocade ICX 7450 Switches to service provider networks. Premium routing capabilities can be added to any Brocade ICX 7450 Switch model through software licensing.

Data Center ToR Switch for 1 GbE and 10 GbE Server Connectivity

Thanks to its class-leading 10 GbE and 40 GbE port count, the Brocade ICX 7450 is a great solution as a Top-of-Rack (ToR) switch in a mixed 1 GbE/10 GbE server connectivity environment. It is designed to fit in server racks, consuming only one rack unit and offering dual integrated power supplies and fan assemblies with front-to-back or back-to-front airflow for flexible cooling options. In data center environments where most servers have 1 GbE and some 10 GbE network interfaces, the Brocade ICX 7450 provides a compact and cost-effective 1 GbE/10 GbE ToR switch. In this configuration some of the Brocade ICX 7450 10 GbE or 40 GbE ports can be used to connect to the data center aggregation switches.

Warranty

The Brocade ICX 7450 Switch is covered by the Brocade Assurance® Limited Lifetime Warranty. For details, visit www.brocade.com/warranty.

Maximum Operational Efficiency with Technical Support

To jumpstart investment protection, Brocade ICX 7450 Switches come with 90 days of free technical support from the Brocade Technical Assistance Center (TAC). For continued access to the TAC past the initial 90 days, customers must purchase a Brocade Technical Support contract. With Technical Support, organizations gain peace of mind while freeing up IT budget and resources to grow their businesses. For details, visit <http://www.brocade.com/en/support/essential-support/essential-support-hardware.html>.

Brocade Global Services

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 20 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.

Affordable Acquisition Options

Brocade Capital Solutions helps organizations easily address their IT requirements by offering flexible network acquisition and support alternatives. Organizations can select from purchase, lease, Brocade Network Subscription, and Brocade Subscription Plus 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 ICX 7450 Feature/Model Comparison

	24 or 48 RJ-45 Ports		24, 32, or 48 PoE+ Ports			48 SFP Ports
	Brocade ICX 7450-24	Brocade ICX 7450-48	Brocade ICX 7450-24P	Brocade ICX 7450-32ZP	Brocade ICX 7450-48P	Brocade ICX 7450-48F
Switching capacity (data rate, full duplex)	288 Gbps	336 Gbps	288 Gbps	328 Gbps	336 Gbps	336 Gbps
Forwarding capacity (data rate, full duplex)	214 Mpps	250 Mpps	214 Mpps	244 Mpps	250 Mpps	250 Mpps
Fixed ports: 10/100/1000 Mbps RJ45	24	48	24	24	48	
Fixed ports: 100/1000 Mbps SFP						48
Fixed ports: 100 Mbps/1000 Mbps/2.5 Gbps RJ45				8		
Modular slots	3	3	3	3	3	3
Modular ports: 1 Gbps SFP (max.)	4	4	4		4	4
Modular ports: 1/10 GbE SFP/SFP+ (max.)	12	12	12	12	12	12
Modular ports: 1/10GBASE-T RJ45 (max.)	12	12	12	12	12	12
Modular ports: 40 GbE QSFP+ (max.)	3	2	3	2	2	2
Modular service: IPsec VPN	With module	With module	With module		With module	With module
Maximum PoE class 3 ports (15.4 W per port)			24 (1 AC PSU)	32 (1 AC PSU)	48 (1 AC PSU)	
Maximum PoE+ ports (30 W per port)			24 (1 AC PSU)	32 (2 AC PSU)	48 (2 AC PSU)	
Maximum PoH ports (95 W per port)			8 (1 AC PSU)	8 (1 AC PSU)	8 (1 AC PSU)	
Base IPv4/v6 Layer 3 routing (Static, RIP)	•	•	•	•	•	•
Advanced IPv4/v6 Layer 3 routing (OSPF, BGP, VRRP, PIM, PBR, VRF)	With license	With license	With license	With license	With license	With license
Aggregated stacking bandwidth	960 Gbps	960 Gbps	960 Gbps	960 Gbps	960 Gbps	960 Gbps
Stacking density (maximum switches in a stack)	12	12	12	12	12	12
Stacking ports (Maximum ports ³ usable for stacking)	Up to 4×10 GbE SFP+ or 2×40 GbE QSFP+					
Maximum stacking distance (distance between stacked switches)	10 km	10 km	10 km	10 km	10 km	10 km
Power						
Power inlet (AC)	C14					
Input voltage/frequency	AC: 100 to 240 VAC @ 50 to 60 Hz DC: 40 to 60 VDC					
Maximum current draw (at 100 VAC, one power supply)	13.3 Amp	13.3 Amp	12.5 Amp	12.5 Amp	12.5 Amp	13.3 Amp
Power supply rated maximum output (AC)	2×250 W	2×250 W	2×1,000 W	2×1,000 W	2×1,000 W	2×250 W
Power supply rated maximum output (DC)	2×510 W	2×510 W	2×510 W	2×510 W	2×510 W	2×510 W
PoE power budget (AC) (two AC power supplies)			1,500 W	1,500 W	1,500 W	
PoE power budget (DC) (two DC power supplies)			516 W	516 W	516 W	
Switch power consumption⁴ (25°C)						
Idle (no PoE load)	63 W	93 W	75 W	90 W	106 W	119 W
10% traffic⁵ (full PoE load)	64 W	95 W	911 W	922 W	930 W	120 W
100% traffic⁵ (full PoE load)	69 W	100 W	916 W	930 W	935 W	123 W

Brocade ICX 7450 Feature/Model Comparison (Continued)

Switch heat dissipation^{4, 6} (25°C)						
Idle (no PoE load)	215 BTU/hour	317 BTU/hour	256 BTU/hour	307 BTU/hour	362 BTU/hour	406 BTU/hour
10% traffic⁵ (full PoE load)	218 BTU/hour	324 BTU/hour	259 BTU/hour	314 BTU/hour	369 BTU/hour	409 BTU/hour
100% traffic⁵ (full PoE load)	235 BTU/hour	341 BTU/hour	276 BTU/hour	330 BTU/hour	386 BTU/hour	420 BTU/hour
Environment						
Weight⁴	6.4 kg (14.11 lb)	6.5 kg (14.33 lb)	6.9 kg (15.21 lb)	7.2 kg (15.87 lb)	7.2 kg (15.87 lb)	6.8 kg (14.99 lb)
Dimensions	440 mm (17.323 in.) W × 393.7 mm (15.5 in.) D × 43.7 mm (1.720 in.) H; 1U					
Acoustics⁴ (25°C, ISO 7779)	46 dBA	47 dBA	49 dBA	49 dBA	49 dBA	46 dBA
MTBF⁴ (25°C)	628,369 hours	571,520 hours	466,576 hours	448,376 hours	444,360 hours	576,586 hours

³ 10 GbE SFP+ or 40 GbE QSFP+ modules are required for stacking.

⁴ Switch includes one AC power supply, one fan, one 4×10 GbE SFP+ uplink module, two QSFP+ stacking modules.

⁵ Traffic load on all ports connected with maximum possible PoE/PoE+ loads (if equipped).

⁶ PoE power not included in switch heat dissipation figures since the heat is not dissipated at the switch.

Brocade ICX 7450 Specifications

Capabilities

Connector options	<ul style="list-style-type: none"> • 10/100/1000 Mbps, 2.5 Gbps, 10 Gbps 10GBASE-T ports: RJ-45 • 100 Mbps SFP ports • 1 Gbps SFP ports • 10 Gbps SFP+ ports • 40 Gbps QSFP+ ports • Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45 • Console management: Mini-USB RS232 serial port (Mini-B plug) • File Transfer: USB port, standard-A plug <p>For the latest information about supported optics, please visit www.brocade.com/optics.</p>
Maximum MAC addresses	32,768
Maximum VLANs	4,096
Maximum PVLANS	32
Maximum STP (spanning trees)	254
Maximum VEs	255
Maximum routes (in hardware)	15,168 (IPv4) 2,284 (IPv6) 16,000 (Next Hop Addresses)
Trunking	Maximum ports per trunk: 8 TBD Maximum trunk groups: 256 TBD
Maximum jumbo frame size	9,216 bytes
Average latency	1.3 μs
QoS priority queues	8 per port
IPsec performance	Maximum throughput: 10 Gbps, full-duplex Maximum tunnels: 20
Multicast Groups	8192 (Layer 2) 8192 (Layer 3)
VRF	16

Brocade ICX 7450 Specifications (Continued)

Features

Layer 2 switching	<ul style="list-style-type: none"> • 802.1s Multiple Spanning Tree • 802.1x Authentication • Auto MDI/MDIX • BPDU Guard, Root Guard • Dual-Mode VLANs • MAC-based VLANs, Dynamic MAC-based VLAN activation • Dynamic Voice VLAN Assignment • Dynamic VLAN Assignment • Fast Port Span • GVRP: GARP VLAN Registration Protocol • IGMP Snooping (v1/v2/v3) • IGMP Proxy for Static Groups • IGMP v2/v3 Fast Leave • IGMP Tracking • Inter-Packet Gap (IPG) adjustment • Link Fault Signaling (LFS) • MAC Address Filtering 	<ul style="list-style-type: none"> • MAC Learning Disable • MLD Snooping (v1/v2) • Multi-device Authentication • Per-VLAN Spanning Tree (PVST/PVST+/PVRST) • Mirroring - Port-based, ACL-based, MAC Filter-based, and VLAN-based • PIM-SM v2 Snooping • Port Loop Detection • Private VLAN • Protocol VLAN (802.1v), Subnet VLAN • Remote Fault Notification (RFN) • Single-instance Spanning Tree • Single-link LACP • Trunk Groups (static, LACP) • Uni-Directional Link Detection (UDLD) • Metro-Ring Protocol (MRP) (v1, v2) • Virtual Switch Redundancy Protocol (VSRP) • VLAN Stacking (Q-in-Q) • Topology Groups
Base Layer 3 IP routing	<ul style="list-style-type: none"> • IPv4 and IPv6 static routes • RIP v1/v2, RIPng (IPv6) • ECMP • Port-based Access Control Lists • Layer 3/Layer 4 ACLs • Host routes 	<ul style="list-style-type: none"> • Virtual Interfaces • Routed Interfaces • Route-only Support • Routing Between Directly Connected Subnets • "MSDP" in Base Layer 3 IP routing
Premium Layer 3 IP routing (with software license)	<ul style="list-style-type: none"> • IPv4 and IPv6 dynamic routes • OSPF v2, OSPF v3 (IPv6) • PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality) • PBR • Virtual Route Redundancy Protocol VRRP v3 (IPv6) 	<ul style="list-style-type: none"> • VRRP-E (IPv4, IPv6) • BGP4, BGP4+ (IPv6) • GRE • IPv6 over IPv4 tunnels • VRF (IPv4 and IPv6)
Quality of Service (QoS)	<ul style="list-style-type: none"> • ACL Mapping and Marking of ToS/DSCP (CoS) • ACL Mapping and Marking of 802.1p • ACL Mapping to Priority Queue • Classifying and Limiting Flows Based on TCP Flags • DiffServ Support 	<ul style="list-style-type: none"> • Honoring DSCP and 802.1p (CoS) • MAC Address Mapping to Priority Queue • Priority Queue Management using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP • Priority Flow Control
Traffic management	<ul style="list-style-type: none"> • ACL-based inbound rate limiting and traffic policies • Broadcast, multicast, and unknown unicast rate limiting 	<ul style="list-style-type: none"> • Inbound rate limiting per port • Outbound rate limiting per port and per queue

Brocade ICX 7450 Specifications (Continued)

Security	<ul style="list-style-type: none"> • IPsec 128/256 AES-GCM (with service module) • MACsec • 802.1X Authentication • MAC Authentication • Flexible authentication • Web authentication • DHCP snooping • Dynamic ARP inspection • Neighbor Discover (ND) Inspection • 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 • Authentication, Authorization, and Accounting (AAA) • MAC Address Locking MAC Port Security • Advanced Encryption Standard (AES) with SSHv2 • RADIUS/TACACS/TACACS+ • Secure Copy (SCP) • Secure Shell (SSHv2) • Local Username/Password • Change of Authorization (CoA) RFC 5176 	<ul style="list-style-type: none"> • RFC Conformance for Encryption: <ul style="list-style-type: none"> – RFC 5996 Internet Key Exchange Protocol Version 2 (IKEv2) – RFC 4303 IP Encapsulating Security Payload (ESP) – RFC 6379 Suite B Cryptographic Suites for IPsec (Suite-B-GCM-256 and Suite-B-GCM-128) – RFC 5903 Elliptic Curve Groups Modulo a Prime (ECP Groups) for IKEv2 – RFC 4868 Using HMAC-SHA-256, HMAC-SHA-384, and HMAC-SHA-512 with IPsec – RFC 4754 IKEv2 Authentication Using the Elliptic Curve Digital Signature Algorithm (ECDSA) – RFC 4106 The use of Galois/Counter Mode (GCM) in IPsec Encapsulating Security Payload (ESP) – SP800-56A Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography
SDN features	<ul style="list-style-type: none"> • OpenFlow v1.0 and v1.3 • OpenFlow with hybrid port mode 	<ul style="list-style-type: none"> • Operates with the Brocade SDN Controller and the applications running on the controller
IEEE standards compliance	<ul style="list-style-type: none"> • 802.1AB LLDP • 802.1D MAC Bridging • 802.1p Mapping to Priority Queue • 802.1s Multiple Spanning Tree (MST) • 802.1w Rapid Reconfiguration of Spanning Tree • 802.1x Port-based Network Access Control (PNAC) • 802.3 Carrier Sense Multiple Access/Collision Detection (CSMA/CD) • 802.3ab 1000BASE-T • 802.1 AX-2008 Link Aggregation • 802.3ae 10 Gigabit Ethernet 	<ul style="list-style-type: none"> • 802.3af Power over Ethernet (15.4 W) • 802.3at Power over Ethernet Plus • 802.3u 100Base-TX • 802.3x Full duplex and Flow Control • 802.3z 1000Base-SX/LX • 802.3 MAU MIB (RFC 2239) • 802.3ba 40 and 100 Gbps Ethernet • 802.1AE-MACsec (with license) • 802.3az Energy Efficient Ethernet • 802.1Q VLAN Tagging • 802.1BR Bridge Port Extension
IETF RFC standards compliance	<ul style="list-style-type: none"> • For a complete list of RFCs supported by the Brocade FastIron® software platform, please visit: www.brocade.com/fastironrfc. 	
High availability	<ul style="list-style-type: none"> • Redundant hot-swappable power supplies • Hot-swappable fan trays • Layer 3 VRRP/VRRP-E protocol redundancy • Real-time state synchronization across the stack 	<ul style="list-style-type: none"> • Hitless failover and switchover from master to standby stack controller • Hot insertion and removal of stacked units • Layer 2 VSRP switch redundancy • In Service Software Update (ISSU)

Brocade ICX 7450 Specifications (Continued)

Network and Device Management

Management	<ul style="list-style-type: none"> • DHCP Auto Configuration • Configuration Logging • Digital Optical Monitoring • Display Log Messages on Multiple Terminals • Embedded Web Management (HTTP/HTTPS) • Embedded DHCP Server • Industry-standard Command Line Interface (CLI) • Brocade Network Advisor (sold separately) • Key-based activation of optional software features • Integration with HP OpenView: • USB file management and storage • Macro for batch execution • Out-of-band Ethernet Management • ERSPAN support for remote traffic monitoring • TFTP 	<ul style="list-style-type: none"> • TELNET Client and Server • Bootp • SNMPv1/v2c • DHCP Server and DHCP Relay • SNMPv3 Intro to Framework • Architecture for Describing SNMP Framework • SNMP Message Processing and Dispatching • SNMPv3 Applications • SNMPv3 User-based Security Model • SNMP View-based Access Control Model SNMP • sFlow • NTP Network Time Protocol • Multiple Syslog Servers • SCP • Virtual Cable Tester (VCT) <p>For management MIB, please visit www.brocade.com.</p>
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Environment

Temperature	<p>Operating temperature: -5°C to 50°C/23°F to 122°F</p> <p>Storage temperature: -40°C to 70°C/-40°F to 158°F</p>
Humidity	<p>Operating relative humidity: 10% to 90% at 50°C, non-condensing</p> <p>Non-operating relative humidity: 5% to 95% at 70°C, non-condensing</p>
Altitude	<p>Operating altitude: 10,000 ft. (3,000 m) maximum</p> <p>Storage altitude: 39,000 ft. (12,000 m) maximum</p>

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
Safety	CAN/CSA-C22.2 NO. 60950-1-07; UL 60950-1; IEC60950-1; EN 60950-1:2006 Safety of Information Technology Equipment; EN 60825-1 Safety of Laser Products
Immunity	EN 61000-6-1 Generic Immunity and Susceptibility; EN 55024 Immunity Characteristics; 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
Vibration	IEC 68-2-36, IEC 68-2-6
Shock and drop	IEC 68-2-27, IEC 68-2-32

Brocade ICX 7450 Ordering Information

Part Number	Description
Switch Bundles	
ICX7450-24-E	24-port 1 GbE switch bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow
ICX7450-24-40G-E	24-port 1 GbE switch bundle includes 3×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow
ICX7450-24P-E	24-port 1 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow
ICX7450-24P-40G-E	24-port 1 GbE switch PoE+ bundle includes 3×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow
ICX7450-24P-E-RMT3	24-port 1 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow, three years 24×7 remote support
ICX7450-32ZP-E	24-port 1 GbE and 8-port 2.5 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply, and one front-to-back airflow fan
ICX7450-48-E	48-port 1 GbE switch bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow
ICX7450-48P-E	48-port 1 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow
ICX7450-48P-E-RMT3	48-port 1 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow, three years 24×7 remote support
ICX7450-48P-STK-E	48-port 1 GbE switch PoE+ bundle includes 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow (stack member with no uplink module)
ICX7450-48P-STK-E-RMT3	48-port 1 GbE switch PoE+ bundle includes 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow, three years 24×7 remote support (stack member with no uplink module)
ICX7450-48F-E	48-port 1 GbE SFP fiber switch bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow
ICX7450-48F-E-RMT3	48-port 1 GbE SFP fiber switch bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow, three years 24×7 remote support
Bare Switches	
ICX7450-24	24-port 1 GbE switch with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-24P	24-port 1 GbE switch PoE+ with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-32ZP	24-port 1 GbE and 8-port 2.5 GbE switch PoE+ with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-48	48-port 1 GbE switch with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-48P	48-port 1 GbE switch PoE+ with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-48F	48-port 1 GbE switch SFP with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.

Brocade ICX 7450 Ordering Information (Continued)

Part Number	Description
Modules	
ICX7400-4X1GF	Brocade ICX 7450 4-port 100 Mbps/1 GbE SFP module
ICX7400-4X10GF	Brocade ICX 7450 4-port 1/10 GbE SFP/SFP+ module (for stacking or uplinks)
ICX7400-4X10GC	Brocade ICX 7450 4-port 1/10 GbE 10GBASE-T copper module
ICX7400-1X40GQ	Brocade ICX 7450 1-port 40 GbE QSFP+ module (for stacking or uplink)
ICX7400-SERVICE-MOD	Brocade ICX 7450 Service Module for IPsec VPN encryption
Power Supplies and Fans	
RPS15-E	Brocade ICX 7450/6610 non-PoE 250 W AC power supply with front-to-back airflow
RPS15-I	Brocade ICX 7450/6610 non-PoE 250 W AC power supply with back-to-front airflow
RPS16-E	Brocade ICX 7450/6610 PoE 1,000 W AC power supply with front-to-back airflow
RPS16-I	Brocade ICX 7450/6610 PoE 1,000 W AC power supply with back-to-front airflow
RPS16DC-E	Brocade ICX 7450/6610 PoE 510 W DC power supply with front-to-back airflow
RPS16DC-I	Brocade ICX 7450/6610 PoE 510 W DC power supply with back-to-front airflow
ICX-FAN10-E	Brocade ICX 7450 front-to-back airflow fan
ICX-FAN10-I	Brocade ICX 7450 back-to-front airflow fan
Feature License and Accessories	
ICX7450-PREM-LIC	Brocade ICX 7450 Layer 3 Premium Software License
ICX-MACSEC-LIC	License to enable MACsec encryption
ICX7000-RMK	FRU, rack mount kit, two post, Brocade ICX 7750/7450
XBR-R000295	FRU, rack mount kit, four post, 24 in. to 32 in. depth rack
BR-NTWADV-IP-BASE	Brocade Network Advisor IP management software license for up to 50 devices; required for initial purchase of IP only management; minimum of one year of support required.
Optics	
E1MG-100FX-OM	100BASE-FX SFP optic MMF, LC connector, optical monitoring-capable
E1MG-100FX-IR-OM	100BASE-FX IR SFP optic for SMF with LC connector, optical monitoring-capable. For distances up to 15 km.
E1MG-100FX-LR-OM	100BASE-FX LR SFP optic for SMF with LC connector, optical monitoring-capable. For distances up to 40 km.
E1MG-TX	1000BASE-TX SFP copper, RJ-45 connector
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring-capable
E1MG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring-capable
E1MG-LHA-OM-T	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring-capable
E1MG-BXU	1000BASE-BXU SFP optic SMF, transmits at 1,310 nm and receives at 1,490 nm, LC connector, single-strand SMF fiber

Brocade ICX 7450 Ordering Information (Continued)

Part Number	Description
Optics	
E1MG-BXD	1000BASE-BXD SFP optic SMF, transmits at 1,490 nm and receives at 1,310 nm, LC connector, single-strand SMF fiber
10G-SFPP-USR	10GE USR SFP+ optic (LC), target range 100 m over MMF, 1-pack
10G-SFPP-SR	10GBASE-SR, SFP+ optic (LC), target range 300 m over MMF
10G-SFPP-LR	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF
10G-SFPP-ER	10GBASE-ER SFP+ optic (LC), for up to 40 km over SMF
10G-SFPP-ZR	10GBASE-ZR SFP+ optic (LC), for up to 80 km over SMF
10G-SFPP-LRM	10GBASE-LRM, 1,310 nm SFP+ optic (LC), TAR
40G-QSFP-SR-BIDI	40GE SR QSFP+ optic (LC), Bidirectional, 100 m over OM3 MMF
40G-QSFP-SR4	40GBASE-SR4 QSFP+ optic (MTP 1×8 or 1×12), 100 m over MMF, 1-pack
40G-QSFP-ESR4	40GBASE-ESR4 QSFP+ optic 400 m over MMF, 1 pack
40G-QSFP-LM4	40GBASE-LM4 QSFP+ optic (LC), for up to 160 m over MMF and 2 km over SMF, 1-pack
40G-QSFP-LR4	40GBASE-LR4 QSFP+ optic (LC), for up to 10 km over SMF, 1-pack
Direct-Attached Cables	
10G-SFPP-TWX-0101	Direct-attached SFP+ active copper cable, 1 m, 1-pack
10G-SFPP-TWX-0301	Direct-attached SFP+ active copper cable, 3 m, 1-pack
10G-SFPP-TWX-0501	Direct-attached SFP+ active copper cable, 5 m, 1-pack
10GE-SFPP-AOC-0701	Direct-attached SFP+ active optic cable, 7 m, 1-pack
10GE-SFPP-AOC-1001	Direct-attached SFP+ active optic cable, 10 m, 1-pack
40G-QSFP-C-00501	40 GbE QSFP+ direct-attached passive copper cable, 0.5 m, 1-pack
40G-QSFP-C-00508	40 GbE QSFP+ direct-attached passive copper cable, 0.5 m, 8-pack
40G-QSFP-C-0101	40 GbE QSFP+ direct-attached passive copper cable, 1 m, 1-pack
40G-QSFP-QSFP-C-0101	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active copper cable, 1 m, 1-pack
40G-QSFP-QSFP-C-0301	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active copper cable, 3 m, 1-pack
40G-QSFP-QSFP-C-0501	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active copper cable, 5 m, 1-pack
40G-QSFP-QSFP-AOC-1001	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active optic cable, 10 m, 1-pack

For the latest information about supported optics and cables, please visit www.brocade.com/optics.

Ordering Instructions

Customers have two options when ordering a Brocade ICX 7450 Switch. They can select one of the six pre-built units from the “Switch Bundles” section, or they can build their own custom unit by selecting a “Bare Switch” and adding their choice of power supplies, fans, port modules, and the IPsec VPN service module.

Pre-built units ordered from the “Switch Bundles” section include a power cord, two-post rack mounting brackets, and a USB serial console cable. Units ordered from the “Bare Switches” section include two-post rack mounting brackets and a USB serial console cable. AC power supplies ordered separately include a power cord. Stacking cables must be ordered separately.

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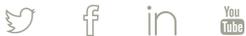
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