State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

ADDRESS CORRESPONDENCE TO ATTENTION OF:

ROBERTA WAGNER
304-558-0067

VENDOR

RFQ COPY
TYPE NAME/ADDRESS HERE

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

SHIP TO

HEALTH AND HUMAN RESOURCES
WILLIAM R. SHARPE JR. HOSPITAL
VARIOUS LOCALES AS INDICATED
BY ORDER

DATE PRINTED
12/18/2013

BID OPENING DATE: 01/15/2014   BID OPENING TIME 1:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT

THE WEST VIRGINIA PURCHASING DIVISION FOR THE
AGENCY, WVDHHR, BUREAU OF HEALTH AND HEALTH FACILITIES
IS SOLICITING BIDS TO ESTABLISH A CONTRACT FOR THE ONE
TIME PURCHASE OF NETWORK SWITCHES TO REPLACE EXISTING
NETWORK EQUIPMENT LOCATED AT WILLIAM R. SHARPE, JR.
HOSPITAL, 936 SHARPE HOSPITAL ROAD, WESTON, WV 26452.

ATTACHMENTS INCLUDE:
1. INSTRUCTIONS TO VENDORS SUBMITTING BIDS.
2. GENERAL TERMS AND CONDITIONS.
3. WSH14122 SPECIFICATIONS.
4. CERTIFICATION AND SIGNATURE PAGE.
5. PURCHASING AFFIDAVIT.
6. RESIDENT VENDOR PREFERENCE (RVP) FORM.

THE MODEL/BRAND/SPECIFICATIONS NAMED HEREIN ESTABLISH
THE ACCEPTABLE LEVEL OF QUALITY ONLY AND ARE NOT
INTENDED TO REFLECT A PREFERENCE OR FAVOR ANY
PARTICULAR BRAND OR VENDOR. VENDORS WHO ARE BIDDING
ALTERNATES SHOULD SO STATE AND INCLUDE PERTINENT
LITERATURE AND SPECIFICATIONS. FAILURE TO PROVIDE
INFORMATION FOR ANY ALTERNATES MAY BE GROUNDS FOR
REJECTION OF THE BID. THE STATE RESERVES THE RIGHT
TO WAIVE MINOR IRREGULARITIES IN BIDS OR SPECIFICATIONS
IN ACCORDANCE WITH SECTION 148-1-4(F) OF THE WEST
VIRGINIA LEGISLATIVE RULES AND REGULATIONS.

01/14/14 02:53:49PM
West Virginia Purchasing Division

0001   EA   205-43
              22
CATALYST 2960S 48 GIGE POE 740W, 4 SFP LAN BASE

SIGNATURE _____

TELEPHONE 304 719-1645   DATE 1-15-2014

TITLE Sr. Client Executive   FEIN 61-1371685

ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO SOLICITATION, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

Solicitation

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LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
				Brocade Alternate Bid		
				See atached pricing sheet.		
0002	2	EA	205-43			
	CATALYST 2960S 24 GIGE POE 370W, 2 X SFP LAN BASE					
0003	20	EA	205-43			
	CISCO CATALYST 2960S FLEXSTACK STACK MODULE, PART					
0004	12	EA	205-43			
	CISCO FLEXSTACK 50CM STACKING CABLE, PART NUMBER					
0005	8	EA	205-43			
	CISCO FLEXSTACK 1M STACKING CABLE, PART NUMBER					
0006	24	EA	205-43			
	CISCO GE SFP, LC CONNECTOR SX TRANSCEIVER, PART					

SIGNATURE		TELEPHONE		DATE	
TITLE	FEIN			ADDRESS CHANGES TO BE NOTED ABOVE	

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LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0007	24	EA	205-43			
	AC POWER CORD, 16AWG, PART NUMBER CAB-16AWG-AC					
0008	8	YR	205-43			
	1ST YEAR CISCO SMARTNET EXTENDED SERVICE AGREEMENT					
0009	1	YR	205-43			
	2ND YEAR RENEWAL PERIOD FOR SERVICE AGREEMENT					
0010	1	YR	205-43			
	3RD YEAR RENEWAL PERIOD FOR SERVICE AGREEMENT					
0011	1	YR	205-43			
	4TH YEAR RENEWAL PERIOD FOR SERVICE AGREEMENT					

SIGNATURE		TELEPHONE	DATE
TITLE	FEIN		ADDRESS CHANGES TO BE NOTED ABOVE

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LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0012	1	YR		205-43		
	5TH YEAR RENEWAL PERIOD FOR SERVICE AGREEMENT					
0013	1	YR		205-43		
	1ST YEAR EXTENDED SERVICE AGREEMENT FOR PART NUMBER					
0014	1	YR		205-43		
	2ND YEAR RENEWAL PERIOD FOR PART NUMBER					
0015	1	YR		205-43		
	3RD YEAR RENEWAL PERIOD FOR PART NUMBER					
0016	1	EA		205-43		
	4TH YEAR RENEWAL PERIOD FOR PART NUMBER					

SIGNATURE		TELEPHONE		DATE
TITLE		FEIN		ADDRESS CHANGES TO BE NOTED ABOVE

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BID OPENING DATE: 01/15/2014 BID OPENING TIME 1:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0017	1	YR		205-43		

5TH YEAR RENEWAL PERIOD FOR PART NUMBER

****** THIS IS THE END OF RFQ   WSH14122 ****** TOTAL: $63,840.00

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO SOLICITATION, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

☐ **BID BOND:** All Vendors shall furnish a bid bond in the amount of five percent (5%) of the total amount of the bid protecting the State of West Virginia. The bid bond must be submitted with the bid.

☐ **PERFORMANCE BOND:** The apparent successful Vendor shall provide a performance bond in the amount of   . The performance bond must be issued and received by the Purchasing Division prior to Contract award. On construction contracts, the performance bond must be 100% of the Contract value.

☐ **LABOR/MATERIAL PAYMENT BOND:** The apparent successful Vendor shall provide a labor/material payment bond in the amount of 100% of the Contract value. The labor/material payment bond must be issued and delivered to the Purchasing Division prior to Contract award.

In lieu of the Bid Bond, Performance Bond, and Labor/Material Payment Bond, the Vendor may provide certified checks, cashier's checks, or irrevocable letters of credit. Any certified check, cashier's check, or irrevocable letter of credit provided in lieu of a bond must be of the same amount and delivered on the same schedule as the bond it replaces. A letter of credit submitted in lieu of a performance and labor/material payment bond will only be allowed for projects under $100,000. Personal or business checks are not acceptable.

☐ **MAINTENANCE BOND:** The apparent successful Vendor shall provide a two (2) year maintenance bond covering the roofing system. The maintenance bond must be issued and delivered to the Purchasing Division prior to Contract award.

☑ **WORKERS' COMPENSATION INSURANCE:** The apparent successful Vendor shall have appropriate workers' compensation insurance and shall provide proof thereof upon request.

☑ **INSURANCE:** The apparent successful Vendor shall furnish proof of the following insurance prior to Contract award and shall list the state as a certificate holder: *Understood will provide*

eQA 1-15-2014

    ☑ **Commercial General Liability Insurance:**
    1,000,000.00 minimum   ⊞ or more.
    ☐ **Builders Risk Insurance:** builders risk – all risk insurance in an amount equal to
       100% of the amount of the Contract.

    ☐

    ☐

    ☐

    ☐

    ☐

REQUEST FOR QUOTATION
WSH14122 Cisco Network Switches

Point of Contact: _Charles D. Arnett_
Telephone Number: _204 . 768-1645_
Fax Number: _204 . 768-1671_
Email Address: _carnett@ thinksis. com_

#10 (3.8.3)	1 yr.	3rd Year renewal period for service agreement on part number CON-SNT-2960S4FS or equal for a qty. of 22 each.		
#11 (3.8.4)	1 yr.	4th Year renewal period for service agreement on part number CON-SNT-2960S4FS or equal for a qty. of 22 each.		
#12 (3.8.5)	1 yr.	5th Year renewal period for service agreement on part number CON-SNT-2960S4FS or equal for a qty. of 22 each		
#13 (3.9.1)	1 yr.	1st Year Extended Service Agreement for Part number CON-SNT-2960S2PS or equal for a qty. of 2 each.		
#14 (3.9.2)	1 yr.	2nd Year Renewal Period for Part number CON-SNT-2960S2PS or equal for a qty. of 2 each.		
#15 (3.9.3)	1 yr.	3rd Year Renewal Periof for Part Number CON-SNT-2960S2PS or equal for a qty. of 2 each.		
#16 (3.9.4)	1 yr.	4thYear Renewal Period for Part Number CON-SNT-2960S2PS or equal for a qty. of 2 each.		
#17 (3.9.5)	1 yr.	5th Year Renewal Period for Part Number CON-SNT-2960S2PS or equal for a qty. of 2 each.		
		Grand Total Bid	63 990.00	

THIS IS A ONE-TIME PURCHASE OF CISCO SWITCHES AND RELATED HARDWARE

CONTRACT ITEMS MUST BE SHIPPED F.O.B. DESTINATION.

Exhibit A
REQUEST FOR QUOTATIONS
WSH14122 CISCO NETWORK SWITCHES

PRICING PAGE

See atabl pricm
sheet

Desired Item #	Quantity	Description	Unit Cost	Extended Cost
#1 (3.1)	22 ea.	Catalyst 2960S 48 GigE PoE 740W, 4 x SFP LAN Base Switch, part number WS-C2960S-48FPS-L or equal.		
#2 (3.2)	2 ea.	Catalyst 2960S 24 GigE PoE 370W, 2 x SFP LAN Base Switch, part number WS-C2960S-24PS-L or equal.		
#3 (3.3)	20 ea.	Cisco Catalyst 2960S FlexStack Stack Module, part number C2960S-STACK or equal.		
#4 (3.4)	12 ea.	Cisco FlexStack 50cm Stacking Cable, part number CAB-STK-E-0.5M or equal.		
#5 (3.5)	8 ea.	Cisco FlexStack 1m Stacking Cable, part number CAB-STK-E-1M or equal.		
#6 (3.6)	24 ea.	Cisco GE SFP, LC connector SX Transceiver, part number GLC-SX-MM or equal.		
#7 (3.7)	24 ea.	AC Power cord, 16AWG, part number CAB-16AWG-AC or equal.		
#8 (3.8.1)	1 yr.	1st Year Cisco Smartnet extended service agreement for WS-C2960S-48FPS-L 12 month duration, part number CON-SNT-2960S4FS or equal for a qty. of 22 each.		
#9 (3.8.2)	1 yr.	2nd Year renewal period for service agreement on part number CON-SNT-2960S4FS or equal for a qty. of 22 each.		

WSH14122 RFQ Pricing Sheet

All components included to meet the requirements

Desired Item #	Quantity	Description	Alternate Description	Alternative List Price	Extended List Price
#1 (3.1)	22	Catalyst 2960S 48 GigE PoE 740W, 4xSFP Lan Base Switch, part number WS-C2960S-48FPS-L or equal.	ICX 6450 48 GigE PoE Switch, 48-port 1G Switch PoE+ 780W, 2x1G SFP+ (upgradable to 10G) & 2x1G/10G SFP+ Uplink/Stacking Ports, part number ICX6450-48P	$ 2,370.00	$ 52,140.00
#2 (3.2)	2	Catalyst 2960S 24 GigE PoE 370W, 2 x SFP LAN Base Switch, part number WS_C2960PS-L or equal.	ICX 6450 24 GigE PoE Switch, 24-port 1G Switch PoE+ 390W, 2x1G SFP+ (upgradable to 10G) & 2x1G/10G SFP+ Uplink/Stacking Ports, part number ICX6450-24P	$ 1,100.00	$ 2,200.00
#3 (3.3)	20	Cisco Catalyst 2960S FlexStack Stack Module, part number C2960S-STACK or equal.	NA	included	$ -
#4 (3.4)	12	Cisco FlexStack 56cm Stacking Cable, part number CAB-STK-E-.5M or equal.	DIRECT ATTACHED 10G SFP+ COPPER CABLE, 1M, STACKING CABLE, part number 10G-SFPP-TWX-0101 (20 1M cables included for 3.4 and 3.5)	$ 55.00	$ 660.00
#5 (3.5)	8	Cisco FlexStack 1m Stacking Cable, part number CAB-STK-E-1M or equal.	DIRECT ATTACHED 10G SFP+ COPPER CABLE, 1M, STACKING CABLE, part number 10G-SFPP-TWX-0101 (20 1M cables included for 3.4 and 3.5)	$ 55.00	$ 440.00
#6 (3.6)	24	Cisco GE SFP, LC connector SX Transciever, part number GLC-SX-MM or equal	1000Base-SX SFP optic, MMF, LC connector, Optical Monitoring Capable, part number E1MG-SX-OM	$ 150.00	$ 3,600.00
#7 (3.7)	24	AC Power cord, 16AWG, Part number CAB-16AWG-AC or Equal.	Power Cord for USA version	included	
#8 (3.8.1)	1 Yr.	1st Year Cisco Smartnet extended service agreement for WS-C2960S-48FPS-L 12 month duration, part number CON-SNT-2960S4FS or equal for qty. of 22 each	Brocade Assurance Limited Lifetime Warranty. Advanced Part Replacement, Next Business Day Service for lifetime (or 5 years after End of Sale (EOS) announcement) of the product for the original owner. (ICX 6450 Also includes 3 years of software upgrades	included	$ -
#9 (3.8.2)	1 Yr.	2nd Year renewal period for service agreement on part number CON-SNT-2960S4FS or equal for qty. of 22	Brocade Assurance Limited Lifetime Warranty. Advanced Part Replacement, Next Business Day Service for lifetime (or 5 years after End of Sale (EOS) announcement) of the product for the original owner. (ICX 6450 Also includes 3 years of software upgrades	included	
#10 (3.8.3)	1 Yr.	3rd Year renewal period for service agreement on part number CON-SNT-2960S4FS or equal for qty. of 22	Brocade Assurance Limited Lifetime Warranty. Advanced Part Replacement, Next Business Day Service for lifetime (or 5 years after End of Sale (EOS) announcement) of the product for the original owner. (ICX 6450 Also includes 3 years of software upgrades	included	
#11 (3.8.4)	22	45h Year renewal period for service agreement on part number CON-SNT-2960S4FS or equal for qty. of 22	Adds remote support to the Lifetime warranty (ICX6450-SVL-RMT-1)	$ 100.00	$ 2,200.00
#12 (3.8.5)	22	5th Year renewal period for service agreement on part number CON-SNT-2960S4FS or equal for qty. of 22	Adds remote support to the Lifetime warranty (ICX6450-SVL-RMT-1)	$ 100.00	$ 2,200.00
#13 (3.9.1)	1 Yr.	1st Year extend service Agreement for part number CON-SNT-2960S2FS or equal for qty. of 2	Brocade Assurance Limited Lifetime Warranty. Advanced Part Replacement, Next Business Day Service for lifetime (or 5 years after End of Sale (EOS) announcement) of the product for the original owner. (ICX 6450 Also includes 3 years of software upgrades	included	
#14 (3.9.2)	1 Yr.	2nd Year extend service Agreement for part number CON-SNT-2960S2FS or equal for qty. of 2	Brocade Assurance Limited Lifetime Warranty. Advanced Part Replacement, Next Business Day Service for lifetime (or 5 years after End of Sale (EOS) announcement) of the product for the original owner. (ICX 6450 Also includes 3 years of software upgrades	included	
#15 (3.9.3)	1 Yr.	3rd Year extend service Agreement for part number CON-SNT-2960S2FS or equal for qty. of 2	Brocade Assurance Limited Lifetime Warranty. Advanced Part Replacement, Next Business Day Service for lifetime (or 5 years after End of Sale (EOS) announcement) of the product for the original owner. (ICX 6450 Also includes 3 years of software upgrades	included	
#16 (3.9.4)	2	4th Year extend service Agreement for part number CON-SNT-2960S2FS or equal for qty. of 2	Adds remote support to the Lifetime warranty (ICX6450-SVL-RMT-1)	$ 100.00	$ 200.00
#17 (3.9.5)	2	5th Year extend service Agreement for part number CON-SNT-2960S2FS or equal for qty. of 2	Adds remote support to the Lifetime warranty (ICX6450-SVL-RMT-1)	$ 100.00	$ 200.00
		Total			$ 63,840.00

Exhibit A
REQUEST FOR QUOTATIONS
WSH14122 CISCO NETWORK SWITCHES

AGENCY WILL EVALUATE BIDS BASED ON THE GRAND TOTAL BID PRICE. A CONTRACT WILL BE AWARDED TO THE VENDOR THAT PROVIDES THE CONTRACT ITEMS MEETING THE REQUIRED SPECIFICATIONS FOR THE LOWEST OVERALL GRAND TOTAL BID PRICE.

PAYMENT TO VENDOR WILL BE MADE IN ARREARS AFTER DELIVERY, AND 100% ACCEPTANCE OF CONTRACT ITEMS BY THE AGENCY.
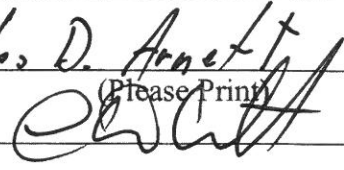
Vendor Name: _Software Information Systems LLC_

Vendor Address: _200 Association Dr. Suite 210_
Charleston, WV 25311

Vendor Telephone Number: _304 768-1645_

Vendor Fax Number: _304 768-1671_

Vendor Email: _carnett @ thinksis.com_

Vendor Authorized Representative: _Charles D. Arnett_
(Please Print)

Vendor Authorized Representative Signature: _[signature]_

Date: _1-5-2017_

CERTIFICATION AND SIGNATURE PAGE

By signing below, I certify that I have reviewed this Solicitation in its entirety; understand the requirements, terms and conditions, and other information contained herein; that I am submitting this bid or proposal for review and consideration; that I am authorized by the bidder to execute this bid or any documents related thereto on bidder's behalf; that I am authorized to bind the bidder in a contractual relationship; and that to the best of my knowledge, the bidder has properly registered with any State agency that may require registration.

Software Information Systems, LLC
(Company)

eCatt
(Authorized Signature)

Charles D. Arnott   Sr. Client Executive
(Representative Name, Title)

_304 768-1645   304 768-1671_
(Phone Number)   (Fax Number)

_1-5-2014_
(Date)

RFQ No. WSH14122

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 Information Systems_

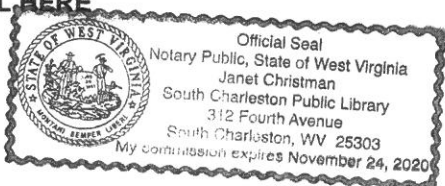Authorized Signature: _____   Date: _1-13 2014_

State of _West Virginia_

County of _Kanawha_____, to-wit:

Taken, subscribed, and sworn to before me this _13_ day of _January_____, 20_14_.

My Commission expires _Nov 2020_____, 20___.

AFFIX SEAL HERE

NOTARY PUBLIC _Janet Christman_

Official Seal
Notary Public, State of West Virginia
Janet Christman
South Charleston Public Library
312 Fourth Avenue
South Charleston, WV 25303
My commission expires November 24, 2020

Purchasing Affidavit (Revised 07/01/2012)

BROCADE ICX 6430 AND 6450 SWITCHES

ENTERPRISE LAN SWITCHING

Enterprise-Class Stackable Switching at an Entry-Level Price

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

- Delivers unprecedented feature/price value for enterprise applications, including Unified Communications (UC) and mobility, with 10 Gigabit Ethernet (GbE) and PoE/PoE+

- Provides unmatched availability for low-cost switching with redundant uplink/stacking ports, hitless stacking failover, and configurable power redundancy

- Simplifies network operations and protects investments with the Brocade HyperEdge Architecture, enabling consolidated network management and advanced services-sharing across heterogeneous switches

- Offers attractive 12-port, compact, and enterprise-class fanless switch models for deployments outside of the wiring closet

- Includes the Brocade Assurance Limited Lifetime Warranty and three years of technical support

Today's organizations expect their enterprise campus LANs to deliver more services to more users at a lower cost. These services include next-generation business applications as well as anytime, anywhere access for mobile devices. At the same time, campus LANs must be able to scale easily to meet future demands and efficiently evolve within dynamic business environments.

Brocade® ICX® 6430 and 6450 Switches provide 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 6430 and 6450 are available in

12-, 24-, and 48-port 10/100/1000 Mbps models and 1 Gigabit Ethernet (GbE) or 10 GbE dual-purpose uplink/stacking ports (see Figures 1 and 2)—with or without IEEE 802.3af Power over Ethernet (PoE) and 802.3at Power over Ethernet Plus (PoE+)— to support enterprise edge networking, wireless mobility, and IP communications.

BUILT FOR MAXIMUM COST-EFFICIENCY AND INVESTMENT PROTECTION

With Brocade ICX 6430 and 6450 Switches, organizations can buy only what they need today and easily scale user ports and services as their network requirements evolve. Brocade offers maximum investment protection through flexible software licensing options that bring advanced services and performance to lower-cost ports.
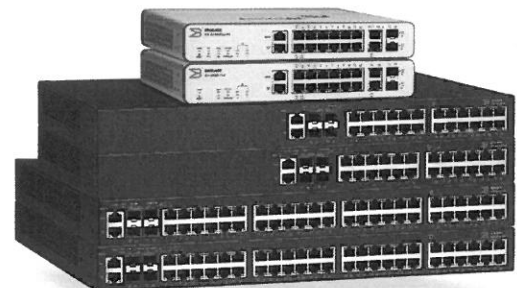
BROCADE

In particular, the Brocade HyperEdge™ Architecture allows premium switch features and services to be shared with entry-level switches (Brocade ICX 6450 only). The Brocade ICX switches also are hardware-capable for easy software implementation (software available in a future release) of emerging security (IEEE 802.1AE MACsec) and energy savings (IEEE 802.3az EEE) standards, helping to protect today's investments while supporting tomorrow's needs.

Brocade ICX 6430 and 6450 Switches come with three years of technical support from the Brocade Technical Assistance Center and software maintenance updates. With these capabilities, organizations gain peace of mind while freeing up IT budget and resources to grow their businesses.

AUTOMATED DEPLOYMENT AND MANAGEMENT

Brocade ICX 6430 and 6450 Switches help simplify network deployment and management by enabling auto-discovery of new Brocade ICX switches within the stack. IT organizations can auto-configure switches using pre-set instructions on the network. To further simplify management, these stacked switches collectively utilize only a single IP address and offer transparent forwarding across the stack.

By embedding sFlow capabilities into the Brocade ICX 6450, Brocade delivers an "always-on" monitoring technology that operates with wire-speed performance. sFlow dramatically reduces implementation complexity compared to traditional network monitoring solutions that rely on mirrored ports, probes, and line-tap technologies.

HIGH AVAILABILITY AND RESILIENCY

Brocade Ethernet switch stacking technology helps IT organizations meet growing user demand by delivering high availability through real-time state synchronization across the stack and instantaneous hitless failover support. In addition, organizations can use hot-insertion and removal of stack members to avoid interrupting network service when adding or replacing a switch. High-performance Link Aggregation Groups (LAGs) increase 10 GbE uplink bandwidth and redundancy to the core, giving users uninterrupted high performance to support the most demanding applications. Brocade ICX 6430 and 6450 Switches also offer an external power supply for added resiliency and increased PoE/PoE+ port availability (see Figure 3).

STACKING TECHNOLOGY FOR THE MOST DEMANDING CAMPUS LAN ENVIRONMENTS

Brocade Ethernet switch stacking technology makes it possible to stack up to eight Brocade ICX 6450 Switches into a single logical switch (except the Brocade ICX 6450-C), providing simple and robust expandability for future growth at the network edge. This stacked switch has only a single IP address to simplify management and offers transparent forwarding across a pool of up to 384 1 GbE ports and 32 10 GbE ports. When new switches join the stack, they automatically inherit the stack's existing configuration file, enabling true plug-and-play network expansion. Flexible licensing of 1 GbE to 10 GbE ports for uplink and stacking allows organizations to optimize network performance based on

specific requirements. 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.

For networks with lower bandwidth requirements, the Brocade ICX 6430 offers the same rugged stacking capability (except the Brocade ICX 6430-C) at a reduced price, providing a lower-density solution of up to 192 1 GbE access ports with 16 1 GbE uplink and stacking ports, and a maximum stack height of four switches.

Built to Power Next-Generation Edge Devices

The Brocade ICX 6430 and 6450 can deliver both PoE power and data across network connections, providing a single-cable solution for the latest edge devices (see Figure 4). Brocade ICX switches are compatible with industry-standard Voice over IP (VoIP) equipment as well as legacy IP phones. In addition, they support the PoE+ standard (IEEE 802.3at) to provide up to Class 4 (30 watts) power to each device. This high-powered solution simplifies wiring for next-generation edge devices, such as video conferencing and VoIP phones, surveillance cameras, and 802.11n wireless Access Points (APs). The PoE capability reduces the number of power receptacles and power adapters while increasing reliability and wiring flexibility. The Brocade ICX 6450 can provide PoE power to all ports and PoE+ (30 watts) to all ports when an external power supply is deployed.

Figure 1.
Brocade ICX 6450 Switches support four dual-mode 1 GbE/10 GbE SFP/SFP+ ports for uplink and stacking, and up to 48 1 GbE RJ-45 ports. Brocade ICX 6430-24 and 6430-48 Switches support four 1 GbE SFP ports for uplink and stacking to provide a cost-optimized solution for lower-traffic networks.
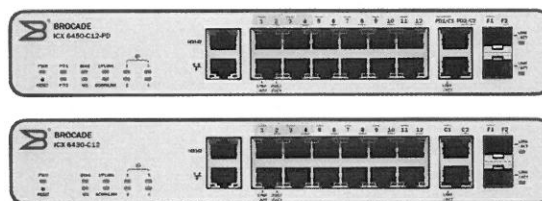

Figure 2.
The Brocade ICX 6430-C and ICX 6450-C Compact Switches support two 1 GbE RJ-45 and two 1 GbE SFP ports for uplink and 12 1 GbE RJ-45 ports with four PoE/PoE+ capable ports in a compact and fanless design—ideal for deployment outside the wiring closet. The ICX 6450-C can be powered either from its internal power supply or with POE/PoE+, through its two RJ45 uplink ports enabling the switch to be deployed in environments where no AC power outlet is present.

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.

The LLDP protocols also reduce operational costs by simplifying and automating network operations. For example, LLDP-MED provides an open protocol for configuring Quality of Service (QoS), security policies, Virtual LAN (VLAN) assignments, PoE power levels, and service priorities.

Compact Switch Solution for Deployment Outside the Wiring Closet

The Brocade ICX 6430-C/6450-C Compact Switch offers enterprise-class LAN switching capabilities, performance, reliability, security, and manageability in a small form factor with fanless operation for deployment outside the wiring closet. It is ideal for deployment in classrooms, retail locations, factories, small offices, workgroup, and space-constrained environments. The Brocade ICX 6430-C/6450-C is available in a 12-port 10/100/1000 Mbps model with IEEE 802.3af PoE and 802.3at PoE+ support on four ports plus four additional 1 GbE uplink ports. Additionally, the Brocade ICX 6450-C can be powered either from its internal AC power supply or with POE/PoE+ power, coming from one or both of its two RJ45 uplink ports, providing increased deployment flexibility by enabling the switch to be deployed in areas where no AC power outlet is present.

In the enterprise, the Brocade ICX 6430-C/6450-C Compact Switch can be used to extend the reach of the network outside the wiring closet, bringing connectivity to more users and supporting additional wireless AP deployment without running more wires. Additionally, the Brocade ICX 6450-C offers L3 routing and GRE support enabling secure and flexible deployment in remote areas. To simplify deployment in-situ, the Brocade ICX 6430-C/6450-C offer flexible mounting options, such as wall brackets and a magnetic mount kit.
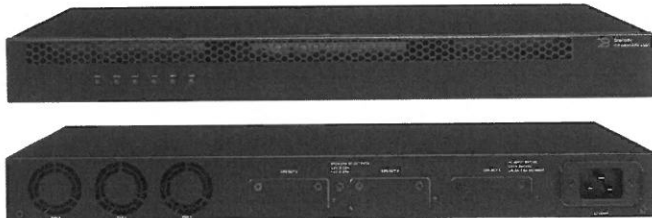
Figure 3.

The optional Brocade ICX 6400-EPS1500 is an external power supply source to provide additional power to the Brocade ICX switches (except the Brocade ICX 6430-C/6450-C and 6430-24). It also can be used for system power redundancy and increased PoE/PoE+ power budget to enable additional PoE/PoE+ ports. Each Brocade ICX 6400-EPS1500 can connect up to three Brocade ICX 6430 and 6450 Switches.

BROCADE HYPEREDGE ARCHITECTURE

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

The HyperEdge Architecture enables organizations to build networks that are:

- **Agile:** By eliminating Spanning Tree Protocol (STP) between HyperEdge Domain switches through a flatter Layer 2 design, the HyperEdge Architecture increases link utilization and reduces application deployment complexity. The Distributed AP Forwarding functionality of Brocade wireless Access Points (APs) efficiently secures and directs mobile traffic at the network edge without tunneling data back to a central controller at the network core.

- **Automated:** By grouping premium and entry-level switches with intelligent wireless APs into a consolidated management domain, HyperEdge Domain switches eliminate the need to provision and manage devices individually—simplifying network deployment and management.

- **Cost-effective:** The HyperEdge Architecture enables the propagation of advanced features and services from premium switches to entry-level switches, allowing IT organizations to purchase only what they need today and add intelligent services as the business evolves. Further cost savings are achieved with Brocade wireless solutions using controller-less or controller-shared license deployment options.

Cost-Optimized Cooling Options

The Brocade ICX 6430 48-port and Brocade ICX 6450 24- and 48-port switches offer industry-standard side-to-back airflow with quiet fans at less than 40 dB (except the Brocade ICX 6450-48P). The Brocade ICX 6430-C/6450-C and 6430-24 Switches are available in a fanless configuration, helping to minimize sound and costs for deployments where users are present, such as classrooms and open office environments.

Basic Layer 3 Capabilities

Brocade ICX 6450/6450-C Switches offer an upgrade option to bring Layer 3 capabilities to the network edge, reducing complexity, and enhancing the reliability of enterprise networks.

Data Center ToR Server Connectivity

The Brocade ICX 6430 and 6450 are 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 6430 and 6450 provide a compact and cost-effective 1 GbE Top-of-Rack (ToR) switch by simply connecting the 1 GbE Network Interface Cards (NICs) in the servers to the Brocade ICX 6430 and 6450 1 GbE ports (see Figure 5). This configuration uses 10 GbE links (Brocade ICX 6450) or 1 GbE links (Brocade ICX 6430) to connect to Brocade ICX data center aggregation switches.

SIMPLIFIED, SECURE STANDARDS-BASED MANAGEMENT AND MONITORING

Brocade ICX 6430 and 6450 Switches provide 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 standards-based network export protocol (RFC 3176) that addresses many of the challenges that network managers face today. By embedding sFlow into the Brocade ICX 6450/6450-C Switches, 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 a full, enterprise-wide monitoring capability for every port in the network.

Simplified Deployment with Auto-Configuration

Brocade ICX 6430 and 6450 Switches support auto-configuration, simplifying deployment with a truly plug-and-play experience. Organizations can use this feature to automate IP address and feature configuration 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

Brocade ICX 6430 and 6450 Switches include an industry-standard Command Line Interface (CLI) and support 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. Embedded Web management is also provided through a GUI-based device interface, and organizations can use Brocade Network Advisor to achieve full device and network management visibility.

Out-of-Band Management

Brocade ICX 6430 and 6450 Switches include a 10/100/1000 Mbps RJ-45 Ethernet port dedicated for out-of-band management, providing a remote path to manage the switches, regardless of the status or configuration of the data ports.

UNIFIED WIRED/WIRELESS NETWORK MANAGEMENT WITH BROCADE NETWORK ADVISOR

Managing enterprise campus networks continues to become more complex due to the growth in services that rely on wired and wireless networks. Services such as Internet, e-mail, video conferencing, real-time collaboration, and distance learning all have specific configuration and management requirements. At the same time, organizations face increasing demand to provide uninterrupted services for high-quality voice and 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 the Brocade Network Advisor Device Configuration Manager tool, organizations can configure Virtual LANs (VLANs) within the network, manage wireless access point realms, or execute CLI commands on specific IP devices or groups of IP devices. sFlow-based proactive monitoring is ideal for performing
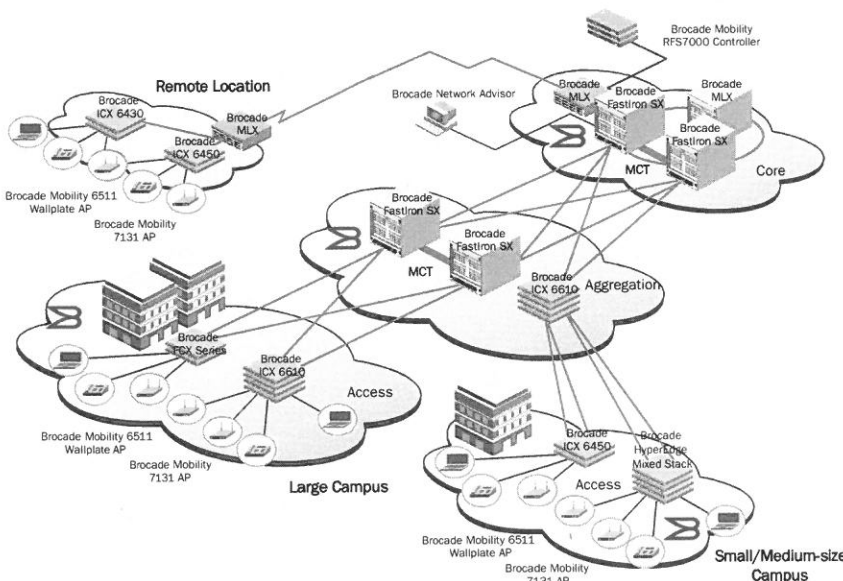

Figure 4.
Brocade ICX 6430 and 6450 Switches are suitable for a wide range of small to medium-size enterprises and branch office deployments at the network access layer.

network-wide troubleshooting, generating traffic reports, and gaining visibility into network activity from the edge to the core. Brocade Network Advisor centralizes management of the entire family of Brocade wired and wireless products, including the Brocade ICX switches.

WARRANTY

Brocade ICX 6430 and 6450 Switches are covered by the Brocade Assurance Limited Lifetime Warranty. For details, visit www.brocade.com/warranty.

BEST-IN-CLASS SUPPORT

Brocade ICX 6430 and 6450 Switches are 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 6430 and 6450 Switches, providing direct access to the Brocade Technical Assistance Center during normal 8×5 business hours.

BROCADE GLOBAL SERVICES

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

CLOUD-OPTIMIZED NETWORK ACQUISITION

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

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.
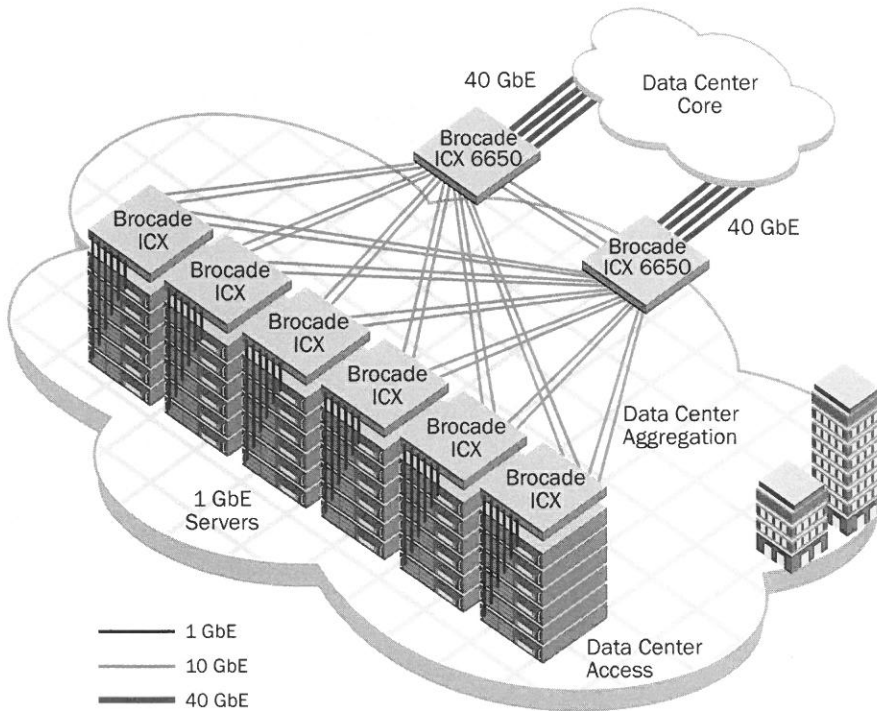
Figure 5.
Brocade ICX 6430 and 6450 Switches provide ToR access while Brocade ICX 6650 Switches provide data center aggregation.

BROCADE ICX 6430/6450 FEATURE AND MODEL SPECIFICATIONS

	Brocade ICX 6430					Brocade ICX 6450				
	6430-C12	6430-24	6430-24P	6430-48	6430-48P	6450-C12-PD	6450-24	6450-24P	6450-48	6450-48P
10/100/1000 Mbps RJ-45 ports	12	24	24	48	48	12	24	24	48	48
10/100/1000 Mbps RJ-45 uplink ports	2					2				
1 GbE SFP ports (uplink/stacking)	2*	4	4	4	4	2*				
1/10 GbE SFP/SFP+ ports (uplink/stacking)							4 (Optional 2-port license)	4 (Optional 2-port license)	4 (Optional 2-port license)	4 (Optional 2-port license)
Stacking bandwidth (data rate, full duplex)		4 Gbps	4 Gbps	4 Gbps	4 Gbps		40 Gbps	40 Gbps	40 Gbps	40 Gbps
Units per stack		4	4	4	4		8	8	8	8
Internal AC power supply rating	100 W	36 W	525 W	65 W	525 W	100 W	65 W	525 W	100 W	880 W
External power supply (redundant power and PoE power)			Optional 525 W	Optional 525 W	Optional 525 W		Optional 525 W	Optional 525 W	Optional 525 W	Optional 525 W × 2
PoE/PoE+ power budget (internal power supply)	68 W		390 W		390 W	68 W		390 W		780 W
PoE Class 3 ports (internal power supply)	4		24		24	4		24		48
PoE+ ports (internal power supply)	2		12		12	2		12		24
Max PoE Class 3 ports (with internal and external power supplies)	4		24		48	4		24		48
Max PoE+ ports (with internal and external power supplies)	2		24		24	2		24		48
PoE/PoE+ powered (Powered Device PD)						Yes				
Base software	Layer 2	Layer 2	Layer 2	Layer 2	Layer 2	Layer 3 with static routes	Layer 3 with static routes	Layer 3 with static routes	Layer 3 with static routes	Layer 3 with static routes
Layer 3 routing (RIP, OSPF)						Optional	Optional	Optional	Optional	Optional
Switching capacity (data rate, full duplex)	32 Gbps	56 Gbps	56 Gbps	104 Gbps	104 Gbps	32 Gbps	128 Gbps	128 Gbps	176 Gbps	176 Gbps
Forwarding capacity (data rate, full duplex)	24 Mpps	42 Mpps	42 Mpps	77 Mpps	77 Mpps	24 Mpps	96 Mpps	96 Mpps	132 Mpps	132 Mpps

* Stacking is not supported on the Brocade 6430-C12/6450-C12-PD. 100Base-FX is supported on the Brocade ICX 6430-C12/6450-C12-PD.

BROCADE ICX 6430/6450 SPECIFICATIONS

System Architecture

Connector options	10/100/1000 Mbps ports: RJ-45
	Brocade ICX 6430: 1 Gbps SFP ports for uplink/stacking: SX, LX, TX, LHA, LHB, direct-attached copper cable (Twinax) for stacking
	Brocade 6430-C/6450-C: 100 Mbps/1 Gbps SFP ports for uplink: FX, SX, LX, TX, LHA, LHB; 10/100/1000 Mbps RJ-45 ports for uplink
	Brocade ICX 6450: 1/10 Gbps SFP+ ports for uplink/stacking: USR, SR, LR, ER, LRM, direct-attached copper cable (Twinax) for stacking
	Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45
	Console management: RJ-45 serial
	External power connector: Redundant system power supply and extended PoE power supply (except the Brocade ICX 6430-24/6430-C12/6450-C12-PD)
Maximum MAC addresses	Brocade ICX 6430, 6430-C: 8000
	Brocade ICX 6450, 6450-C: 16,000
Maximum VLANs	Brocade ICX 6430-C: 1024
	Brocade ICX 6430, 6450, 6450-C: 4096
Maximum STP (spanning trees)	Brocade ICX 6430, 6430-C: 32
	Brocade ICX 6450, 6450-C: 253
Maximum routes (in hardware)	Brocade ICX 6450, 6450-C: 12,000 (IPv4)
	Brocade ICX 6450, 6450-C: 1070 (IPv6)
Trunking	Brocade ICX 6430 Maximum ports per trunk: 8 Maximum trunk groups: 29
	Brocade ICX 6430-C Maximum ports per trunk: 8 Maximum trunk groups: 16
	Brocade ICX 6450, 6450-C Maximum ports per trunk: 8 Maximum trunk groups: 124
Priority queues	Brocade ICX 6430, 6430-C: 4
	Brocade ICX 6450, 6450-C: 8
Maximum jumbo frame size	9216 bytes
Layer 2 switching	• 802.1s Multiple Spanning Tree
	• 802.1X Authentication
	• Auto MDI/MDIX
	• BPDU Guard, Root Guard
	• Dual-Mode VLANs
	• MAC-based VLANs, Dynamic MAC-based VLAN activation
	• Dynamic VLAN Assignment
	• Dynamic Voice VLAN Assignment
	• Fast Port Span
	• GARP VLAN Registration Protocol
	• IGMP Snooping (v1/v2/v3)
	• IGMP Proxy for Static Groups
	• IGMP v2/v3 Fast Leave
	• IGMP Tracking
	• Inter-Packet Gap (IPG) adjustment
	• Link Fault Signaling (LFS)
	• MAC Address Locking, MAC Port Security
	• MAC-Layer Filtering, Filtering on source and destination MAC address

Layer 2 switching (continued)	• MAC Learning Disable
	• MLD Snooping (v1/v2)
	• Multi-device Authentication
	• Per-VLAN Spanning Tree (PVST/PVST+/PVRST)
	• Mirroring: Port-based, ACL-based, MAC Filter-based, and VLAN-based
	• Port Loop Detection
	• Private VLAN
	• Protected Link Groups
	• Protocol VLAN (802.1v), Subnet VLAN
	• Remote Fault Notification (RFN)
	• Single-instance Spanning Tree
	• Single-link LACP
	• Trunk Groups
	• Uni-Directional Link Detection (UDLD)
IPv6 support	• Host functionality management
	• Hardware support for IPv6
	• IPv6 static routing (Brocade ICX 6450/6450-C only)
Base Layer 3 routing (Brocade ICX 6450/6450-C)	• IPv4 and IPv6 Static Routes
	• Port-based Access Control Lists
	• Host Routes
	• Virtual Interfaces, up to 255 virtual interfaces
	• Routed Interfaces
	• Route-only Support
	• IP helper
	• Routing Between Directly Connected Subnets
	• ECMP
	• Layer 3/Layer 4 ACLs
Premium Layer 3 routing (Brocade ICX 6450/6450-C)	• OSPF v2
	• RIP v1/v2
	• Virtual Route Redundancy Protocol (VRRP)
	• VRRP-E
	• GRE
Metro features (except the Brocade ICX 6430-C/6450-C)	• Metro-Ring Protocol MRP (v1, v2)
	• Virtual Switch Redundancy Protocol (VSRP)
	• VLAN Stacking (Q-in-Q)
	• VRRP
	• Topology Groups

Quality of Service (QoS)	- ACL Mapping and Marking of ToS/DSCP - ACL Mapping and Marking of 802.1p - ACL Mapping to Priority Queue - ACL Mapping to ToS/DSCP - Classifying and Limiting Flows Based on TCP Flags - DHCP Relay - DiffServ Support - Honoring DSCP and 802.1p - MAC Address Mapping to Priority Queue - Priority Queue Management using Weighted Round Robin (WRR), - Strict Priority (SP), and a combination of WRR and SP
IEEE standards compliance	802.1AB LLDP/LLDP-MED 802.1D-2004 MAC Bridging 802.1p Mapping to Priority Queue 802.1Q with Tagging 802.1s Multiple Spanning Tree 802.1w Rapid Spanning Tree (RSTP) 802.1X Port-based Network Access Control 802.3 10BASE-T 802.3ab 1000BASE-T 802.3ad Link Aggregation (Dynamic and Static) 802.3ae 10 Gigabit Ethernet 802.3af Power over Ethernet 802.3at Power over Ethernet Plus 802.3u 100BASE-TX 802.3x Flow Control 802.3z 1000BASE-SX/LX 802.3 MAU MIB (RFC 2239) 802.1AE- MACsec (HW-capable): Brocade ICX 6450/6450-C only 802.3az-2010 - EEE (HW-capable)
Traffic management	- ACL-based inbound rate limiting and traffic policies - Broadcast, multicast, and unknown unicast rate limiting - Inbound rate limiting per port - Outbound rate limiting per port and per queue
High availability	- Redundant external power supply - Layer 3 VRRP protocol redundancy - Real-time state synchronization across the stack - Hitless failover from master to standby stack controller - Protected link groups - Hot insertion and removal of stacked units

Management

Management and control	- Auto Configuration - Brocade HyperEdge technology (Brocade ICX 6450 only) - Configuration Logging - Digital Optical Monitoring (DOM) - Display Log Messages on Multiple Terminals - Embedded Web Management - Embedded DHCP Server - Industry-standard Command Line Interface (CLI) - Key-based activation of optional software features - Integration with HP OpenView for Sun Solaris, HP-UX, IBM AIX, and Windows - Brocade Network Advisor support - MIB Support for MRP, Port Security, MAC Authentication, MAC-based VLANs - Out-of-band Ethernet Management - RFC 783 TFTP - RFC 854 TELNET Client and Server - RFC 951 Bootp - RFC 1157 SNMPv1/v2c - RFC 1213 MIB-II - RFC 1493 Bridge MIB - RFC 1516 Repeater MIB - RFC 1573 SNMP MIB II - RFC 1643 Ethernet Interface MIB - RFC 1643 Ethernet MIB - RFC 1724 RIP v1/v2 MIB - RFC 1757 RMON MIB - RFC 2068 Embedded HTTP - RFC 2131 DHCP Server and DHCP Relay - RFC 2570 SNMPv3 Intro to Framework - RFC 2571 Architecture for Describing SNMP Framework - RFC 2572 SNMP Message Processing and Dispatching - RFC 2573 SNMPv3 Applications - RFC 2574 SNMPv3 User-based Security Model - RFC 2575 SNMP View-based Access Control Model SNMP - RFC 2818 Embedded HTTPS - RFC 3176 sFlow (Brocade ICX 6450/6450-C only) - SNTP Simple Network Time Protocol - Multiple Syslog Servers
Embedded security	802.1X Accounting - MAC authentication - DHCP snooping - Dynamic ARP inspection - Bi-level Access Mode (Standard and EXEC Level) - EAP pass-through support - Packet filtering on TCP Flags - IEEE 802.1X username export in sFlow - Protection against Denial of Service (DoS) attacks

Secure management	• Authentication, Authorization, and Accounting (AAA)
	• Advanced Encryption Standard (AES) with SSHv2
	• Bi-level Access Mode (Standard and EXEC Level)
	• RADIUS/TACACS/TACACS+
	• Secure Copy (SCP)
	• Secure Shell (SSHv2)
	• Username/password
	• Web authentication

Physical Specifications

Dimensions	• Brocade ICX 6430-C12/6450-C12-PD models: 1.7 in. (H) × 10.6 in. (W) × 8.4 in. (D) 4.34 cm (H) × 26.92 cm (W) × 21.33 cm (D)
	• All 24-port models: 1.7 in. (H) × 17.44 in. (W) × 9.45 in. (D) 4.34 cm (H) × 44.3 cm (W) × 24 cm (D)
	• All 48-port models: 1.7 in. (H) × 17.44 in. (W) × 14.57 in. (D) 4.34 cm (H) × 44.3 cm (W) × 37 cm (D)
	• ICX6400-EPS1500: 1.7 in. (H) × 17.44 in. (W) × 14.57 in. (D) 4.34 cm (H) × 44.3 cm (W) × 37 cm (D)
Weight	• Brocade ICX 6430-C12: 4 lb (1.81 kg)
	• Brocade ICX 6430-24: 7.58 lb (3.44 kg)
	• Brocade ICX 6430-24P: 10.08 lb (4.57 kg)
	• Brocade ICX 6430-48: 11.09 lb (5.03 kg)
	• Brocade ICX 6430-48P: 13.8 lb (6.26 kg)
	• Brocade ICX 6450-C12-PD: 4.62 lb (2.09 kg)
	• Brocade ICX 6450-24: 7.39 lb (3.35 kg)
	• Brocade ICX 6450-24P: 10.03 lb (4.55 kg)
	• Brocade ICX 6450-48: 11.07 lb (5.02 kg)
	• Brocade ICX 6450-48P: 14.11 lb (6.4 kg)
	• Brocade ICX 6400-EPS1500: 14.85 lb (6.75 kg)

Environment

Temperature	• Operating temperature: 0°C to 45°C (32°F to 113°F)
	• Operating temperature for Brocade ICX 6430-C12: 0°C to 40°C (32°F to 104°F)
	• Storage temperature: -40°C to 70°C (-40°F to 158°F)
Humidity	• Operating relative humidity: 5% to 95%, non-condensing
	• Non-operating relative humidity: 0% to 95%, non-condensing
Storage altitude	• 10,000 ft (3000 m) maximum

Acoustic (25°C)	• Brocade ICX 6430-C12: Fanless (ambient)
	• Brocade ICX 6430-24: Fanless (ambient)
	• Brocade ICX 6430-24P: 39.2 dBA
	• Brocade ICX 6430-48: 37.2 dBA
	• Brocade ICX 6430-48P: 39.3 dBA
	• Brocade ICX 6450-C12-PD: Fanless (ambient)
	• Brocade ICX 6450-24: 37.9 dBA
	• Brocade ICX 6450-24P: 39.2 dBA
	• Brocade ICX 6450-48: 37.2 dBA
	• Brocade ICX 6450-48P: 55.5 dBA
	• Brocade ICX 6400-EPS1500: 60.9 dBA
Vibration	• IEC 68-2-36, IEC 68-2-6
Shock and drop	• IEC 68-2-27
	• IEC 68-2-32
MTBF (25°C, CL: 60%)	• Brocade ICX 6430-C12: 1,124,442 hours
	• Brocade ICX 6430-24: 1,229,732 hours
	• Brocade ICX 6430-24P: 505,469 hours
	• Brocade ICX 6430-48: 748,262 hours
	• Brocade ICX 6430-48P: 384,288 hours
	• Brocade ICX 6450-C12-PD: 868,732 hours
	• Brocade ICX 6450-24: 906,243 hours
	• Brocade ICX 6450-24P: 485,749 hours
	• Brocade ICX 6450-48: 756,081 hours
	• Brocade ICX 6450-48P: 397,590 hours
	• Brocade ICX 6400-EPS1500: 789,923 hours

Power

Power supplies	• Integrated AC power supply for system and PoE power • External 1500 W AC power supply for redundant system power and extended PoE power
Power inlet (Max current rating at 100 V input)	• Brocade ICX 6430-C12: 1.8 Amp • Brocade ICX 6430-24: 0.9 Amp • Brocade ICX 6430-24P: 6 Amp • Brocade ICX 6430-48: 1.5 Amp • Brocade ICX 6430-48P: 6 Amp • Brocade ICX 6450-C12-PD: 1.8 Amp • Brocade ICX 6450-24: 1.5 Amp • Brocade ICX 6450-24P: 6 Amp • Brocade ICX 6450-48: 2 Amp • Brocade ICX 6450-48P: 10 Amp • Brocade ICX 6400-EPS1500: 16 Amp
Input voltage	• Universal 100 to 240 VAC
AC power cord current rating	• Brocade ICX 6430-C12/6450-C12-PD: 10 Amp, 100 to 240 V • Brocade ICX 6430 and 6450 switches: 13 Amp, 100 to 240 V • Brocade ICX 6400-EPS1500: 20 Amp, 100 to 240 V
DC power cord current rating	• Brocade ICX 6400-EPS1500: 5.6 Amp at 12 V rail; 6.85 Amp at 54 V rail • Brocade ICX 6400-EPS1500: 3 DC cables included; cable length: 3 feet
Input line frequency	• 50 to 60 Hz
Heat dissipation (no PoE load)	• Brocade ICX 6430-C12: 62 BTU/hr • Brocade ICX 6430-24: 67 BTU/hr • Brocade ICX 6430-24P: 104 BTU/hr • Brocade ICX 6430-48: 128 BTU/hr • Brocade ICX 6430-48P: 132 BTU/hr • Brocade ICX 6450-C12-PD: 68.3 BTU/hr • Brocade ICX 6450-24: 124 BTU/hr • Brocade ICX 6450-24P: 129 BTU/hr • Brocade ICX 6450-48: 186 BTU/hr • Brocade ICX 6450-48P: 192 BTU/hr

Regulatory Compliance and Safety Approvals

Electromagnetic compatibility	• FCC Part 15, Subpart B, Class A • ICES-003: 2004 • VCCI—Technical Requirement (V-3/2011.04)/Class A • EN 55022: 2006+A1: 2007 Class A • EN 61000-3-2: 2006+A1:2009+A2:2009 Class A • EN 61000-3-3: 2008 • EN 61000-6-1: 2007 • EN 61000-6-3: 2007 • EN 55024: 1998+A1:2001+A2:2003 • EN 300 386 (V1.4.1): 2008 • IEC 61000-4-2: 2008 ED. 2.0 • IEC 61000-4-3: 2006+A1:2007+A2:2010 ED. 3.2 • IEC 61000-4-4: 2004+A1:2010 ED. 2.0 • IEC 61000-4-5: 2005 ED. 2.0 • IEC 61000-4-6: 2008 ED. 3.0 • IEC 61000-4-8: 2009 ED. 2.0 • IEC 61000-4-11: 2004 ED. 2.0
Safety	• CAN/CSA-C22.2 NO. 60950-1-07; UL 60950-1 2nd Edition; IEC 60950-1 2nd Edition; EN 60950-1:2006 Safety of Information Technology Equipment; EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification, Requirements and User's Guide; EN 60825-2 Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems
Environmental regulatory compliance	• RoHS-compliant (6 of 6); WEEE-compliant

Measured Power Utilization

Models	Idle[1]	5% Throughput[2]	100% Throughput[3]
Brocade ICX 6430-C12	10 W	92.6 W	93 W
Brocade ICX 6430-24	7 W	19 W	20 W
Brocade ICX 6430-24P	9 W	391 W	396 W
Brocade ICX 6430-48	15 W	37 W	38 W
Brocade ICX 6430-48P	16 W	401 W	403 W
Brocade ICX 6450-C12-PD	11.6 W	94.3 W	94.6 W
Brocade ICX 6450-24	20 W	29 W	37 W
Brocade ICX 6450-24P	21 W	395 W	400 W
Brocade ICX 6450-48	30 W	51 W	55 W
Brocade ICX 6450-48P	31 W	771 W	776 W

[1] All ports are disconnected with no PoE load.

[2] 5 percent traffic load on all ports connected with maximum possible PoE loads (if equipped).

[3] 100 percent traffic load on all ports connected with maximum possible PoE loads (if equipped).

BROCADE ICX 6430/6450 ORDERING INFORMATION

Part Number	Description
ICX6430-C12	12-port 1 GbE compact switch (4 PoE+), 2×100 Mbps/1 GbE SFP and 2×100 Mbps/1 GbE copper uplinks, fanless
ICX6430-24	24-port 1 GbE switch, 4×1 GbE SFP uplink/stacking ports, fanless
ICX6430-24P	24-port 1 GbE switch PoE+ 390 W, 4×1 GbE SFP uplink/stacking ports
ICX6430-48	48-port 1 GbE switch, 4×1 GbE SFP uplink/stacking ports
ICX6430-48P	48-port 1 GbE switch PoE+ 390 W, 4×1 GbE SFP uplink/stacking ports
ICX6450-C12-PD	12-port 1 GbE compact switch (4 PoE+), 2×100 Mbps/1 GbE SFP and 2×100 Mbps/1 GbE copper uplinks, fanless, L3 static, PoE-powered
ICX6450-24	24-port 1 GbE switch, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports
ICX6450-24-A	24-port 1 GbE switch, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports, TAA
ICX6450-24P	24-port 1 GbE switch PoE+ 390 W, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports
ICX6450-24P-A	24-port 1 GbE switch PoE+ 390 W, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports, TAA
ICX6450-48	48-port 1 GbE switch, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports
ICX6450-48-A	48-port 1 GbE switch, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports, TAA
ICX6450-48P	48-port 1 GbE switch PoE+ 780 W, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports
ICX6450-48P-A	48-port 1 GbE switch PoE+ 780 W, 2×1 GbE SFP+ (upgradable to 10 GbE) and 2×1 GbE/10 GbE SFP+ uplink/stacking ports, TAA

Accessories and Options	
ICX6450-PREM-LIC	Brocade ICX 6450/6450-C premium license (Layer 3 features)
ICX6450-2X10G-LIC-POD	Brocade ICX 6450 2×10 GbE capacity-based license; upgrade 1 GbE uplink/stacking ports to 1GbE/10 GbE
ICX6400-EPS1500	Brocade ICX 6430/6450 1500 W external power supply for RPS/EPS (connect up to three switches)
ICX6400-RMK	Brocade ICX 6400 two-post rack mount kit, spare
ICX6400-C12-RMK	Brocade ICX 6400-C compact switch 2-post rack mount kit
ICX6400-C12-MGNT	Brocade ICX 6400-C compact switch magnet mount kit
10G-SFPP-TWX-0101	Direct-attached SFP+ copper cable, 1 m, one-pack, stacking cable
10G-SFPP-TWX-0301	Direct-attached SFP+ copper cable, 3 m, one-pack, stacking cable
10G-SFPP-TWX-0501	Direct-attached SFP+ copper cable, 5 m, one-pack, stacking cable
1G-SFP-TWX-0101	Direct-attached 1 Gbps SFP copper cable, 1 m, stacking cable
1G-SFP-TWX-0501	Direct-attached 1 Gbps SFP copper cable, 5 m, stacking cable
10G-SFPP-USR	10GE USR SFP+ optic (LC), target range 100 m over MMF, one-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-LRM	10GBASE-LRM, 1310 nm SFP+ optic (LC), TAR
E1MG-TX	1000BASE-TX SFP copper, RJ-45 connector
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring-capable
E1MG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring-capable
E1MG-LHA-OM	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring-capable; 80 km
E1MG-LHB	1000BASE-LHB SFP optic, SMF, LC connector, 150 km maximum reach
E1MG-100FX-OM	100BASE-FX SFP optic MMF, LC connector, optical monitoring-capable (Brocade ICX 6400-C only)

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BROCADE

Warranties

- **Brocade Branded Product Warranty Summary**
- **Product Repair Information**
- **Product Warranty Details**
  - Standard Limited Warranty
  - Host Bus Adaptor and Converged Network Adapter Warranty
  - Limited Lifetime Warranty
  - Brocade Assurance Limited Lifetime Warranty

Brocade Branded Product Warranty Summary*

Warranty Category	Products Covered	Hardware Warranty Duration	Hardware Coverage	Software Warranty Duration	Software Coverage	Exclusion
Standard Limited Warranty	IP & SAN	13 months from ship	Return to Factory 30 day turn around	90 days from ship	Substantial conformance to published specifications & media replacement	None
Host Bus Adaptor & Converged Network Adapter Warranty	Host Bust Adaptor & Converged Network Adapter (HBAs & CNAs)	36 months from ship	Advanced Hardware Replacement	36 months from ship	24x7 phone & email support, lifetime access to updates	None
Limited Lifetime Warranty	EIF, FES, FLS, FGS, FESX	5 years from ship	Return to Factory 30 day turn around	90 days from ship	Substantial conformance to published specifications & media replacement	Power supply, fan, removable optics, LEDs[2]
Brocade Assurance Limited Lifetime Warranty[3]	FCX, FSX800/1600, ICX6610, ICX6430, ICX6450 FWS & TI-24X	Life of product[1] Initial registered end user only	Advanced Hardware Replacement (Next Business Day where available)	Life of product[1] Initial registered end user only	Software defect repairs and software maintenance updates through the product end of support date. Knowledge portal access. Software defect repairs for firmware release current at time of purchase only. Knowledge portal access.	Removable optics, LEDs[2]
Stand Alone Software Warranty	Stand Alone Software	Not Applicable	Not Applicable	90 days from ship	Substantial conformance to published specifications & media replacement	None

* For informational purposes only. Terms and conditions apply. Brocade branded products only.

1 Covered through product end of support date

2 Subject to Brocade's Standard Limited Warranty

3 Applies only to Brocade branded products purchased on or after October 1, 2009. Brocade branded products purchased prior to October 1, 2009 are covered under Brocade's Standard Limited Warranty.

Product Repair Information

To submit a request for repair (non-Assurance Limited Lifetime warranty products); please complete the product repair form.

RMA Request »

Product Warranty Details

The terms and conditions governing your warranty on Brocade branded products are located below. Such terms and conditions supersede all other terms, unless otherwise agreed in writing by Brocade.

Warranty Start Date

"Start Date" as used in this policy means the date the product is shipped from the manufacturing facilities of Brocade.

Standard Limited Warranty

Brocade branded Products are subject to the Standard Limited warranty other than as specified below.

Hardware

For a period of thirteen (13) months from the Start Date, Brocade warrants that the Brocade branded product hardware will be free from defects in materials and workmanship under normal use. End User's sole and exclusive remedy and the entire liability of Brocade and its suppliers under this limited warranty will be, at Brocade's option, repair or replacement of such product hardware within thirty (30) working days of its receipt of the failed hardware, if in advance of its receipt, such hardware received a Technical Support RMA number from Brocade. Further, the product hardware must be shipped, shipment pre-paid, to Brocade, and the RMA number must be clearly indicated on the shipping box and papers. Where applicable, for shipments to locations outside the US, Customer or Customer's assigned agent will act as Importer of Record for shipments of repaired/replacement units and will be responsible for payment of any import duties, taxes and fees. See other Warranty Limitations and Restrictions below.

Software (embedded in Brocade hardware)

For a period of ninety (90) days from the Start Date, Brocade warrants (a) that the media on which the software is delivered will be free of defects in material and workmanship, and (b) the software will operate substantially as set forth in the applicable Brocade specifications when used in accordance with the terms of the Brocade software license. End User's exclusive remedy and the entire liability of Brocade and its suppliers under this limited warranty will be replacement of the software media. Except for the foregoing, the software is provided AS IS. This limited warranty extends only to the End User as the original licensee. See other Warranty Limitations and Restrictions below.

Software (Stand Alone Software Products)

For a period of ninety (90) days from the Start Date, Brocade warrants (a) that the media on which the software is delivered will be free of defects in material and workmanship, and (b) the software will operate substantially as set forth in the applicable Brocade specifications when used in accordance with the terms of the Brocade software license. End User's exclusive remedy and the entire liability of Brocade and its suppliers under this limited warranty will be replacement of the software media. Except for the foregoing, the software is provided AS IS. This limited warranty extends only to the End User as the original licensee. See other Warranty Limitations and Restrictions below.

Host Bus Adaptor and Converged Network Adapter Warranty

Hardware

For a period of thirty-six (36) months from the Start Date, Brocade warrants that the Brocade branded hardware will be free from defects in material and workmanship under normal use. End User's sole and exclusive remedy and the entire liability of Brocade and its suppliers under this limited warranty will be advanced replacement of such product hardware. Replacement response times are based on local standard business days and working hours and commercially reasonable efforts. Response times commence when Brocade is notified of the warranty failure via web request. In some countries and regions and under certain supplier constraints, actual response times may vary. If your location is outside the customary service area, your response time may be longer. Where applicable, for shipments to locations outside the US, Customer or Customer's assigned agent will act as Importer of Record for shipments of repaired/replacement units and will be responsible for payment of any import duties, taxes and fees. Please contact Brocade's Support Team for response time availability in your area. See other Warranty Limitations and Restrictions below.

Software (embedded in Brocade hardware)

For a period of thirty-six (36) months from the Start Date, Brocade warrants (a) that the media on which the software is delivered will be free of defects in material and workmanship, and (b) that the software, when used in accordance with the terms of the Brocade software license, will operate substantially as set forth in the applicable Brocade specifications for a period of ninety (90) days following delivery of the software to licensee. End User's exclusive remedy and the entire liability of Brocade and its suppliers under this limited warranty will be to provide 24x7 telephone and email support and web access to Brocade Technical Support resources when purchased from Brocade or an approved Brocade partner. Except for the foregoing, the software is provided AS IS. This limited warranty extends only to the End User as the original licensee. See other Warranty Limitations and Restrictions below.

Limited Lifetime Warranty

For select products, Brocade provides a limited lifetime (five year) warranty.

Hardware

Brocade warrants only to the original end-user, that for a period of five (5) years the Brocade branded hardware will be free from defects in material and workmanship under normal use. End User's sole and exclusive remedy and the entire liability of Brocade and its suppliers under this limited warranty will be, at Brocade's option, repair or replacement of such product hardware within thirty (30) working days of its receipt of the failed hardware, if in advance of its receipt, such hardware received a Technical Support RMA number from Brocade. Further, the product hardware must be shipped, shipment pre-paid, to Brocade, and the RMA number must be clearly indicated on the shipping box and papers. Where applicable, for shipments to locations outside the US, Customer or Customer's assigned agent will act as Importer of Record for shipments of repaired/replacement units and will be responsible for payment of any import duties, taxes and fees. This warranty excludes power supplies, fans, removable optics, and LEDs. See other Warranty Limitations and Restrictions below.

Software (embedded in Brocade hardware)

For a period of ninety (90) days from the Start Date, Brocade warrants (a) that the media on which the software is delivered will be free of defects in material and workmanship, and (b) that the software, when used in accordance with the terms of the Brocade software license, will operate substantially as set forth in the applicable Brocade specifications for a period of ninety (90) days following delivery of the software to licensee. End User's exclusive remedy and the entire liability of Brocade and its suppliers under this limited warranty will be replacement of the software media. Except for the foregoing, the software is provided AS IS. This limited warranty extends only to the End User as the original licensee. See other Warranty Limitations and Restrictions below.

Brocade Assurance Limited Lifetime Warranty

For select products, Brocade provides a limited lifetime warranty beginning on the Start Date and continuing for as long as the original End User continues to own and use the Brocade branded equipment, as set forth below.

Hardware

Brocade warrants that the Brocade branded hardware will be free from defects in material and workmanship under normal use. End User's sole and exclusive remedy and the entire liability of Brocade and its suppliers under this limited warranty will be replacement of such product hardware next business day, provided the request is received before 2PM local time.* Defective hardware must be received by Brocade within 30 days of End User's receipt of replacement Product. This warranty excludes removable optics and LEDs. In the event of discontinuance of product manufacture, the warranty is limited to five (5) years from the announced product end of life date. *Response times are based on local standard business days and working hours and commercially reasonable efforts. Response times commence when Brocade is informed of the warranty failure via web request. In some countries and regions and under certain supplier constraints, actual response times may vary. If your location is outside the customary service area, your response time may be longer. Please contact Brocade's Support Team for response time availability in

your area. Where applicable, for shipments to locations outside the US, Customer or Customer's assigned agent will act as Importer of Record for shipments of repaired/replacement units and will be responsible for payment of any import duties, taxes and fees. See other Warranty Limitations and Restrictions below.

Software (embedded in Brocade product)

Brocade warrants (a) that the media on which the software is delivered will be free of defects in material and workmanship, and (b) the software will operate substantially as set forth in the applicable Brocade Documentation when used in accordance with the terms of the Brocade software license. End User's exclusive remedy and the entire liability of Brocade and its suppliers under this limited warranty will be replacement of the software media. In addition, End User may download defect repairs from Brocade.com for the firmware release current at time of purchase or any previous release and may also access Brocade's Knowledge Portal. On certain products (as indicated in the table above) End User may also download software maintenance updates through the product end of support date. Except for the foregoing, the software is provided AS IS. This limited warranty extends only to the End User as the original licensee. See other Warranty Limitations and Restrictions below.

Warranty Limitations and Restrictions

Brocade warranties as set forth herein ("Warranty") are contingent on proper use of the Brocade branded hardware and software ("Products") and do not apply if (a) the Products have been modified without the written approval of Brocade, (b) the Products' serial number label is removed, (c) the Product has been damaged or subjected to abnormal physical or electrical stress, abnormal environmental conditions, misuse, negligence, or accident, or (d) the Product is licensed for beta, evaluation, testing or demonstration purposes. The terms of the Warranty are limited to the remedies as set forth in this Warranty. THIS WARRANTY IS PROVIDED IN LIEU OF ALL OTHER RIGHTS, CONDITIONS AND WARRANTIES. BROCADE MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE SOFTWARE, HARDWARE, PRODUCTS, DOCUMENTATION OR BROCADE SUPPORT, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF THIRD PARTY RIGHTS. BROCADE DOES NOT WARRANT THAT ANY PRODUCTS WILL BE ERROR-FREE, OR THAT ANY DEFECTS THAT MAY EXIST IN ITS PRODUCTS CAN BE CORRECTED. IN NO EVENT SHALL BROCADE BE LIABLE FOR COST OF PROCUREMENT OF SUBSTITUTE GOODS, LOST PROFITS OR ANY OTHER SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES (INCLUDING BUT NOT LIMITED TO LOST DATA), HOWEVER CAUSED WHETHER OR NOT BROCADE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME JURISDICTIONS DO NOT ALLOW LIMITATION OR EXCLUSION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, SO THAT LIMITATION OR EXCLUSION MAY NOT APPLY.