



# West Virginia Purchasing Division

2019 Washington Street, East  
Charleston, WV 25305  
Telephone: 304-558-2306  
General Fax: 304-558-6026  
Bid Fax: 304-558-3970

The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.

Header 3

List View

General Information | Contact | Default Values | Discount | Document Information

Procurement Folder: 220813

SO Doc Code: CRFQ

Procurement Type: Central Purchase Order

SO Dept: 0702

Vendor ID: 000000219154

SO Doc ID: TAX1700000003

Legal Name: SOFTWARE INFORMATION SYSTEMS LLC

Published Date: 10/4/16

Alias/DBA:

Close Date: 10/11/16

Total Bid: \$34,100.00

Close Time: 13:30

Response Date: 10/11/2016

Status: Closed

Response Time: 11:25

Solicitation Description: Addendum 1 - Cisco Switches and Router or Equal

Total of Header Attachments: 3

Total of All Attachments: 3



Purchasing Division  
 2019 Washington Street East  
 Post Office Box 50130  
 Charleston, WV 25305-0130

State of West Virginia  
 Solicitation Response

Proc Folder : 220813

Solicitation Description : Addendum 1 - Cisco Switches and Router or Equal

Proc Type : Central Purchase Order

Date issued	Solicitation Closes	Solicitation Response	Version
	2016-10-11 13:30:00	SR 0702 ESR10111600000001585	1

VENDOR
000000219154 SOFTWARE INFORMATION SYSTEMS LLC

Solicitation Number: CRFQ 0702 TAX1700000003

Total Bid : \$34,100.00      Response Date: 2016-10-11      Response Time: 11:25:49

Comments:

**FOR INFORMATION CONTACT THE BUYER**  
 Michelle L Childers  
 (304) 558-2063  
 michelle.l.childers@wv.gov

Signature on File	FEIN #	DATE
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All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Cisco 3850 Series 48 Port Switches or Equal w/warranty	5.00000	EA	\$6,820.000000	\$34,100.00

Comm Code	Manufacturer	Specification	Model #
43222612			

<b>Extended Description :</b>	Cisco 3850 Series 48 Port Switches or equal w/warranty
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**Comments:** See pricing page. This is a place holder to equal the total bid.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
2	Cisco 3850 Series 24 Port Switches or Equal w/warranty	1.00000	EA	\$0.000000	\$0.00

Comm Code	Manufacturer	Specification	Model #
43222612			

<b>Extended Description :</b>	Cisco 3850 Series 24 Port Switches or equal w/warranty
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Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
3	Cisco 2960X 48 Port Switches or Equal w/warranty	2.00000	EA	\$0.000000	\$0.00

Comm Code	Manufacturer	Specification	Model #
43222501			

<b>Extended Description :</b>	Cisco 2960X 48 Port Switches or equal w/warranty.
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Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
4	Cisco ASA 5508-X Security Firewall or Equal w/warranty	1.00000	EA	\$0.000000	\$0.00

Comm Code	Manufacturer	Specification	Model #
43222612			

<b>Extended Description :</b>	Cisco ASA 5508-X Security Firewall or equal w/warranty.
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Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
5	Cisco 2951 Router or Equal w/warranty	1.00000	EA	\$0.000000	\$0.00

Comm Code	Manufacturer	Specification	Model #
43222609			

<b>Extended Description :</b>	Cisco 2951 Router or equal w/warranty.
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Purchasing Division  
 2019 Washington Street East  
 Post Office Box 50130  
 Charleston, WV 25305-0130

State of West Virginia  
 Request for Quotation  
 21 – Info Technology

Proc Folder: 220813

Doc Description: Request for Quotation for Cisco Switches and Router or Equal

Proc Type: Central Purchase Order

Date Issued	Solicitation Closes	Solicitation No	Version
2016-09-12	2016-10-11 13:30:00	CRFQ 0702 TAX1700000003	1

**BID RECEIVING LOCATION**

BID CLERK  
 DEPARTMENT OF ADMINISTRATION  
 PURCHASING DIVISION  
 2019 WASHINGTON ST E  
 CHARLESTON WV 25305  
 US

**VENDOR**

Vendor Name, Address and Telephone Number:

Software Information System, LLC  
 200 Association Drive, Suite 210  
 Charleston, WV 25311

*304 769-1195*

*\$34,100.00*

**FOR INFORMATION CONTACT THE BUYER**

Michelle L Childers  
 (304) 558-2063  
 michelle.l.childers@wv.gov

Signature *[Handwritten Signature]* FEIN # *61-1371695* DATE *10-11-2016*

All offers subject to all terms and conditions contained in this solicitation

**ADDITIONAL INFORMATION:**

The West Virginia Purchasing Division is soliciting bids on behalf of the West Virginia Tax Division to establish a contract for the one time purchase of network equipment.

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	Cisco 3850 Series 48 Port Switches or Equal w/warranty	5.00000	EA		<i>see attached</i>

Comm Code	Manufacturer	Specification	Model #
43222612	<i>Brocade</i>		

**Extended Description :**  
Cisco 3850 Series 48 Port Switches or equal w/warranty

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
2	Cisco 3850 Series 24 Port Switches or Equal w/warranty	1.00000	EA		<i>see price pg 1</i>

Comm Code	Manufacturer	Specification	Model #
43222612			

**Extended Description :**  
Cisco 3850 Series 24 Port Switches or equal w/warranty

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
3	Cisco 2960X 48 Port Switches or Equal w/warranty	2.00000	EA		

*See pricing page 1*

Comm Code	Manufacturer	Specification	Model #
43222501			

**Extended Description :**

Cisco 2960X 48 Port Switches or equal w/warranty.

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
4	Cisco ASA 5508-X Security Firewall or Equal w/warranty	1.00000	EA		

*See pricing page 1*

Comm Code	Manufacturer	Specification	Model #
43222612			

**Extended Description :**

Cisco ASA 5508-X Security Firewall or equal w/warranty.

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
5	Cisco 2951 Router or Equal w/warranty	1.00000	EA		

*See pricing page*

Comm Code	Manufacturer	Specification	Model #
43222609			

**Extended Description :**

Cisco 2951 Router or equal w/warranty.



<b>TAX1700000003</b>	<b>Document Phase</b> Final	<b>Document Description</b> Request for Quotation for Cisco Switches and Router or Equal	<b>Page 4</b> <b>of 4</b>
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**ADDITIONAL TERMS AND CONDITIONS**

See attached document(s) for additional Terms and Conditions

STATE OF WEST VIRGINIA  
Purchasing Division

**PURCHASING AFFIDAVIT**

**MANDATE:** Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

**EXCEPTION:** The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

**DEFINITIONS:**

**"Debt"** means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

**"Employer default"** means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

**"Related party"** means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

**AFFIRMATION:** By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

**WITNESS THE FOLLOWING SIGNATURE:**

Vendor's Name: Software Technology Systems LLC

Authorized Signature: [Signature] Date: 10-11-2016

State of West Virginia

County of Kanawha, to-wit:

Taken, subscribed, and sworn to before me this 11<sup>th</sup> day of October, 2016.

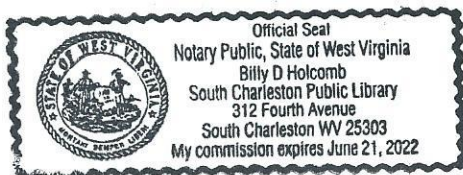
My Commission expires 06/21, 2022.

**AFFIX SEAL HERE**

**NOTARY PUBLIC**

[Signature: Billy D. Holcomb]

*Purchasing Affidavit (Revised 08/01/2015)*



**DESIGNATED CONTACT:** Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Charles D. Arnett Sr. Client Executive  
(Name, Title)

(Printed Name and Title)

200 Association Dr. Suite 210 Chgo IL 60614  
(Address)

304 768-1645 304 768-1671  
(Phone Number) / (Fax Number)

carnett@thinksis.com  
(email address)

**CERTIFICATION AND SIGNATURE:** By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

Software Innovator Systems LLC  
(Company)

CD Arnett Sr. Client Executive  
(Authorized Signature) (Representative Name, Title)

Charles D. Arnett Sr. Client Executive  
(Printed Name and Title of Authorized Representative)

10-11-2016  
(Date)

304 768-1645 304 768-1671  
(Phone Number) (Fax Number)

Exhibit A - Pricing Page  
Network Equipment

Item #	Item Description	Unit of Measure	Unit Price	Qty	Extended Price
3.1.1	Cisco Catalyst 3850 Switches (WS-C-3850-48F) or Equal	Each		5	
3.1.2	Cisco Catalyst 3850 Series Switches (WS-C3850-24T) or Equal	Each		1	
3.1.3	Cisco 2960 X Series Switches (WS-C2960X-48FPD-L) or Equal	Each		2	
3.1.4	Cisco ASA 5508-X Security Appliance (ASA 5508-K9) or Equal	Each		1	
3.1.5	Cisco 2951 Router (C2951-CME-SRST/K9) or Equal	Each		1	
				<b>Total Bid Amount</b>	34,100

see attached pricing page

**CRFQ – 0702 TAX1700000003 due 10-11-2016**

**Exhibit A – Pricing Page**

**Network Equipment**

***Brocade equivalent with Cisco ASA5508-K9***

Line No.	Qty	Part Number	Description	Unit List	Ext List
1	5	ICX7450-48P-E	48-PORT 1 GBE SWITCH POE+ BUNDLE INCLUDE	\$3,300.00	\$16,500.00
2	1	ICX7450-24P-E	24-PORT 1 GBE SWITCH POE+ BUNDLE INCLUDE	\$2,200.00	\$2,200.00
3	2	ICX7250-48P-2X10G	48-PORT 1 GBE SWITCH POE+ 740W BUNDLE WI	\$1,800.00	\$3,600.00
4	5	ICX7450-SVL-RMT-5	ESSENTIAL REMOTE SUPPORT, ICX 7450 24P	\$1,400.00	\$7,000.00
5	1	ICX7450-SVL-RMT-5	ESSENTIAL REMOTE SUPPORT, ICX 7450 24P	\$1,300.00	\$1,300.00
6	1	ICX7250-SVL-RMT-2	ESSENTIAL REMOTE SUPPORT, ICX 7250 24P	\$200.00	\$200.00
7	1	ASA5508-K9	ASA 5508-X WITH FIREPOWER SERVICES, 8GE,	\$2,100.00	\$2,100.00
8	1	CON-3SNT-ASA5508K	3YR SNTC 8X5XNBD ASA 5508-X WITH FIRE	\$1,200.00	\$1,200.00
9	1	CAB-AC	AC POWER CORD (NORTH AMERICA), C13, NEMA	\$0.00	\$0.00
10	1	SF-ASA-K-9.6-K8	ASA 9.6 SOFTWARE IMAGE FOR ASA 5506/5508	\$0.00	\$0.00
11	1	SF-ASA-FP5.4.1-K9	CISCO FIREPOWER SOFTWARE V5.4.1 FOR ASA	\$0.00	\$0.00
12	1	ASA5508-CTRL-LIC	CISCO ASA5508 CONTROL LICENSE	\$0.00	\$0.00
13	1	ASA5508-SSD	ASA 5508-X SSD	\$0.00	\$0.00
14	1	ASA5500-ENCR-K9	ASA 5500 STRONG ENCRYPTION LICENSE (3DES)	\$0.00	\$0.00
			<b>Total</b>		<b>\$34,100.00</b>

# 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.

### 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

## 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.



**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.

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, 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 logical switch. This logical device

\* Support on the Brocade ICX 7250 to be available in a future release.

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.



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

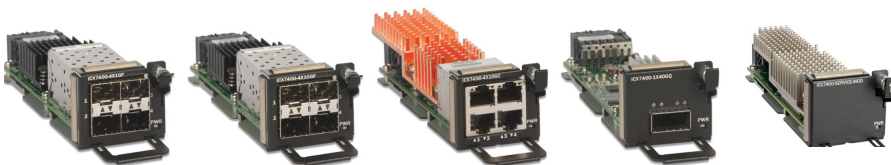
The Brocade ICX 7450 includes an industry-standard Command Line Interface (CLI) and supports Secure Shell (SSHv2), Secure Copy (SCP), and SNMPv3 to restrict and encrypt management communications to the

**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.\*

<b>Brocade ICX7400-4X1GF Module</b>	4-port 100 Mbps/1 GbE SFP
<b>Brocade ICX7400-4X10GF Module</b>	4-port 1/10 GbE SFP/SFP+ for uplink or stacking
<b>Brocade ICX7400-4X10GC Module</b>	4-port 1/10 GbE 10GBASE-T copper
<b>Brocade ICX7400-1X40GQ Module</b>	1-port 40 GbE QSFP+ for uplink or stacking
<b>Brocade ICX7400-SERVICE-MOD Module</b>	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.

\* 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.

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



**Figure 4:** 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.

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.

### 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 Open Mobility partners' 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 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](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 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](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		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
<b>Switching capacity</b> (data rate, full duplex)	288 Gbps	336 Gbps	288 Gbps	328 Gbps	336 Gbps	336 Gbps
<b>Forwarding capacity</b> (data rate, full duplex)	214 Mpps	250 Mpps	214 Mpps	244 Mpps	250 Mpps	250 Mpps
<b>Fixed ports: 10/100/1000 Mbps RJ45</b>	24	48	24	24	48	
<b>Fixed ports: 100/1000 Mbps SFP</b>						48
<b>Fixed ports: 100 Mbps/1000 Mbps/2.5 Gbps RJ45</b>				8		
<b>Modular slots</b>	3	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	12
<b>Modular ports: 1/10GBASE-T RJ45 (max.)</b>	12	12	12	12	12	12
<b>Modular ports: 40 GbE QSFP+ (max.)</b>	3	2	3	2	2	2
<b>Modular service: IPsec VPN</b>	Supported	Supported	Supported		Supported	Supported
<b>Maximum PoE ports (15.4 W)</b>			24 (1 AC PSU)	32 (1 AC PSU)	48 (1 AC PSU)	
<b>Maximum PoE+ ports (30 W)</b>			24 (1 AC PSU)	32 (2 AC PSU)	48 (2 AC PSU)	
<b>Maximum PoH ports (95 W)</b>			8 (1 AC PSU)	8 (1 AC PSU)	8 (1 AC PSU)	
<b>Advanced IPv4/v6 L3 routing</b> (RIP, OSPF, BGP)	With license	With license	With license	With license	With license	With license
<b>Aggregated stacking bandwidth</b>	960 Gbps	960 Gbps	960 Gbps	960 Gbps	960 Gbps	960 Gbps
<b>Stacking density</b> (maximum switches in a stack)	12	12	12	12	12	12
<b>Maximum stacking distance</b> (distance between stacked switches)	10 km	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 output (AC)</b>	2×250 W	2×250 W	2×1,000 W	2×1,000 W	2×1,000 W	2×250 W
<b>Power supply rated maximum output (DC)</b>	2×510 W	2×510 W	2×510 W	2×510 W	2×510 W	2×510 W
<b>PoE power budget (AC)</b> (two AC power supplies)			1,500 W	1,500 W	1,500 W	
<b>PoE power budget (DC)</b> (two DC power supplies)			516 W	516 W	516 W	
<b>Switch power draw<sup>†</sup> (25°C)</b>						
<b>Idle</b> (no PoE load)	63 W	93 W	75 W	90 W	106 W	119 W
<b>10% traffic<sup>§</sup></b> (full PoE load)	64 W	95 W	91 W	92 W	93 W	120 W
<b>100% traffic<sup>§</sup></b> (full PoE load)	69 W	100 W	91 W	93 W	93 W	123 W
<b>Switch heat dissipation<sup>†</sup> (25°C)</b>						
<b>Idle</b> (no PoE load)	215 BTU/hr	317 BTU/hr	256 BTU/hr	307 BTU/hr	362 BTU/hr	406 BTU/hr
<b>10% traffic<sup>§</sup></b> (full PoE load)	218 BTU/hr	324 BTU/hr	259 BTU/hr	314 BTU/hr	369 BTU/hr	409 BTU/hr
<b>100% traffic<sup>§</sup></b> (full PoE load)	235 BTU/hr	341 BTU/hr	276 BTU/hr	330 BTU/hr	386 BTU/hr	420 BTU/hr
<b>Environment</b>						
<b>Weight<sup>†</sup></b>	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)
<b>Dimensions</b>	440 mm (17.323 in.) W × 393.7 mm (15.5 in.) D × 43.7 mm (1.720 in.) H; 1U					
<b>Acoustics<sup>†</sup> (25°C, ISO 7779)</b>	46 dBA	47 dBA	49 dBA	49 dBA	49 dBA	46 dBA
<b>MTBF<sup>†</sup> (25°C)</b>	628,369 hours	571,520 hours	466,576 hours	448,376 hours	444,360 hours	576,586 hours

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

<sup>§</sup> Traffic load on all ports connected with maximum possible PoE/PoE+ loads (if equipped).

<sup>\*\*</sup> 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"><li>• 10/100/1000 Mbps, 2.5 Gbps, 10 Gbps 10GBASE-T ports: RJ-45</li><li>• 100 Mbps SFP ports</li><li>• 1 Gbps SFP ports</li><li>• 10 Gbps SFP+ ports</li><li>• 40 Gbps QSFP+ ports</li><li>• Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45</li><li>• Console management: Mini-USB RS232 serial port (Mini-B plug)</li><li>• Storage: USB port, standard-A plug</li></ul> <p>For the latest information about supported optics, please visit <a href="http://www.brocade.com/optics">www.brocade.com/optics</a>.</p>
Maximum MAC addresses	32,768
Maximum VLANs	4,096
Maximum STP (spanning trees)	254
Maximum routes (in hardware)	15,168 (IPv4) 5,120 (IPv6)
Trunking	Maximum ports per trunk: 16 Maximum trunk groups: 256
Maximum jumbo frame size	9,216 bytes
QoS priority queues	8 per port
IPsec performance	Maximum throughput: 10 Gbps, full-duplex Maximum tunnels: 20
Multicast Groups	8192
VRF	16

## Features

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 Voice VLAN Assignment</li><li>• Fast Port Span</li><li>• GVRP</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 Filtering</li></ul>	<ul style="list-style-type: none"><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>• Remote Fault Notification (RFN)</li><li>• Single-instance Spanning Tree</li><li>• Single-link LACP</li><li>• Trunk Groups (static, LACP)</li><li>• Uni-Directional Link Detection (UDLD)</li><li>• Metro-Ring Protocol (MRP) (v1, v2)</li><li>• Virtual Switch Redundancy Protocol (VSRP)</li><li>• VLAN Stacking (Q-in-Q)</li><li>• Topology Groups</li></ul>
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## Brocade ICX 7450 Specifications (Continued)

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> </ul>	<ul style="list-style-type: none"> <li>• Virtual Interfaces</li> <li>• Routed Interfaces</li> <li>• Route-only Support</li> <li>• Routing Between Directly Connected Subnets</li> <li>• "MSDP" in Base Layer 3 IP routing</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> </ul>	<ul style="list-style-type: none"> <li>• Virtual Route Redundancy Protocol VRRP v3 (IPv6)</li> <li>• VRRP-E, VRRP-E (IPv6)</li> <li>• BGP4, BGP4+ (IPv6)</li> <li>• GRE</li> <li>• IPv6 over IPv4 tunnels</li> <li>• VRF (IPv4 and IPv6)</li> </ul>
Quality of Service (QoS)	<ul style="list-style-type: none"> <li>• ACL Mapping and Marking of ToS/DSCP (CoS)</li> <li>• ACL Mapping and Marking of 802.1p</li> <li>• ACL Mapping to Priority Queue</li> <li>• Classifying and Limiting Flows Based on TCP Flags</li> <li>• DiffServ Support</li> </ul>	<ul style="list-style-type: none"> <li>• Honoring DSCP and 802.1p (CoS)</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> <li>• Priority Flow Control</li> </ul>
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> </ul>	<ul style="list-style-type: none"> <li>• Inbound rate limiting per port</li> <li>• Outbound rate limiting per port and per queue</li> <li>• Multicast traffic reduction</li> </ul>
Security	<ul style="list-style-type: none"> <li>• IPsec 128/256 AES-GCM (with service module)</li> <li>• MACsec</li> <li>• 802.1X Authentication</li> <li>• MAC Authentication</li> <li>• Flexible authentication</li> <li>• Web authentication</li> <li>• DHCP snooping</li> <li>• Dynamic ARP inspection</li> <li>• Ndiian inspection</li> <li>• Bi-level Access Mode (Standard and EXEC Level)</li> <li>• EAP pass-through support</li> <li>• IEEE 802.1X username export in sFlow</li> <li>• Protection against Denial of Service (DoS) attacks</li> <li>• Authentication, Authorization, and Accounting (AAA)</li> <li>• MAC Address Locking MAC Port Security</li> <li>• Advanced Encryption Standard (AES) with SSHv2</li> <li>• RADIUS/TACACS/TACACS+</li> <li>• Secure Copy (SCP)</li> <li>• Secure Shell (SSHv2)</li> <li>• Local Username/Password</li> <li>• Change of Authorization (CoA) RFC 5176</li> <li>• Dynamic VLAN assignment</li> </ul>	<ul style="list-style-type: none"> <li>• RFC Conformance for Encryption: <ul style="list-style-type: none"> <li>- RFC 5996 Internet Key Exchange Protocol Version 2 (IKEv2)</li> <li>- RFC 4303 IP Encapsulating Security Payload (ESP)</li> <li>- RFC 6379 Suite B Cryptographic Suites for IPsec (Suite-B-GCM-256 and Suite-B-GCM-128)</li> <li>- RFC 5903 Elliptic Curve Groups Modulo a Prime (ECP Groups) for IKEv2</li> <li>- RFC 4868 Using HMAC-SHA-256, HMAC-SHA-384, and HMAC-SHA-512 with IPsec</li> <li>- RFC 4754 IKEv2 Authentication Using the Elliptic Curve Digital Signature Algorithm (ECDSA)</li> <li>- RFC 4106 The use of Galois/Counter Mode (GCM) in IPsec Encapsulating Security Payload (ESP)</li> <li>- SP800-56A Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography</li> </ul> </li> </ul>
SDN features	<ul style="list-style-type: none"> <li>• OpenFlow v1.0 and v1.3</li> <li>• OpenFlow with hybrid port mode</li> </ul>	<ul style="list-style-type: none"> <li>• Operates with the Brocade SDN Controller and the applications running on the controller</li> </ul>

## Brocade ICX 7450 Specifications (Continued)

High availability	<ul style="list-style-type: none"> <li>• Redundant hot-swappable power supplies</li> <li>• Hot-swappable fan trays</li> <li>• L3 VRRP/VRRP-E protocol redundancy</li> <li>• Real-time state synchronization across the stack</li> </ul>	<ul style="list-style-type: none"> <li>• Hitless failover and switchover from master to standby stack controller</li> <li>• Hot insertion and removal of stacked units</li> <li>• L2 VSRP switch redundancy</li> </ul>
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### Network and Device Management

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Management	<ul style="list-style-type: none"> <li>• DHCP Auto Configuration</li> <li>• CLI Logging</li> <li>• Digital Optical Monitoring</li> <li>• Display Log Messages on Multiple Terminals</li> <li>• Embedded Web Management (HTTP/HTTPS)</li> <li>• Embedded DHCP Server</li> <li>• Industry-standard Command Line Interface (CLI)</li> <li>• Brocade Network Advisor (sold separately)</li> <li>• Integration with HP OpenView:</li> <li>• USB file management and storage</li> <li>• Macro for batch execution</li> <li>• Out-of-band Ethernet Management</li> <li>• ERSPAN support for remote troubleshooting and traffic monitoring</li> <li>• TFTP</li> </ul> <p>For management MIB, please visit <a href="http://www.brocade.com">www.brocade.com</a>.</p>	<ul style="list-style-type: none"> <li>• TELNET Client and Server</li> <li>• Bootp</li> <li>• SNMPv1/v2c</li> <li>• DHCP Server and DHCP Relay</li> <li>• SNMPv3 Intro to Framework</li> <li>• Architecture for Describing SNMP Framework</li> <li>• SNMP Message Processing and Dispatching</li> <li>• SNMPv3 Applications</li> <li>• SNMPv3 User-based Security Model</li> <li>• SNMP View-based Access Control Model SNMP</li> <li>• Embedded HTTPS</li> <li>• sFlow</li> <li>• NTP Network Time Protocol</li> <li>• Multiple Syslog Servers</li> <li>• SCP</li> </ul>
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IEEE standards compliance	<ul style="list-style-type: none"> <li>• 802.1AB LLDP</li> <li>• 802.1D MAC Bridging</li> <li>• 802.1p Mapping to Priority Queue</li> <li>• 802.1s Multiple Spanning Tree (MST)</li> <li>• 802.1w Rapid Reconfiguration of Spanning Tree</li> <li>• 802.1x Port-based Network Access Control (PNAC)**</li> <li>• 802.3 Carrier Sense Multiple Access/Collision Detection (CSMA/CD)</li> <li>• 802.3ab 1000BASE-T</li> <li>• 802.1AX-2008 Link Aggregation</li> <li>• 802.3ae 10 Gigabit Ethernet</li> </ul>	<ul style="list-style-type: none"> <li>• 802.3af Power over Ethernet (15.4 W)</li> <li>• 802.3at Power over Ethernet Plus</li> <li>• 802.3u 100Base-TX</li> <li>• 802.3x Full duplex and Flow Control</li> <li>• 802.3z 1000Base-SX/LX</li> <li>• 802.3 MAU MIB (RFC 2239)</li> <li>• 802.3ba 40 and 100 Gbps Ethernet</li> <li>• 802.1AE-MACsec (with license)</li> <li>• 802.3az Energy Efficient Ethernet</li> <li>• 802.1Q VLAN Tagging</li> <li>• 802.1BR Bridge Port Extension</li> </ul>
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IETF 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> .
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\*\* Partial support



## Brocade ICX 7450 Specifications (Continued)

### Environment

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

### 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
<b>Switch Bundles</b>	
ICX7450-24-E	24-port 1 GbE switch bundle includes 4x10 GbE SFP+ uplinks/stacking, 2x40 GbE QSFP+ uplinks/stacking, 1x250 W AC power supply and one fan, front-to-back airflow
ICX7450-24-40G-E	24-port 1 GbE switch bundle includes 3x40 GbE QSFP+ uplinks/stacking, 1x250 W AC power supply and one fan, front-to-back airflow
ICX7450-24P-E	24-port 1 GbE switch PoE+ bundle includes 4x10 GbE SFP+ uplinks/stacking, 2x40 GbE QSFP+ uplinks/stacking, 1x1,000 W AC power supply and one fan, front-to-back airflow
ICX7450-24P-40G-E	24-port 1 GbE switch PoE+ bundle includes 3x40 GbE QSFP+ uplinks/stacking, 1x1,000 W AC power supply and one fan, front-to-back airflow
ICX7450-24P-E-RMT3	24-port 1 GbE switch PoE+ bundle includes 4x10 GbE SFP+ uplinks/stacking, 2x40 GbE QSFP+ uplinks/stacking, 1x1,000 W AC power supply and one fan, front-to-back airflow, three years 24x7 remote support
ICX7450-32ZP-E	24-port 1 GbE and 8-port 2.5 GbE switch PoE+ bundle includes 4x10 GbE SFP+ uplinks/stacking, 2x40 GbE QSFP+ uplinks/stacking, 1x1,000 W AC power supply, and one front-to-back airflow fan
ICX7450-48-E	48-port 1 GbE switch bundle includes 4x10 GbE SFP+ uplinks/stacking, 2x40 GbE QSFP+ uplinks/stacking, 1x250 W AC power supply and one fan, front-to-back airflow
ICX7450-48P-E	48-port 1 GbE switch PoE+ bundle includes 4x10 GbE SFP+ uplinks/stacking, 2x40 GbE QSFP+ uplinks/stacking, 1x1,000 W AC power supply and one fan, front-to-back airflow
ICX7450-48P-E-RMT3	48-port 1 GbE switch PoE+ bundle includes 4x10 GbE SFP+ uplinks/stacking, 2x40 GbE QSFP+ uplinks/stacking, 1x1,000 W AC power supply and one fan, front-to-back airflow, three years 24x7 remote support
ICX7450-48P-STK-E	48-port 1 GbE switch PoE+ bundle includes 2x40 GbE QSFP+ uplinks/stacking, 1x1,000 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 2x40 GbE QSFP+ uplinks/stacking, 1x1,000 W AC power supply and one fan, front-to-back airflow, three years 24x7 remote support (stack member with no uplink module)
ICX7450-48F-E	48-port 1 GbE SFP fiber switch bundle includes 4x10 GbE SFP+ uplinks/stacking, 2x40 GbE QSFP+ uplinks/stacking, 1x250 W AC power supply and one fan, front-to-back airflow
ICX7450-48F-E-RMT3	48-port 1 GbE SFP fiber switch bundle includes 4x10 GbE SFP+ uplinks/stacking, 2x40 GbE QSFP+ uplinks/stacking, 1x250 W AC power supply and one fan, front-to-back airflow, three years 24x7 remote support
<b>Bare Switches</b>	
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
<b>Modules</b>	
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
<b>Power Supplies and Fans</b>	
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
<b>Feature License and Accessories</b>	
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.
<b>Optics</b>	
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

## Brocade ICX 7450 Ordering Information (Continued)

Part Number	Description
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-SR-BIDI	40GE SR QSFP+ optic (LC), Bidirectional, 100 m over OM3 MMF
40G-QSFP-SR4	40GBASE-SR4 QSFP+ optic (MTP 1x8 or 1x12), 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
<b>Direct-Attached Cables</b>	
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](http://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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**BROCADE** 

# Brocade ICX 7250 Switch



## HIGHLIGHTS

- Offers enterprise-class stackable switching at an entry-level price, allowing organizations to buy what they need now and easily scale as demand grows and new technologies emerge
- Future-proofs campus networks via flexible stacking, software licensing of 1 GbE to 10 GbE ports, Brocade Campus Fabric technology\*, and future upgrades to OpenFlow support in true hybrid port mode, enabling Software-Defined Networking (SDN) for programmatic network control
- Enables enterprise-class manageability with up to 8×10 GbE ports for stacking or uplinks
- Delivers market-leading stacking scalability with up to 12 switches per stack, 80 Gbps of stacking bandwidth, and long-distance stacking using open standards
- Offers full Power over Ethernet (PoE+) to power wireless access points, video surveillance and video conferencing equipment, VDI terminals, and HD displays directly from the switch
- Includes the Brocade Assurance Limited Lifetime Warranty and three years of technical support

## Entry-Level, Enterprise-Class Stackable Switch with Future-Proof Expandability

The Brocade® ICX® 7250 Switch delivers the performance, flexibility, and scalability required for enterprise Gigabit Ethernet (GbE) access deployment. It raises the bar with up to 8×10 GbE ports for uplinks or stacking and market-leading stacking density with up to 12 switches (576×1 GbE) per stack. In addition, the Brocade ICX 7250 combines enterprise-class features, manageability, performance, and reliability with the flexibility, cost-effectiveness, and “pay as you grow” scalability of a stackable solution.

### Premium Performance in an Entry-Level Switch

The Brocade ICX 7250 Switch provides enterprise-class stackable LAN switching solutions to meet the growing demands of campus networks. Designed for small to medium-size enterprises, branch offices, and distributed campuses, these intelligent, scalable edge switches deliver enterprise-class functionality at an affordable price—without compromising performance and reliability. The Brocade ICX 7250 delivers wire-speed, non-blocking performance across all ports to support latency-sensitive applications, such as real-time voice/video streaming and Virtual Desktop Infrastructure (VDI). The Brocade ICX 7250 is available in 24- and 48-port 10/100/1000 Mbps models with 1 GbE uplink or 10 GbE dual-purpose uplink/stacking ports (see Figure 1)—with or without PoE and PoE+—to support

enterprise edge networking, wireless mobility, and IP communications without the need for additional power outlets or power injectors.

The new Brocade Campus Fabric technology\* maximizes the value of Brocade ICX 7250 Switches. It enables the Brocade ICX 7250 to extend ports in combination with Brocade ICX 7450 and 7750 Switches, creating a complete campus network solution with consolidated management across aggregation and core layers, shared network services—adding advanced Layer 3 capabilities to all switches—and scale-out flexibility to expand port density as needed (see Figure 2). The Brocade ICX 7250 with Campus Fabric technology\* provides an ideal network access solution for the campus network.

\* Support on the Brocade ICX 7250 to be available in a future release.

## Scaling Out Ports and Services as Demand Grows

The Brocade ICX 7250 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.

Brocade stacking technology makes it easy to scale ports by stacking up to 12 Brocade ICX 7250 Switches into a single logical switch. This allows the Brocade ICX 7250 to provide a class-leading 80 Gbps of backplane bandwidth as well as simple and robust expandability for future growth at the network edge. In addition, this stacked switch has only a single IP address to simplify management and offers transparent forwarding across a pool of up to 576x1 GbE ports and 96x10 GbE ports. When new switches join the stack, they automatically inherit the stack's existing configuration file, enabling true plug-and-play network expansion. Flexible licensing of 1 GbE to 10 GbE ports, for uplink and stacking, allows organizations to optimize network performance based on specific requirements.

Furthermore, Brocade Campus Fabric technology\* enables organizations to add advanced Layer 3 services across the stack by simply adding premium Brocade ICX 7750 Switches to existing Brocade ICX 7250 deployments. This eliminates the need for "rip and replace" upgrades, since low-cost Brocade ICX 7250 ports can live on to inherit new services.

### Brocade Campus Fabric Technology: Extending Options and Scalability

Brocade Campus Fabric 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

### Brocade ICX 7250 Switches

Except as noted, all Brocade ICX 7250 models offer eight uplink/stacking ports, a single integrated power supply and fan, one RJ-45 network management port, one mini USB serial management port, and one USB storage port on the front panel.



#### Brocade ICX 7250-24G

24x10/100/1000 Mbps RJ-45 ports  
4x1 GbE uplink ports  
Not upgradable; no EPS connector  
Premium Layer 3 licenses not applicable



#### Brocade ICX 7250-24

24x10/100/1000 Mbps RJ-45 ports  
8x1 GbE uplink/stacking ports  
Upgradable to 10 GbE



#### Brocade ICX 7250-24P

24x10/100/1000 Mbps RJ-45 PoE+ ports  
370 W PoE budget  
8x1 GbE uplink/stacking ports  
Upgradable to 10 GbE



#### Brocade ICX 7250-48

48x10/100/1000 Mbps RJ-45 ports  
8x1 GbE uplink/stacking ports  
Upgradable to 10 GbE



#### Brocade ICX 7250-48P

48x10/100/1000 Mbps RJ-45 PoE+ ports  
740 W PoE budget  
8x1 GbE uplink/stacking ports  
Upgradable to 10 GbE

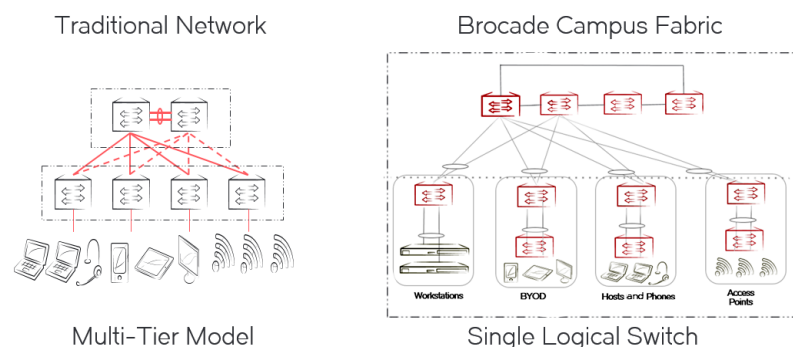
a single logical switch. This logical device shares network services while reducing management touch points and network hops through a single-layer design spanning the entire campus network.

These powerful deployments deliver equivalent or better functionality than large, rigid modular chassis systems, but with significantly lower costs and smaller carbon footprints.



**Figure 1:** Up to 12 Brocade ICX 7250 Switches can be stacked together using up to four full-duplex SFP+ 10 Gbps ports for a fully redundant backplane with 80 Gbps of stacking bandwidth.

\* Support on the Brocade ICX 7250 to be available in a future release.



**Figure 2:** Brocade Campus Fabric technology.

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 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.

### Full Layer 3 Capabilities

Brocade ICX 7250 Switches offer an upgrade option to bring full Layer 3 capabilities to the network edge, reducing complexity and enhancing the reliability of enterprise networks.

### Power to Spare

The Brocade ICX 7250 can deliver both power and data across network connections, supporting Power over Ethernet (PoE/PoE+) standards and providing a single-cable solution for edge devices, such as wireless access points, VoIP phones, video surveillance equipment, and VDI thin terminals. Carrying data and power through a single Ethernet wire reduces the number of power receptacles and power adapters while increasing reliability and wiring flexibility. The Brocade ICX 7250-24P provides 370 watts and can deliver PoE power to all 24 ports, while the Brocade ICX 7250-48P provides

740 watts and can deliver PoE+ power for up to 12 or 24 ports. Both switches can provide PoE and PoE+ (30 watts) power to all ports when an external power supply is deployed.

The optional Brocade ICX-EPS 4000 is an external power supply source that delivers additional power for up to 16 Brocade ICX 7250 Switches (see Figures 3 and 4). It can be used for system power redundancy and an increased PoE/PoE+ power budget to enable additional ports.

### 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 7250 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.

## 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.





Figure 3: Brocade ICX-EPS 4000 for the Brocade ICX 7250, shown with four AC power supplies.



Figure 4: Rear view of the Brocade ICX-EPS 4000 connectivity.

In addition to stack-level high availability, Brocade ICX 7250 Switches also offer an external power supply for failover resiliency, as well as increased PoE/PoE+ port availability.

### Simplified, Open-Standards-based Management and Monitoring

The Brocade ICX 7250 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 7250, 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 7250 supports auto-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 can automatically receive their IP addresses and configuration files from DHCP and Trivial File Transport Protocol (TFTP) servers. They also can automatically receive a software update to be at the same code revision as currently installed switches.

#### Open-Standards Management

The Brocade ICX 7250 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.

### 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 7250 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 7250 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 7250 hardware support for OpenFlow enables organizations to apply these capabilities at line rate.

### Plug-and-Play Operations for Powered Devices

Brocade ICX switches support 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 provide a standard, open method for configuring, discovering, and managing network infrastructure.

### **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 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.

### **Data Center ToR Server Connectivity**

The Brocade ICX 7250 is designed to fit in server racks by consuming only one rack unit. In data center environments where most servers are 1 GbE-capable, the Brocade ICX 7250 provides a compact and cost-effective 1 GbE Top-of-Rack (ToR) switch by simply connecting 1 GbE Network Interface Cards (NICs) in the servers to Brocade ICX 7250 1 GbE ports. This configuration uses 10 GbE links to connect to Brocade ICX data center aggregation switches.

### **Warranty**

Brocade ICX 7250 Switches are covered by the Brocade Assurance® Limited Lifetime Warranty. For details, visit [www.brocade.com/warranty](http://www.brocade.com/warranty).

### **Best-in-Class Support**

The Brocade ICX 7250 Switch is supported by next-business-day advance replacement where available, as well as software defect repairs and maintenance updates. In an effort to further improve service levels and operational efficiency, Brocade includes three years of technical support for Brocade ICX 7250 Switches, providing direct 24\*7 access to the Brocade Technical Assistance Center.

### **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](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 7250 SWITCH AND CONTROLLER INTEROPERABILITY**

The Brocade ICX 7250 Switch operates seamlessly under the Brocade SDN 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.

## Brocade ICX 7250 Feature/Model Comparison

	24 RJ-45 Ports	24 or 48 Ports Non-PoE		24 or 48 PoE+ Ports	
	Brocade ICX 7250-24G	Brocade ICX 7250-24	Brocade ICX 7250-48	Brocade ICX 7250-24P	Brocade ICX 7250-48P
<b>Switching capacity</b> (data rate, full duplex)	128 Gbps	208 Gbps	256 Gbps	208 Gbps	256 Gbps
<b>Forwarding capacity</b> (data rate, full duplex)	96 Mpps	154 Mpps	190 Mpps	154 Mpps	190 Mpps
<b>Fixed ports: 10/100/1000 Mbps RJ-45</b>	24	24	48	24	48
<b>Fixed ports: 100/1000 Mbps SFP</b>	4				
<b>Fixed ports: 1/10 Gbps SFP+</b> (10 GbE SPF+ optional upgrade license)		8	8	8	8
<b>Maximum PoE Class 3 ports</b> (internal AC power supply only)	N/A	N/A	N/A	24	48
<b>Maximum PoE+ ports</b> (internal AC power supply only)	N/A	N/A	N/A	12	24
<b>Maximum PoE+ ports</b> (with external power supply)	N/A	N/A	N/A	24	48
<b>Advanced IPv4/v6 L3 routing</b> (RIP, OSPF)	N/A	with license	with license	with license	with license
<b>Aggregated stacking bandwidth</b>	N/A	480 Gbps	480 Gbps	480 Gbps	480 Gbps
<b>Stacking density</b> (maximum switches in a stack)	N/A	12	12	12	12
<b>Maximum stacking distance</b> (distance between stacked switches)	N/A	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				
<b>Power supply rated maximum (AC)</b>	135 W	135 W	135 W	525 W	880 W
<b>PoE power budget (AC)</b> (internal AC power supply only)	N/A	N/A	N/A	370 W	740 W
<b>Switch power consumption (25°C)</b>					
<b>Idle</b> (no PoE load)	33.6 W	42.6 W	50.64 W	50 W	66 W
<b>10% traffic*</b> (full PoE load)	42.6 W	51.6 W	63.55 W	63 W	84 W
<b>100% traffic*</b> (full PoE load)	44.4 W	57.6 W	69.51 W	73 W	96 W
<b>Airflow</b>	front-to-back	side-to-back	side-to-back	side-to-back	side-to-back
<b>Switch heat dissipation (25°C)<sup>†</sup></b>					
<b>Idle</b> (no PoE load)	114.6 BTU/Hr	145.3 BTU/Hr	172.7 BTU/Hr	170.6 BTU/Hr	225.2 BTU/Hr
<b>10% traffic*</b> (full PoE load)	145.3 BTU/Hr	176.06 BTU/Hr	216.8 BTU/Hr	214.9 BTU/Hr	286.6 BTU/Hr
<b>100% traffic*</b> (full PoE load)	151.4 BTU/Hr	196.5 BTU/Hr	237.1 BTU/Hr	249.08 BTU/Hr	327.5 BTU/Hr

\* Traffic load on all ports connected with maximum possible PoE/PoE+ loads (if equipped). PoE power delivered to powered devices not included.

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

## Brocade ICX 7250 Feature/Model Comparison (Continued)

	24 RJ-45 Ports	24 or 48 Ports Non-PoE	24 or 48 PoE+ Ports		
<b>Environment</b>					
<b>Weight (kg)</b>	3.58	3.76	4.84	4.73	5.86
<b>Dimensions</b>	<b>48 port:</b> 440 mm (17.323 in.) W×370 mm (14.56 in.) D×43.7 mm (1.720 in.) H – 1U <b>24 port:</b> 440 mm (17.323 in.) W×280 mm (11.02 in.) D×43.7 mm (1.720 in.) H – 1U				
<b>Acoustics (25°C)</b>	40 dB	41.9 dB	44.5 dB	44.7 dB	45.9 dB
<b>MTBF (hours) (25°C)</b>	767,718	676,362	665,319	429,209	411,187

## Brocade ICX 7250 Specifications

### Specifications

Connector options	<ul style="list-style-type: none"> <li>• 10/100/1000 ports: RJ-45</li> <li>• 1 Gbps SFP ports (Brocade ICX 7250-24G only)</li> <li>• 1/10 Gbps SFP+ ports (not available on Brocade ICX 7250-24G)</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>• File transfer: USB port (Standard-A plug)</li> </ul> For the latest information about supported optics, please visit <a href="http://www.Brocade.com/Optics">www.Brocade.com/Optics</a> .	
Maximum MAC addresses	16,000	
Maximum VLANs	4,095	
Maximum STP (spanning trees)	254	
Maximum routes (in hardware)	12,000	
Trunking	16	
Maximum jumbo frame size	9,216 bytes	
Average latency	1.5 µs	
QoS Priority Queues	8	
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>• PIM-SM v2 Snooping</li> <li>• Port Loop Detection</li> <li>• Private VLAN</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>	

## Brocade ICX 7250 Specifications (Continued)

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> </ul>	<ul style="list-style-type: none"> <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	<ul style="list-style-type: none"> <li>• IPv4 and IPv6 dynamic routes</li> <li>• RIP v1/v2</li> <li>• OSPF v2</li> <li>• Virtual Route Redundancy Protocol (VRRP)</li> <li>• VRRP-E</li> <li>• IPv6 over IPv4 tunnels</li> </ul>	<ul style="list-style-type: none"> <li>• PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality)</li> <li>• OSPF v3</li> <li>• VRRP v3</li> <li>• RIPng</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> </ul>	<ul style="list-style-type: none"> <li>• Operates seamlessly under the Brocade SDN 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> </ul>	<ul style="list-style-type: none"> <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> </ul>	<ul style="list-style-type: none"> <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> </ul>	<ul style="list-style-type: none"> <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>• 802.3az-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> </ul>	<ul style="list-style-type: none"> <li>• Inbound rate limiting per port</li> <li>• Outbound rate limiting per port and per queue</li> </ul>
High availability	<ul style="list-style-type: none"> <li>• L3 VRRP protocol redundancy</li> <li>• Real-time state synchronization across the stack</li> </ul>	<ul style="list-style-type: none"> <li>• Hitless failover from master to standby stack controller</li> <li>• Hot insertion and removal of stacked units</li> </ul>

### Network and Device Management

Management	<ul style="list-style-type: none"> <li>• Auto Configuration</li> <li>• Configuration Logging</li> <li>• Digital Optical Monitoring</li> <li>• Display Log Messages on Multiple Terminals</li> <li>• Embedded Web Management</li> <li>• Embedded DHCP Server</li> </ul>	<ul style="list-style-type: none"> <li>• Industry-standard Command Line Interface (CLI)</li> <li>• Key-based activation of optional software features</li> <li>• Integration with HP OpenView for Sun Solaris, HP-UX, IBM AIX, and Windows</li> <li>• Brocade Network Advisor</li> <li>• MIB Support for MRP, Port Security, MAC Authentication, and MAC-based VLANs</li> </ul>
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## Brocade ICX 7250 Specifications (Continued)

Management (continued)	<ul style="list-style-type: none"> <li>• Out-of-band Ethernet Management</li> <li>• ERSPAN support for remote traffic monitoring</li> <li>• RFC 783 TFTP</li> <li>• RFC 854 TELNET Client and Server</li> <li>• RFC 951 Bootp</li> <li>• RFC 1157 SNMPv1/v2c</li> <li>• RFC 1213 MIB-II</li> <li>• RFC 1493 Bridge MIB</li> <li>• RFC 1516 Repeater MIB</li> <li>• RFC 1573 SNMP MIB II</li> <li>• RFC 1643 Ethernet Interface MIB</li> <li>• RFC 1724 RIP v1/v2 MIB</li> <li>• RFC 1757 RMON MIB</li> <li>• RFC 2068 Embedded HTTP</li> </ul>	<ul style="list-style-type: none"> <li>• RFC 2131 DHCP Server and DHCP Relay</li> <li>• RFC 2570 SNMPv3 Intro to Framework</li> <li>• RFC 2571 Architecture for Describing SNMP Framework</li> <li>• RFC 2572 SNMP Message Processing and Dispatching</li> <li>• RFC 2573 SNMPv3 Applications</li> <li>• RFC 2574 SNMPv3 User-based Security Model</li> <li>• RFC 2575 SNMP View-based Access Control Model SNMP</li> <li>• RFC 2818 Embedded HTTPS</li> <li>• RFC 3176 sFlow</li> <li>• SNTP Simple Network Time Protocol</li> <li>• Multiple Syslog Servers</li> </ul>
Security	<ul style="list-style-type: none"> <li>• 802.1X Accounting</li> <li>• MAC Authentication</li> <li>• DHCP snooping</li> <li>• Dynamic ARP inspection</li> <li>• Bi-level Access Mode (Standard and EXEC Level)</li> <li>• EAP pass-through support</li> <li>• IEEE 802.1X username export in sFlow</li> <li>• Protection against Denial of Service (DoS) attacks</li> <li>• Authentication, Authorization, and Accounting (AAA)</li> </ul>	<ul style="list-style-type: none"> <li>• Advanced Encryption Standard (AES) with SSHv2</li> <li>• RADIUS/TACACS/TACACS+</li> <li>• Secure Copy (SCP)</li> <li>• Secure Shell (SSHv2)</li> <li>• Username/Password</li> <li>• Web authentication</li> <li>• Change of Authorization (CoA) RFC 5176</li> <li>• Flexible authentication</li> </ul>
<b>Environment</b>		
Temperature	<ul style="list-style-type: none"> <li>• Operating temperature: -5°C to 50°C/23°F to 122°F</li> <li>• Storage temperature: -25°C to 70°C/-13°F to 158°F</li> </ul>	
Humidity	<ul style="list-style-type: none"> <li>• Operating relative humidity: 5% to 95% at 50°C, non-condensing</li> <li>• Non-operating relative humidity: 0% to 95% at 70°C, non-condensing</li> </ul>	
Altitude	<ul style="list-style-type: none"> <li>• Operating altitude: 10,000 ft (3,000 m) maximum</li> <li>• Storage altitude: 39,000 ft (12,000 m) maximum</li> </ul>	
<b>Compliance/Certification</b>		
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 7250 Ordering Information

Part Number	Description
<b>Brocade ICX 7250 Switches</b>	
ICX7250-24G	Brocade ICX 7250 Switch 24-port, 4x1 GbE (basic, non-upgradable switch) with front-to-back airflow, no EPS connector
ICX7250-24	Brocade ICX 7250 Switch 24-port, 8x1/10 GbE, no 10 GbE PoD license preloaded, with side-to-back airflow
ICX7250-24P	Brocade ICX 7250 Switch 24-port PoE, 8x1/10 GbE, no 10 GbE PoD license preloaded, with side-to-back airflow
ICX7250-48	Brocade ICX 7250 Switch 48-port, 8x1/10 GbE, no 10 GbE PoD license preloaded, with side-to-back airflow
ICX7250-48P	Brocade ICX 7250 Switch 48-port PoE, 8x1/10 GbE, no 10 GbE PoD license preloaded, with side-to-back airflow
<b>Switches</b>	<b>With 2x10 GbE PoD Licenses</b>
ICX7250-24-2X10G	Brocade ICX 7250 Switch 24-port, 8x1/10 GbE, 2x10 GbE PoD license preloaded
ICX7250-24P-2X10G	Brocade ICX 7250 Switch 24-port PoE, 8x1/10 GbE, 2x10 GbE PoD license preloaded
ICX7250-48-2X10G	Brocade ICX 7250 Switch 48-port, 8x1/10 GbE, 2x10 GbE PoD license preloaded
ICX7250-48P-2X10G	Brocade ICX 7250 Switch 48-port PoE, 8x1/10 GbE, 2x10 GbE PoD license preloaded
<b>Brocade ICX-EPS 4000 External Power Supply Options for the Brocade ICX 7250 Switch</b>	
The Brocade ICX-EPS4000 supports up to four removable power supplies. Each power supply provides 920 W.	
ICX-EPS4000-SHELF	1U EPS
RPS17	EPS power supply, 920 W
ICX-EPS4000-CBL-01	Brocade ICX-EPS4000 power cable 1:1
ICX-EPS4000-CBL-02	Brocade ICX-EPS4000 power cable 1:2
<b>Feature License and Accessories</b>	
ICX7250-PREM-LIC	Brocade ICX 7250 Layer 3 Premium software license (non-node lock)
ICX7250-2X10G-LIC-POD	2x10 GbE PoD license (node lock)—upgrade uplink/stacking ports from 8x1 GbE to 2x1 GbE/10 GbE + 6x1 GbE
ICX7250-8X10G-LIC-POD	Upgrade uplink/stacking ports from 2x1 GbE/10 GbE + 6x1 GbE to 8x1 GbE/10 GbE (node lock)
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
<b>Optics</b>	<b>For Brocade ICX 7250-24G Only</b>
EIMG-BXD	1000BASE-BXD SFP optic SMF, transmits at 1,490 nm and receives at 1,310 nm, LC connector, single strand SMF fiber. This optic should only be connected to an EIMG-BXU at the far end.
EIMG-BXU	1000BASE-BXU SFP optic SMF, transmits at 1,310 nm and receives at 1,490 nm, LC connector, single strand SMF fiber. This optic should only be connected to an EIMG-BXD at the far end.
EIMG-LHA-OM-T	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring capable (70 km), industrial temperature
EIMG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring capable
EIMG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable
EIMG-TX	1000BASE-TX SFP copper, RJ-45 connector

## Brocade ICX 7250 Ordering Information (Continued)

<b>Optics</b>	<b>For Brocade ICX 7250-24/24P/48/48P</b>
10G-SFPP-ER	10GBASE-ER SFP+ optic (LC), for up to 40 km over SMF
10G-SFPP-LR	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF
10G-SFPP-SR	10GBASE-SR, SFP+ optic (LC), target range 300 m over MMF
10G-SFPP-USR	10GE USR SFP+ optic (LC), target range 100 m over MMF, 1-pack
10G-SFPP-ZR	10GBASE-ZR SFP+ optic (LC), for up to 80 km over SMF
E1MG-BXD	1000BASE-BXD SFP optic SMF, transmits at 1,490 nm and receives at 1,310 nm, LC connector, single strand SMF fiber. This optic should only be connected to an E1MG-BXU at the far end.
E1MG-BXU	1000BASE-BXU SFP optic SMF, transmits at 1,310 nm and receives at 1,490 nm, LC connector, single strand SMF fiber. This optic should only be connected to an E1MG-BXD at the far end.
E1MG-LHA-OM-T	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring capable (70 km), industrial temperature
E1MG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring capable
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable
E1MG-TX	1000BASE-TX SFP Copper, RJ-45 connector
<b>Direct-Attached Cables</b>	<b>For Brocade ICX 7250-24/24P/48/48P</b>
10G-SFPP-TWX-0101	Direct-attached SFP+ copper cable, 1 m, 1-pack, active
10G-SFPP-TWX-0301	Direct-attached SFP+ copper cable, 3 m, 1-pack, active
10G-SFPP-TWX-0501	Direct-attached SFP+ copper cable, 5 m, 1-pack, active
10GE-SFPP-AOC-0701	10 GbE SFP+ direct-attached active optical cable, 7m, 1-pack
10GE-SFPP-AOC-1001	10 GbE SFP+ direct-attached active optical cable, 10 m, 1-pack
1G-SFP-TWX-0101	Direct-attached 1 GbE SFP copper cable, 1 m
1G-SFP-TWX-0501	Direct-attached 1 GbE SFP copper cable, 5 m

For a list of cables and fiber optics approved for stacking, visit [www.brocade.com/fastironstacking](http://www.brocade.com/fastironstacking).



## Ordering Instructions

Customers have two options when ordering a Brocade ICX 7250 Switch. They can order one of the five Brocade ICX 7250 Switch models with 1 GbE uplink/stacking ports, or order a switch preloaded with a PoD license for two 10 GbE uplink/stacking ports.

The Brocade ICX 7250 (-24/-24P/-48/-48P) can be upgraded to 2x10 GbE uplink/stacking ports by purchasing a PoD license (ICX7250-2X10G-LIC-POD).

A Brocade ICX 7250 Switch with 2x10 GbE uplink/stacking ports can be upgraded to 8x10 GbE by purchasing an additional PoD license (ICX7250-8X10G-LIC-POD). Only switches that already have 2x10 GbE can be upgraded to 8x10 GbE.

Note that the Brocade ICX 7250-24G Switch is not upgradable and will support 4x1 GbE uplink ports only.

All Brocade ICX 7250 Switches include a power cord, two-post rack mounting brackets, and a USB serial console cable. Stacking cables must be ordered separately.

### Corporate Headquarters

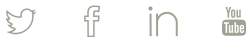
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