

# Brocade ICX 7450 Switch



## Highlights

- Provides a unique modular design with three expansion slots for a choice of 1 GbE, 10 GbE, or 40 GbE uplinks, providing ultimate flexibility and “pay as you grow” scalability
- Delivers market-leading stacking scalability with up to 12 switches per stack, 160 Gbps of stacking bandwidth, and long-distance stacking using open-standards QSFP+ or SFP+ ports to enable single point management across the campus
- Provides OpenFlow support in true hybrid port mode, enabling Software-Defined Networking (SDN) for programmatic control of network data flows
- Offers Power over HDBaseT (PoH), to power video surveillance and video conferencing equipment, VDI terminals, and HD displays directly from the switch

## 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 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. In addition, this mid-market stackable switch is 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.

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.

The Brocade ICX 7450 is an ideal network solution for campus network 1 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.

## 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.

## BROCADE HYPEREDGE ARCHITECTURE

The Brocade HyperEdge Architecture brings campus networks into the modern era to better support mobility, security, and application agility. This evolutionary architecture integrates innovative wired and wireless technologies to streamline application deployment, simplify network management, and reduce operating costs.

The HyperEdge Architecture enables organizations to build networks that deliver:

- **Consolidated management:** Reduces unnecessary network layers to create large HyperEdge management domains that eliminate individual switch touch points, easing maintenance time and costs.
- **Shared network services:** Allows premium and entry-level switches that share a common HyperEdge management domain to also share advanced Layer 2/3 services, achieving lower price-per-port functionality.
- **Scale-out networking:** Integrates high-performance, fixed form-factor switches to create a single logical device that is independent of physical location and allows organizations to scale ports when and where needed across the campus.

## Brocade Switch Port Extender Technology: Extending Options and Scalability

Brocade Switch Port Extender\* technology, offered for Brocade ICX 7250, 7450, and 7750 Switches, extends network options and scalability. It integrates premium Brocade ICX 7750, midrange Brocade ICX 7450, and entry-level Brocade ICX 7250 Switches, collapsing network access, aggregation, and core layers into a single HyperEdge domain. This domain 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 Distributed Chassis deployment models that use standards-based optics and cabling interface connections to help ensure maximum distance between campus switches—up to 80 km—and minimum cabling costs—up to 50 percent less than incumbent solutions. This gives organizations the flexibility to deliver ports wherever they are needed on campus at a fraction of the cost. 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 160 Gbps of backplane 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 collocated 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 true 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.



**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 160 Gbps of stacking bandwidth.

\*Support to be available in a future release.

## 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.

## BROCADE ICX 7450 SWITCH AND CONTROLLER INTEROPERABILITY

The Brocade ICX 7450 Switch operates seamlessly under the Brocade Vyatta® Controller. This controller is a quality-assured edition of the OpenDaylight controller code supported by an established networking provider and its leaders within the OpenDaylight community.

**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.

<b>Brocade ICX 7450-24 Switch</b>	24×10/100/1000 Mbps RJ-45 ports
<b>Brocade ICX 7450-24P Switch</b>	24×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W)
<b>Brocade ICX 7450-48 Switch</b>	48×10/100/1000 Mbps RJ-45 ports
<b>Brocade ICX 7450-48P Switch</b>	48×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W)
<b>Brocade ICX 7450-48F Switch</b>	48×100/1000 Mbps SFP ports



**Figure 2:** Brocade ICX 7450-48 shown with optional Brocade ICX7400-4X10GC module.



**Figure 3:** Brocade ICX 7450-24P shown with optional Brocade ICX7400-1X40GQ QSFP+ module.



**Figure 4:** Brocade ICX 7450-48F shown with optional Brocade ICX7400-4X10GF SFP+ module.



**Figure 5:** Brocade ICX 7450 rear view shown with two optional Brocade ICX7400-1X40GQ QSFP+ uplink/stacking modules, two AC power supplies, and two fan trays.

\* 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). The Brocade ICX7400-4X1GF module cannot be installed in the rear slots of any model of the Brocade ICX 7450 Switch.

## Simplified, Automated Deployment with Auto-Configuration

The Brocade ICX 7450 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 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.

## Out-of-Band Management

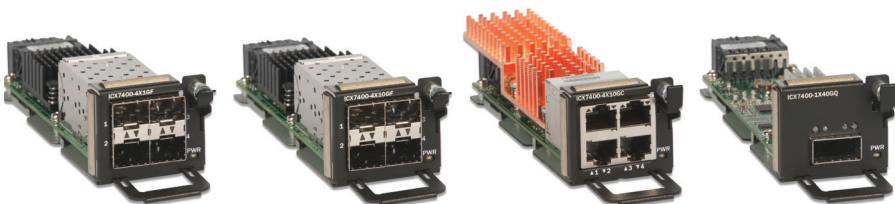
The Brocade ICX 7450 includes a 10/100/1000 Mbps RJ-45 Ethernet port dedicated to out-of-band management, providing a remote path to manage the switches, regardless of the status or configuration of the data ports.

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

### Brocade ICX 7450 Port Module Options

Four different optional port modules are offered for the Brocade ICX 7450. These modules are interchangeable and can be installed in the three modular slots within the Brocade ICX 7450.\*

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



**Figure 6:** Four 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.

**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 7:** The Brocade ICX 7450 offers a 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.

## 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, scale, and efficiency. The Brocade ICX 7450 enables SDN by supporting the OpenFlow 1.3 protocol, which allows communication between an OpenFlow controller and an OpenFlow-enabled switch. Using this approach, organizations can control their networks programmatically, transforming the network into a platform for innovation through new network applications and services.

The Brocade ICX 7450 delivers OpenFlow in true hybrid port mode, which allows organizations to simultaneously deploy traditional Layer 2/3 forwarding with OpenFlow on the same port. This unique capability provides a pragmatic path to SDN by enabling network administrators to progressively integrate OpenFlow into existing networks, giving them the programmatic control offered by SDN for specific flows while the remaining traffic is forwarded as before. Brocade ICX 7450 hardware support for OpenFlow enables organizations to apply these capabilities at line rate.

## 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 centralizes management of the entire family of Brocade wired products and Aruba wireless products.

### EEE Power Savings

The Brocade ICX 7250 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 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. Additional design features include intake and exhaust temperature sensors and fan spin detection to quickly identify abnormal or failed operating conditions—helping to minimize mean time to repair.

### 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. Advanced 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](http://www.brocade.com/warranty).

## **Maximum Operational Efficiency and Investment Protection**

To further improve operational efficiency, Brocade ICX 7450 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.

## **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.

## **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](http://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](http://www.brocade.com).

# Brocade ICX 7450 Feature / Model Comparison

	24 or 48 RJ-45 Ports		48 SFP Ports	24 or 48 PoE+ Ports	
	Brocade ICX 7450-24	Brocade ICX 7450-48	Brocade ICX 7450-48F	Brocade ICX 7450-24P	Brocade ICX 7450-48P
<b>Switching capacity</b> <i>(data rate, full duplex)</i>	288 Gbps	336 Gbps	336 Gbps	288 Gbps	336 Gbps
<b>Forwarding capacity</b> <i>(data rate, full duplex)</i>	214 Mpps	250 Mpps	250 Mpps	214 Mpps	250 Mpps
<b>Fixed ports: 10/100/1000 Mbps RJ45</b>	24	48		24	48
<b>Fixed ports: 100/1000 Mbps SFP</b>			48		
<b>Modular slots</b>	3	3	3	3	3
<b>Modular ports: 1 GbE SFP (max.)</b>	4	4	4	4	4
<b>Modular ports: 1/10 GbE SFP/SFP+ (max.)</b>	12	12	12	12	12
<b>Modular ports: 1/10GBASE-T RJ45 (max.)</b>	12	12	12	12	12
<b>Modular ports: 40 GbE QSFP+ (max.)</b>	3	2	2	3	2
<b>Maximum PoE Class 3 ports</b>				24 (1 AC PSU)	48 (1 AC PSU)
<b>Maximum PoE+ ports</b>				24 (1 AC PSU)	48 (2 AC PSU)
<b>Maximum PoH ports</b>				8 (1 AC PSU)	8 (1 AC PSU)
<b>Advanced IPv4/v6 L3 routing</b> <i>(RIP, OSPF, BGP)</i>	With license	With license	With license	With license	With license
<b>Stacking bandwidth</b> <i>(data rate, full duplex)</i>	160 Gbps	160 Gbps	160 Gbps	160 Gbps	160 Gbps
<b>Stacking density</b> <i>(maximum switches in a stack)</i>	12	12	12	12	12
<b>Maximum stacking distance</b> <i>(distance between stacked switches)</i>	10 Km	10 Km	10 Km	10 Km	10 Km
<b>Power</b>					
<b>Power inlet (AC)</b>	C14				
<b>Input voltage / frequency</b>	AC: 100 to 240 VAC @ 50 to 60 Hz   DC: 40 to 60 VDC				
<b>Power supply rated maximum (AC)</b>	2x250 W	2x250 W	2x250 W	2x1,000 W	2x1,000 W
<b>Power supply rated maximum (DC)</b>	2x510 W	2x510 W	2x510 W	2x510 W	2x510 W
<b>PoE power budget (AC)</b> <i>(two AC power supplies)</i>					1,500 W
<b>PoE power budget (DC)</b> <i>(two DC power supplies)</i>					516 W
<b>Switch power utilization* (25°C)</b>					
<i>Idle (no PoE load)</i>	63 W	93 W	119 W	75 W	106 W
<i>10% traffic† (full PoE load)</i>	64 W	95 W	120 W	91 W	93 W
<i>100% traffic† (full PoE load)</i>	69 W	100 W	123 W	96 W	95 W
<b>Switch heat dissipation*, § (25°C)</b>					
<i>Idle (no PoE load)</i>	215 BTU/hr	317 BTU/hr	406 BTU/hr	256 BTU/hr	362 BTU/hr
<i>10% traffic† (full PoE load)</i>	218 BTU/hr	324 BTU/hr	409 BTU/hr	259 BTU/hr	369 BTU/hr
<i>100% traffic† (full PoE load)</i>	235 BTU/hr	341 BTU/hr	420 BTU/hr	276 BTU/hr	386 BTU/hr
<b>Environment</b>					
<b>Weight*</b>	6.4 kg (13.95 lb)	6.6 kg (14.55 lb)	6.8 kg (14.99 lb)	6.9 kg (15.21 lb)	7.2 kg (15.87 lb)
<b>Dimensions</b>	440 mm (17.323 in.) W x 393.7 mm (15.5 in.) D x 43.7 mm (1.720 in.) H; 1U				
<b>Acoustics* (25°C, ISO 7779)</b>	46 dBA	47 dBA	46 dBA	49 dBA	49 dBA
<b>MTBF* (25°C)</b>	399,973 hours	376,635 hours	330,154 hours	317,719 hours	297,862 hours

\* Switch includes one AC power supply, one fan, one 4x10 GbE SFP+ uplink module, two QSFP+ stacking modules.

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

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

# Brocade ICX 7450 Specifications

## Specifications

Connector options	<ul style="list-style-type: none"><li>• 10/100/1,000 ports: RJ-45</li><li>• 100 Mbps SFP ports: 100BASE-FX</li><li>• 1 Gbps SFP ports: SX, LX, LHA, BXU, BXD</li><li>• 10 Gbps SFP+ ports: USR, SR, LR, ER, ZR, LRM</li><li>• 40 Gbps QSFP+ ports: SR4, LR4, direct-attached copper cables for stacking</li><li>• Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45</li><li>• Console management: Mini-USB serial port (Mini-B plug)</li><li>• Storage: USB port, standard-A plug (available in a future software release)</li><li>• For the latest information about supported optics, please visit <a href="http://www.brocade.com/Optics">www.brocade.com/Optics</a>.</li></ul>
Maximum MAC addresses	32,000
Maximum VLANs	4,096
Maximum STP (spanning trees)	254
Maximum routes (in hardware)	16,000 (IPv4) 3000 (IPv6)
Trunking	Maximum ports per trunk: 8 Maximum trunk groups: 124
Maximum jumbo frame size	9,216 bytes
QoS priority queues	8 per port
Layer 2 switching	<ul style="list-style-type: none"><li>• 802.1s Multiple Spanning Tree</li><li>• 802.1x Authentication</li><li>• Auto MDI/MDIX</li><li>• BPDU Guard, Root Guard</li><li>• Dual-Mode VLANs</li><li>• MAC-based VLANs, Dynamic MAC-based VLAN activation</li><li>• Dynamic VLAN Assignment</li><li>• Dynamic Voice VLAN Assignment</li><li>• Fast Port Span</li><li>• GARP VLAN Registration Protocol</li><li>• IGMP Snooping (v1/v2/v3)</li><li>• IGMP Proxy for Static Groups</li><li>• IGMP v2/v3 Fast Leave</li><li>• IGMP Tracking</li><li>• Inter-Packet Gap (IPG) adjustment</li><li>• Link Fault Signaling (LFS)</li><li>• MAC Address Locking; MAC Port Security</li><li>• MAC-Layer Filtering</li><li>• MAC Learning Disable</li><li>• MLD Snooping (v1/v2)</li><li>• Multi-device Authentication</li><li>• Per-VLAN Spanning Tree (PVST/PVST+/PVRST)</li><li>• Mirroring - Port-based, ACL-based, MAC Filter-based, and VLAN-based</li><li>• Port Loop Detection</li><li>• Private VLAN</li><li>• Protected Link Groups</li><li>• Protocol VLAN (802.1v), Subnet VLAN</li><li>• Remote Fault Notification (RFN)</li><li>• Single-instance Spanning Tree</li><li>• Single-link LACP</li><li>• Trunk Groups</li><li>• Uni-Directional Link Detection (UDLD)</li></ul>
Base Layer 3 IP routing	<ul style="list-style-type: none"><li>• IPv4 and IPv6 static routes</li><li>• ECMP</li><li>• Port-based Access Control Lists</li><li>• L3/L4 ACLs</li><li>• Host routes</li><li>• Virtual Interfaces</li><li>• Routed Interfaces</li><li>• Route-only Support</li><li>• Routing Between Directly Connected Subnets</li></ul>



Premium Layer 3 IP routing (with software license)	<ul style="list-style-type: none"> <li>• IPv4 and IPv6 dynamic routes</li> <li>• RIP v1/v2, RIPng (IPv6)</li> <li>• OSPF v2, OSPF v3 (IPv6)</li> <li>• PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality)</li> <li>• PBR</li> <li>• Virtual Route Redundancy Protocol (VRRP)</li> <li>• VRRP-E, VRRP-E (IPv6)</li> <li>• VRRPv3 (IPv6)</li> <li>• BGP4, BGP4+(IPv6)</li> <li>• GRE</li> <li>• IPv6 over IPv4 tunnels</li> <li>• VRF (IPv4 and IPv6)</li> </ul>
SDN features	<ul style="list-style-type: none"> <li>• Support for OpenFlow v1.0 and v1.3</li> <li>• OpenFlow support with true hybrid port mode</li> <li>• Operates seamlessly under the Brocade Vyatta® Controller</li> </ul>
Metro features	<ul style="list-style-type: none"> <li>• Metro-Ring Protocol (MRP) (v1, v2)</li> <li>• Virtual Switch Redundancy Protocol (VSRP)</li> <li>• VLAN Stacking (Q-in-Q)</li> <li>• VRRP</li> <li>• Topology Groups</li> </ul>
Quality of Service (QoS)	<ul style="list-style-type: none"> <li>• ACL Mapping and Marking of ToS/DSCP</li> <li>• ACL Mapping and Marking of 802.1p</li> <li>• ACL Mapping to Priority Queue</li> <li>• ACL Mapping to ToS/DSCP</li> <li>• Classifying and Limiting Flows Based on TCP Flags</li> <li>• DHCP Relay</li> <li>• DiffServ Support</li> <li>• Honoring DSCP and 802.1p</li> <li>• MAC Address Mapping to Priority Queue</li> <li>• Priority Queue Management using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP</li> </ul>
IEEE standards compliance	<ul style="list-style-type: none"> <li>• 802.1AB LLDP/LLDP-MED</li> <li>• 802.1D-2004 MAC Bridging</li> <li>• 802.1p Mapping to Priority Queue</li> <li>• 802.1s Multiple Spanning Tree</li> <li>• 802.1w Rapid Spanning Tree (RSTP)</li> <li>• 802.1x Port-based Network Access Control</li> <li>• 802.3 10Base-T</li> <li>• 802.3ab 1000Base-T</li> <li>• 802.3ad Link Aggregation (Dynamic and Static)</li> <li>• 802.3ae 10 Gigabit Ethernet</li> <li>• 802.3af Power over Ethernet</li> <li>• 802.3at Power over Ethernet Plus</li> <li>• 802.3u 100Base-TX</li> <li>• 802.3x Flow Control</li> <li>• 802.3z 1000Base-SX/LX</li> <li>• 802.3 MAU MIB (RFC 2239)</li> <li>• 802.3ba 40 Gbps Ethernet</li> <li>• 802.1AE- MACsec (With License)</li> <li>• 802.3az-2010 - EEE</li> <li>• 802.1Q VLAN Tagging</li> </ul>
RFC standards compliance	For a complete list of RFCs supported by the Brocade FastIron® software platform, please visit <a href="http://www.brocade.com/FastIronRFC">www.brocade.com/FastIronRFC</a> .
Traffic management	<ul style="list-style-type: none"> <li>• ACL-based inbound rate limiting and traffic policies</li> <li>• Broadcast, multicast, and unknown unicast rate limiting</li> <li>• Inbound rate limiting per port</li> <li>• Outbound rate limiting per port and per queue</li> </ul>
High availability	<p>Redundant hot-swappable power supplies</p> <p>Hot-swappable fan trays</p> <p>L3 VRRP protocol redundancy</p> <p>Real-time state synchronization across the stack</p> <p>Hitless failover from master to standby stack controller</p> <p>Protected link groups</p> <p>Hot insertion and removal of stacked unitsx</p>

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## Network and Device Management

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### Management

- Auto Configuration
- Configuration Logging
- Digital Optical Monitoring
- Display Log Messages on Multiple Terminals
- Embedded Web Management
- Embedded DHCP Server
- 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
- 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 951 Bootp
- 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 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
- Multiple Syslog Servers

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### Security

- 802.1X Accounting
- MAC Authentication
- DHCP snooping
- Dynamic ARP 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)
- Advanced Encryption Standard (AES) with SSHv2
- RADIUS/TACACS/TACACS+
- Secure Copy (SCP)
- Secure Shell (SSHv2)
- Username/Password
- Web authentication
- Change of Authorization (CoA) RFC 5176
- Flexible authentication

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### Environment

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#### Temperature

Operating temperature: -5°C to 50°C/23°F to 122°F  
Storage temperature: -25°C to 70°C/-13°F to 158°F

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#### Humidity

Operating relative humidity: 5% to 95% at 50°C, non-condensing  
Non-operating relative humidity: 5% to 95% at 70°C, non-condensing

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#### Altitude

Operating altitude: 10,000 ft. (3,000 m) maximum  
Storage altitude: 39,000 ft. (12,000 m) maximum

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## 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 Second Edition; IEC 60950-1 Second 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 (supersedes EN 50082-1); EN 55024 Immunity Characteristics (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
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
ICX7450-24P-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
ICX7450-48-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-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)
ICX7450-48F-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

#### 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.
ICX7450-48	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.

#### Port 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)

## 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 510 W DC power supply with front-to-back airflow
RPS16DC-I	Brocade ICX 7450/6610 510 W DC power supply with back-to-front airflow
ICX-FAN10-E	Brocade ICX 7450/6610 front-to-back airflow fan
ICX-FAN10-I	Brocade ICX 7450/6610 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

EIMG-100FX-OM	100BASE-FX SFP optic MMF, LC connector, optical monitoring capable
EIMG-100FX-IR-OM	100BASE-FX IR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 15 km.
EIMG-100FX-LR-OM	100BASE-FX LR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 40 km.
EIMG-TX	1000BASE-TX SFP copper, RJ-45 connector
EIMG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable
EIMG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring capable
EIMG-LHA-OM-T	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring capable
EIMG-BXU	1000BASE-BXU SFP optic SMF, transmits at 1,310 nm and receives at 1,490 nm, LC connector, single-strand SMF fiber
EIMG-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-SR4	40GBASE-SR4 QSFP+ optic (MTP 1x8 or 1x12), 100 m over MMF, 1-pack
40G-QSFP-LR4	40GBASE-LR4 QSFP+ optic (LC), for up to 10 km over SMF, 1-pack

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## Direct-Attached Cables

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40G-QSFP-C-00501	40 GbE QSFP+ direct-attached copper cable, 0.5 m, 1-pack, passive
40G-QSFP-C-00508	40 GbE QSFP+ direct-attached copper cable, 0.5 m, 8-pack, passive
40G-QSFP-C-0101	40 GbE QSFP+ direct-attached copper cable, 1 m, 1-pack, passive
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
10G-SFP-TWX-0101	Direct-attached SFP+ copper cable, 1 m, 1-pack, active
10G-SFP-TWX-0301	Direct-attached SFP+ copper cable, 3 m, 1-pack, active
10G-SFP-TWX-0501	Direct-attached SFP+ copper cable, 5 m, 1-pack, active

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## 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, and port modules.

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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