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

Solicitation

NUMBER	PAGE
COR61681	1

ADDRESS CORRESPONDENCE TO ATTENTION OF:

TARA LYLE
304-558-2544

RFQ COPY
TYPE NAME/ADDRESS HERE

VENDOR

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

SHIP TO

DIVISION OF CORRECTIONS
1409 GREENBRIER ST
CHARLESTON, WV
25311   304-558-8045

DATE PRINTED	
03/13/2014	

BID OPENING DATE: 04/03/2014   BID OPENING TIME   1:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
				THE WEST VIRGINIA PURCHASING DIVISION FOR THE AGENCY, WV DIVISION OF CORRECTIONS, IS SOLICITING BIDS TO PROVIDE NETWORK SWITCHES AND INTERFACE CONVERTERS, PER THE ATTACHED SPECIFICATIONS.		
				ATTACHMENTS INCLUDE:		
				1. INSTRUCTIONS TO VENDORS SUBMITTING BIDS 2. GENERAL TERMS AND CONDITIONS 3. COR61681 SPECIFICATIONS 4. CERTIFICATION AND SIGNATURE PAGE 5. PURCHASING AFFIDAVIT 6. RESIDENT VENDOR PREFERENCE (RVP) FORM		
0001	45	EA	205-16	NETWORK SWITCHES	*Brocade Alternative Bid* *See Attached Pricing sheet*	
0002	65	EA	205-16	NETWORK SWITCHES		
0003	220	EA	205-16	INTERFACE CONVERTERS		

04/16/14 03:01:26PM
West Virginia Purchasing Division

SIGNATURE _C.E. Off_   TELEPHONE 304 768-1645   DATE 4-16-2014

TITLE Sr. Chief Executive   FEIN 61-1371685   ADDRESS CHANGES TO BE NOTED ABOVE

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

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LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0004	110	EA		939-22		
	WARRANTY 24X4X7					

****** THIS IS THE END OF RFQ   COR61681 ****** TOTAL: $210 625.00

see attached pricing sheet

SIGNATURE		TELEPHONE	DATE
TITLE	FEIN		ADDRESS CHANGES TO BE NOTED ABOVE

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

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)

(Authorized Signature)

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

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

4-16-2014
(Date)

COR61681 - Network Switches/Interface Converter

Item #	Brand, Model Number and/or Product Code	Description	Unit of Measure	Quantity	Unit Price	Extended Amount
3.1.1		Cisco Catalyst 2960-SF 48 FE PoE 740W 4 x SFP LAN Base, or equal, WS-C2960S-F48FPS-L	Each	45		
3.1.2		Cisco Catalyst 2960-SF 24 FE PoE 370W 2 x SFP LAN Base, or equal, WS-C2960S-F24PS-L	Each	65		
3.1.3		Cisco SFP Gigabit Ethernet Interface Converter (GBIC), or equal, GLC-SX-MM	Each	220		
3.1.8		Cisco Smartnet 24x4x7, or equal, Warranty, one year term	Each	110		

OVERALL TOTAL COST: $210,625

see attached pricing sheet

Bidder/Vendor Information:

Name: Software Information Systems LLC

Address: 500 Association Dr. Suite 210

Charleston, WV 25311

Phone No.: 304 768-1645

Fax No.: 304 768-1671

Email Address: garbett@thinksy.com

Authorized Signature

Failure to use this form may result in disqualification

SIS Alternative Response to RFQ COR61681

All components included to meet the requirements

Item #	Brand	Description	Alternate Brand	Alternate Description	Unit of Measure	Quantity	Unit Price	Unit Price	Exteded Amount
3.1.1	Cisco	Cisco Catalyst 2960-SF 48 FE PoE 740W 4 x SFP LAN Base, or equal, WS-C2960S-F48FPS-L	Brocade	ICX 6450 48 GigE PoE Switch, 48-port 1G Switch PoE+ 780W, 2x1G SFP+ (upgradable to 10G) & 2x1G/10G SFP+ Uplink/Stacking Ports, ICX6450-48P	Each	45	$ 1,750.00	$ 1,750.00	$ 78,750.00
3.1.2	Cisco	Cisco Catalyst 2960-SF 24 FE PoE 370W 2 x SFP LAN Base, or equal, WS-C2960S-F24PS-L	Brocade	ICX 6450 24 GigE PoE Switch, 24-port 1G Switch PoE+ 390W, 2x1G SFP+ (upgradable to 10G) & 2x1G/10G SFP+ Uplink/Stacking Ports, ICX6450-24P	Each	65	$ 1,150.00	$ 1,150.00	$ 74,750.00
3.1.3	Cisco	Cisco SFP Gigabit Ethernet Interface Converter (GBIC), or equal, GLC-SX-MM	Brocade	1000Base-SX SFP optic, MMF, LC connector, Optical Monitoring Capable, part number E1MG-SX-OM	Each	220	$ 110.00	$ 110.00	$ 24,200.00
3.1.4	Cisco	Cisco Smartnet 24x4x7, or equal, Warranty, one year term	Brocade	ESSENTIAL 4HR PARTS ONLY SUPPORT, ICX 6430 24P & 48P, ICX6430-SVL-4P-1	Each	110	$ 260.00	$ 260.00	$ 28,600.00
N/A	N/A	N/A	Brocade	IP management SW license for up to 50 devices; required for initial purchase of IP only management; minimum of one year support is required, BR-NTWADV-IP-BASE	Each	1	$ 2,500.00	$ 2,500.00	$ 2,500.00
N/A	N/A	N/A	Brocade	Adds IP management SW license FOR 100 devices; Pre-requisite are IP-BASE or INM Upgrade or IP Extension; minimum of one year support is required, BR-NTWADV-IP-100	Each	1	$ 800.00	$ 800.00	$ 800.00
N/A	N/A	N/A	Brocade	ESSENTIAL APP SUPPORT 24X7, BR-NTWADV-IP-BASE	Each	1	$ 750.00	$ 750.00	$ 750.00
N/A	N/A	N/A	Brocade	ESSENTIAL APP SUPPORT 24X7, BR-NTWADV-IP-100	Each	1	$ 275.00	$ 275.00	$ 275.00

Brocade Network Advisor will satisfy the Call Home Requirement

Brocade Network Advisor along with GRVP will satisfy the VLAN propagation Requirement.

Project Total	$ 210,625.00

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.: COR61681

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:
(Check the box next to each addendum received)

[✓] Addendum No. 1   [   ] Addendum No. 6

[✓] Addendum No. 2   [   ] Addendum No. 7

[   ] Addendum No. 3   [   ] Addendum No. 8

[   ] Addendum No. 4   [   ] Addendum No. 9

[   ] Addendum No. 5   [   ] Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Softum Informatic Systems
Company

_e a a_
Authorized Signature

_4-16-2014_
Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.

RFQ No. _____

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: _Softwcke Information Systems LLC_
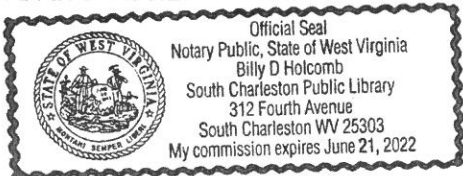
Authorized Signature: _(signature)_ Date: _4-15-2014_

State of _West Virginia_

County of _Kanawha_ , to-wit:

Taken, subscribed, and sworn to before me this _15th_ day of _April_ , 20_14_.

My Commission expires _6-21_ , 20_22_.

AFFIX SEAL HERE

NOTARY PUBLIC _Billy D. Holub_ (signature)

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.
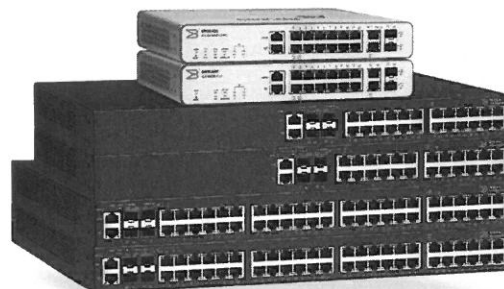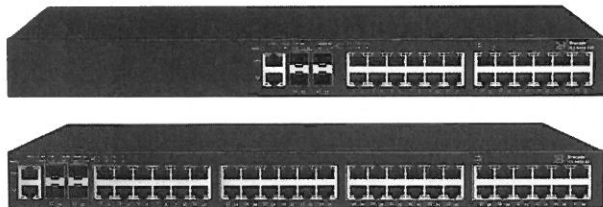
BROCADE

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).

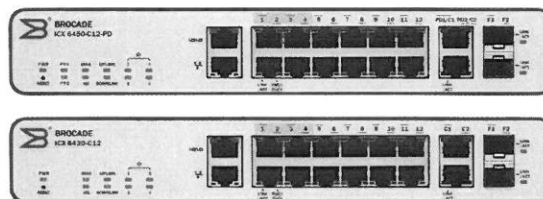## STACKING TECHNOLOGY FOR THE MOST DEMANDING CAMPUS LAN ENVIRONMENTS

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.
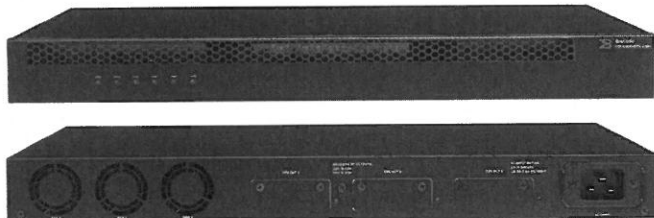
Figure 3.

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
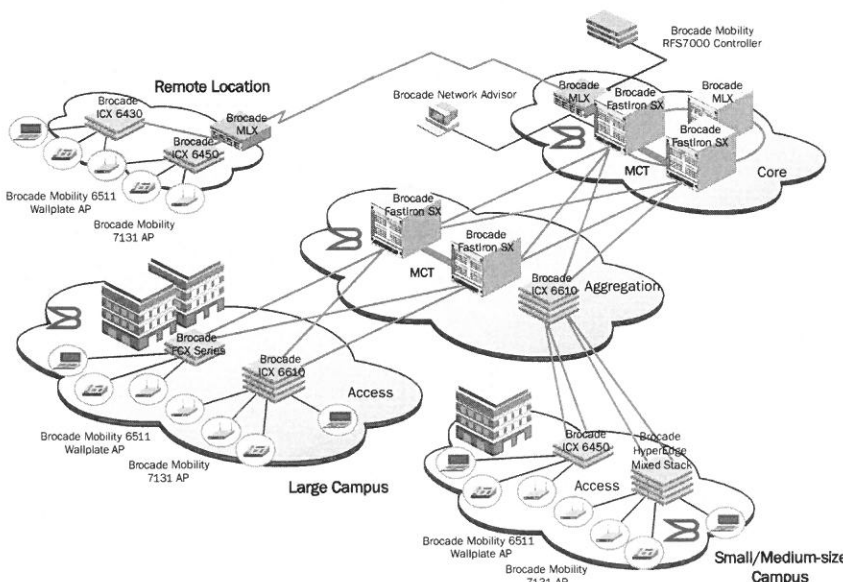

Figure 4.
Brocade ICX 6430 and 6450 Switches are suitable for a wide range of small to medium-size enterprises and branch office deployments at the network access layer.

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.
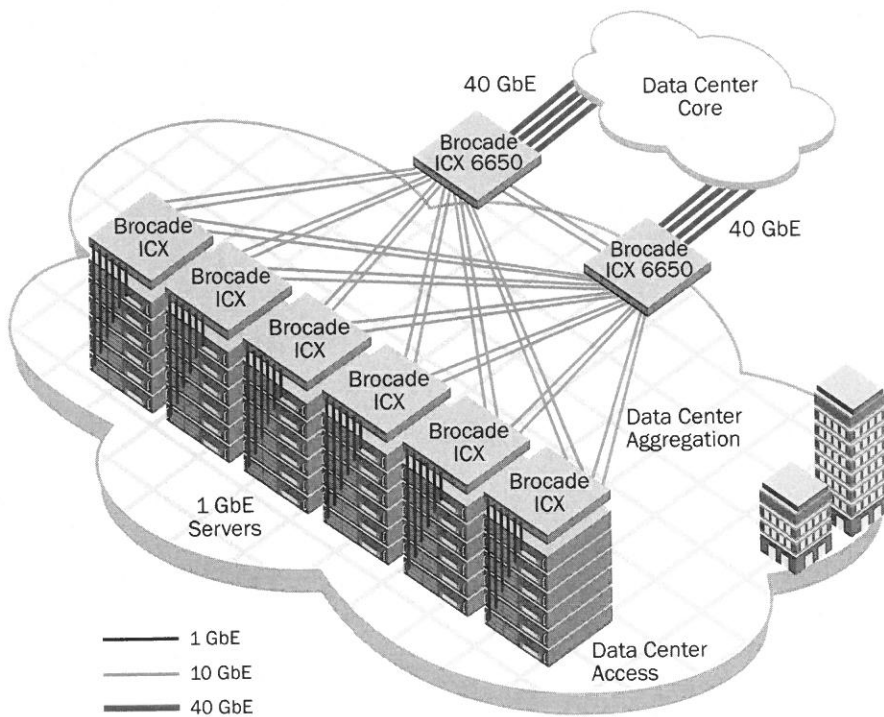

Figure 5.

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 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

BROCADE NETWORK ADVISOR

NETWORK MANAGEMENT

Simplified Network Management for Today's Increasingly Dynamic Networks

HIGHLIGHTS

- Simplifies operations by providing an intuitive Graphical User Interface (GUI) and customizable dashboards

- Reduces Total Cost of Ownership (TCO) by providing proactive performance analysis and troubleshooting capabilities

- Unifies network management across Storage Area Networks (SANs) and IP networks

- Accelerates data center automation through enhanced support for Brocade VCS Fabric technology

- Integrates seamlessly with industry-leading management solutions from Microsoft, VMware, EMC, HP, and IBM, maximizing the value of IT investments

Today's IT organizations are under pressure to reduce costs, free up resources, and accelerate the introduction of private, public, and hybrid clouds for service delivery. Many are standardizing their operational processes and policies, and seeking ways to more proactively address availability and performance issues. During this transition, the network is increasingly becoming a focus area for both reducing unexpected downtimes and ongoing operational costs, while enabling greater IT and business agility.

Brocade® Network Advisor helps organizations simplify daily network operations and focus on strategic IT initiatives. This software management tool features customizable dashboards that enable organizations to identify network problems quickly and optimize their network resources. It also unifies management for the entire Brocade IP and SAN portfolio as well as integrates with third-party solutions, reducing the number of tools that organizations need to gain visibility and control. With its feature-rich, easy-to-use interface, Brocade Network Advisor automates repetitive tasks while helping organizations proactively manage their networks.

## KEY FEATURES FOR MORE EFFECTIVE NETWORK MANAGEMENT

Brocade Network Advisor is a simple yet powerful tool that helps organizations manage the entire network lifecycle, including monitoring, diagnostics, change management, troubleshooting, and remediation.

Simplified Daily Network Operations

Brocade Network Advisor saves administrators valuable time and enables greater IT and business agility through several key capabilities, including:

- **Intelligent dashboards:** Organizations can proactively identify problem areas and prevent network downtime with a customizable, at-a-glance summary of all discovered Brocade devices and third-party IP devices (see Figure 1).

- **Easy-to-use interface:** Administrators can rapidly identify problem areas and troubleshoot use cases with performance dashboards and drill-down options.

- **Performance and historical data reporting:** Organizations gain visibility into in-depth performance measures and historical data for advanced troubleshooting and performance management (see Figure 2).

BROCADE
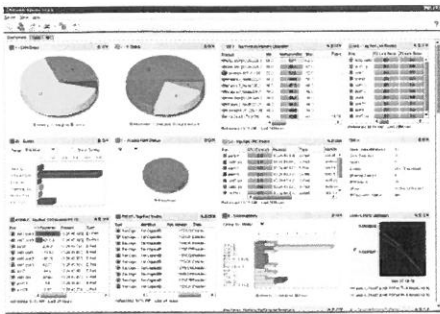
Figure 1. Brocade Network Advisor provides a customizable dashboard of storage and IP networks.

- **Network time and scope:** Administrators can set all dashboard widgets by network type and/or time scope to easily troubleshoot and correlate errors.

- **Virtual Machine (VM) visibility:** Network administrators gain visibility into virtual environments within SAN and IP networks through integration with VMware vCenter.

- **Role-Based Access Control (RBAC):** Organizations can define granular administrator roles and privileges to support the needs of different SAN and IP network teams.

- **Event management:** Administrators can receive SNMP traps, syslog event messages, and customizable event alerts for reporting, analysis, monitoring, and remediation.

- **Advanced Call Home:** Brocade Network Advisor can automatically collect diagnostic information and send notifications for faster fault diagnosis, isolation, and remote support operations.
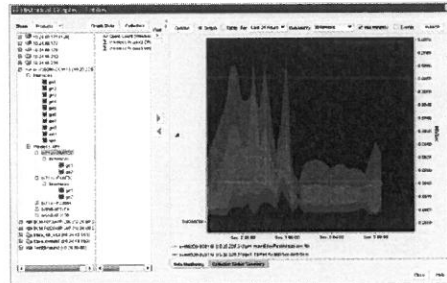
Figure 2. Brocade Network Advisor enables historical data visibility.

End-to-End Network Management

With Brocade Network Advisor, organizations can reduce operational expenditures by leveraging the same management solution for their entire SAN and IP network infrastructure. This enables better coordination between storage and data networking administrators for provisioning, troubleshooting, and reporting. Brocade Network Advisor manages:

- IP and SAN networks
- MPLS services
- Brocade application delivery switches
- Virtual IP (VIP)
- SSL certificates
- Global Server Load Balancing (GSLB)

Flexibility through Partner Integration

Brocade Network Advisor provides deep integration with a wide range of third-party network management solutions to bridge operational gaps across server, network, and storage administrators. For instance, Brocade Network Advisor integrates with VMware vCenter and Microsoft System Center Operations Manager (SCOM) to provide end-to-end network visibility.

Network administrators also can manage Brocade devices with third-party applications through the Brocade SMI Agent, which is based on the Storage Management Initiative-Specification (SMI-S). The SMI Agent provides out-of-the-box support for leading data center orchestration frameworks, such as:

- IBM TotalStorage Productivity Center and Systems Director
- HP VirtualConnect Enterprise Manager and Storage Provisioning Manager
- EMC Next-Generation Resource Management Suite

ADVANCED MANAGEMENT FOR VCS FABRICS

Brocade Network Advisor allows organizations to maximize their Brocade VCS® Fabric technology investments by enabling advanced management of Brocade VCS fabrics and Brocade VDX® switches. Brocade Network Advisor complements the simplicity and automation inherent in Brocade VCS fabrics with management

capabilities for the entire network lifecycle—including configuration, fault isolation, network performance, and diagnostics.

Brocade Network Advisor enables administrators to easily define and implement network policies and services within VCS fabric domains. Key features include:

- **Flexible management options:** Administrators can manage a VCS fabric as a single entity or logical chassis, or they can drill-down to individual Brocade VDX switches (see Figure 3).

- **VCS fabric visibility:** Brocade Network Advisor provides end-to-end visibility from the data center edge to hosts and VMs, as well as across multiple VCS fabrics and at individual node levels.

- **VCS fabric diagnostics:** Organizations can visualize traffic paths, measure network latency, and perform fault isolation via hop-by-hop inspection to pinpoint bottlenecks.

- **sFlow-based monitoring:** Brocade Network Advisor leverages sFlow data and integrates with VMware vCenter to enable VM-level monitoring and provide application performance insights.

- **VLAN management:** Administrators can create, edit, and delete VLANs, reducing the time spent on manual tasks.

- **Firmware management:** Brocade Network Advisor supports upgrading firmware for the entire VCS fabric or for a subset of Brocade VDX switches within the fabric.

- **VCS Virtual Fabric management:** Users can edit and delete virtual fabrics within Brocade Network Advisor, and creation is supported with C-Tag configuration.

Automatic Migration of Port Profiles Management

Brocade Network Advisor enables VM automation by simplifying management of Automatic Migration of Port Profiles (AMPP) configurations. Organizations can:

- Create, read, inventory, delete, associate, and disassociate port profiles to VMs, simplifying port profile management for network administrators.

- Rapidly associate between port profiles and VMware port groups managed by a single or multiple VMware vCenter servers. This is particularly beneficial when thousands of VMs are involved.

- Perform integrity checks of the port profiles across Brocade VDX switch configurations, either in the same fabric or across different VCS fabrics.
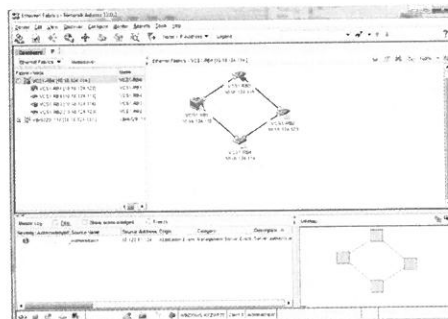

Figure 3. Brocade Network Advisor provides deep visibility with VCS fabric topology maps.

DATA CENTER SAN NETWORKS

Brocade Network Advisor simplifies management of data center fabrics with its performance dashboards, easy-to-use interface, and automation features. With Brocade Network Advisor, storage and server administrators can proactively manage their SAN environments to support non-stop networking, address issues before they impact operations, and minimize manual tasks. Key capabilities include:

- **Configuration management:** Organizations can automate manual operations with configuration wizards for Fibre Channel SANs, FICON® and cascaded FICON environments, Fibre Channel over IP (FCIP) tunnels, Fibre Channel over Ethernet (FCoE) network environments, Host Bus Adapters (HBAs), and Converged Network Adapters (CNAs).

- **Policy Monitor management:** Brocade Network Advisor can proactively validate SAN configurations with best-practices templates.

- **Top Talkers:** Organizations can identify devices or ports with the most demanding traffic flows for proactive capacity planning.

- **VM-to-storage visibility:** Brocade Network Advisor integrates with leading virtualization solutions such as VMware vCenter to provide VM-to-LUN visibility and management.

Brocade Fabric Vision Technology

Brocade Network Advisor integrates with Brocade Fabric Vision technology to provide unprecedented visibility and insight across the storage network. Brocade Network Advisor supports the following Brocade Fabric Vision technology features:

- **Monitoring and Alerting Policy Suite (MAPS):** Configures and monitors data center fabrics based on a set of user-defined policies.

- **Flow Vision:** Identifies, monitors, and analyzes application-level data flows to maximize network performance.

- **Single-dialog bulk configuration:** Reduces time spent on repetitive tasks by deploying MAPS policies and rules across the fabric from a single dialog.

- **Brocade ClearLink Diagnostics:** Runs diagnostic tests on optics and cables to quickly identify and isolate potential fabric issues.

- **Bottleneck Detection:** Automatically monitors and detects network congestion in the fabric, and identifies which devices or hosts are impacted by a bottlenecked port.

- **Brocade SAN Analytics Management Pack for vCOPS:** Delivers SAN health, risk, and efficiency insights to VMware vCenter Operations Manager, enabling faster recovery and better VM performance (see Figure 4).

Figure 4. View of SAN health through VMware vCenter Operations Manager.

ENTERPRISE CAMPUS NETWORKS

Brocade Network Advisor provides management for increasingly complex enterprise campus networks that support services such as video conferencing, real-time collaboration, and distance learning. Brocade Network Advisor helps network administrators deliver highly available wired and wireless networks by enabling them to:

- Centralize management of Brocade wired and wireless solutions, including Access Points (APs) and wireless controllers

- Discover, manage, and deploy configurations to dynamically updated groups of devices

- Check end-to-end VLAN consistency and gain other insights using CLI Manager and policy monitoring capabilities

- Receive alerts when users deviate from customizable configuration policies, ensuring compliance standards are maintained

- Create and export reports for wired products and APs using pre-built or customized templates

Metro and Carrier Ethernet Networks

Brocade Network Advisor helps service providers address the exponential growth in network traffic by helping to reduce operational costs, prevent bandwidth over-provisioning, and improve user service provisioning. Key features include:

- Discovery, monitoring, deployment, management, and configuration capabilities for metro and Carrier Ethernet networks

- Comprehensive MPLS service management with support for MPLS Virtual Private LAN Services (VPLS), Label Switched Path (LSP), Local VPLS, Virtual Leased Line (VLL), and Local VLL services

- The ability to detect, isolate, and report Ethernet faults with full support for the IEEE 802.1ag Connectivity Fault Management (CFM) set of standards

SUPPORTED TECHNOLOGIES AND PLATFORMS

Brocade Network Advisor supports the entire Brocade portfolio, unifying network management under a single tool. For a complete list of supported Brocade products, refer to the *Brocade Network Advisor Installation and Migration Guide*.

Supported platforms and hardware, include:

- Brocade ServerIron® ADX® Series Application Delivery Switches
- Brocade Converged Network Adapters (CNAs)
- Brocade DCX® Backbones
- Brocade FastIron® SX Series
- Brocade FastIron WS Series
- Brocade Host Bus Adapters (HBAs)
- Brocade ICX® switches
- Brocade MLX® Series
- Brocade MLXe Core Routers
- Brocade Mobility Access Points
- Brocade Mobility controllers
- Brocade NetIron® CER 2000 Series
- Brocade SAN switches
- Brocade VDX switches
- Brocade Vyatta® vRouters

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, and education services, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

Training and Education

Brocade Global Education Services offers Web-based training and instructor-led courses to share product information, tips, and best practices—and to provide hands-on experience with Brocade Network Advisor.

AFFORDABLE ACQUISITION OPTIONS

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

MAXIMIZING INVESTMENTS

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

System Requirements

Brocade Network Advisor software and documentation are available via download. For details on the recommended system specifications, refer to the Brocade Network Advisor Installation and Migration Guide.

Ordering Information

Brocade Network Advisor comes in several packages, providing organizations with the flexibility to choose what best meets their network requirements. Package options include SAN-only, IP-only, SAN+IP, and SMI Agent-only.

Ease of Upgrade

Brocade Network Advisor also provides a non-disruptive path for organizations that are upgrading from Brocade IronView® Network Manager (INM) or Brocade Data Center Fabric Manager (DCFM®).

SYSTEM REQUIREMENTS FOR 64-BIT WINDOWS AND LINUX SYSTEMS

Small Network

Intel Core 2 Duo, 2 GHz or equivalent, 8 GB RAM, 20 GB disk

Medium Network

Intel Core 2 Duo Dual-CPU, 2.4 GHz or equivalent, 8 to 16 GB[1] RAM, 60 GB disk

Large Network

Intel Core 2 Duo Dual-CPU, 2.4 GHz or equivalent, 8 to 16 GB[1] RAM, 80 GB disk

[1] 16 GB RAM is required for SAN+IP bundle and medium or large networks.

BROCADE NETWORK ADVISOR LICENSES

License	License Description
SAN Professional Plus	SAN management, supports up to 2,560 switch ports and 36 fabrics
SAN Enterprise	SAN management, supports up to 9,000 switch ports and 36 fabrics
IP Base[2]	IP management, supports multiple VCS fabrics, up to 50 IP devices
SAN Professional Plus with IP	SAN+IP management, supports up to 2,560 SAN switch ports, 36 SAN fabrics, and 150 IP devices
SAN Enterprise with IP	SAN+IP management, supports up to 9,000 SAN switch ports, 36 SAN fabrics, and 550 IP devices

[2] Additional licenses can be purchased for MPLS management and increased IP device support.

SUPPORTED SERVER AND CLIENT OPERATING SYSTEMS

	Operating System		Supported Package
x86 32-bit	• Windows Server 2008 Standard • Windows 7 Enterprise • Red Hat Enterprise Linux 6.1, 6.2, 6.3 Adv • Oracle Enterprise Linux 6.1, 6.2, 6.3	• SUSE Linux Enterprise Server 11 • Guest VMs for all the above: VMware ESXi 5.0, KVM, and Microsoft Hyper-V (Hyper-V Server 2008 R2 SP1)	• For small and medium configurations • SAN-only • IP-only • SMI Agent-only
x86 64-bit	• Windows Server 2008 R2 Standard, Data Center, and Enterprise Editions • Windows Server 2012 Standard, Data Center, and Enterprise Editions • Windows 7 Enterprise • Windows 8 Enterprise	• Red Hat Enterprise Linux 6.1, 6.2, 6.3 Adv • Oracle Enterprise Linux 6.1, 6.2, 6.3 • Guest VMs for all the above: VMware ESXi 5.0, KVM, and Microsoft Hyper-V (Hyper-V Server 2008 R2 SP1)	• For large configurations • SAN+IP • SAN-only • IP-only • SMI Agent-only

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BROCADE ⧖®

Brocade Campus LAN Switching Product Warranty and Support Overview

	Brocade ICX 6610 FCX FSX 800 FSX 1600	Brocade ICX 6430 ICX 6450	Brocade FWS	Brocade FGS FLS FES FESX Super X	Optics with Brocade ICX 6610 FCX FSX 800 FSX 1600	Optics with Brocade ICX 6430 ICX 6450	External Power Supply ICX 6400- ESP 1500
WARRANTY							
Brocade Assurance Limited Lifetime Warranty [1]	✓	✓	✓				
Limited Lifetime Warranty [1]				✓			
Standard Limited Warranty [1] (13 months from ship)					✓	✓	✓
HARDWARE DEFECT REPLACEMENT DURING WARRANTY							
Advanced Replacement Next Business Day [1]	✓	✓	✓				
Repair or Replace 30-days				✓	✓	✓	✓
ACCESS TO SOFTWARE DEFECT DOWNLOADS DURING WARRANTY							
Included through the product end of support date [1]	✓	✓					
Included for the firmware release current at time of purchase or any previous release. Brocade's Knowledge Portal.			✓				
Accessible for 90-days from ship				✓			
ACCESS TO SOFTWARE MAINTENANCE UPDATES DURING WARRANTY							
Included through the product end of support date [1]	✓	✓					
Optional Essential Support contracts required			✓	✓			
ACCESS TO SOFTWARE UPGRADES							
Optional L3 license upgrades are available for purchase	✓	✓	✓	✓			
ACCESS TO NEW SOFTWARE FEATURES							
Optional Essential Support contracts are required	✓	✓	✓	✓			
ACCESS TO TECHNICAL SUPPORT							
Included for 90-days 8x5	✓				✓		
Included for 3-years 8x5		✓				✓	✓
Optional Essential Support contracts are required			✓	✓			

[1] See detailed information at www.brocade.com/warranty.

General Questions and Answers

Q Is an Essential Support contract required to download software updates?

A For the Brocade® FastIron® and ICX® switches, an Essential Support contract is not required to download software defect repairs and software maintenance updates posted on Brocade.com. However, it should be noted that a support contract is required to download software maintenance updates for licensed Advanced routing images (Brocade ICX 6610, Brocade FCX®).

Q Do the enterprise campus switches include downloading of minor and major software releases or revisions?

A The Brocade FastIron and ICX switches include downloading of software defect repairs and software maintenance updates that are incorporated in minor software releases and new software releases.

Q What is a software maintenance update or release?

A End users with Brocade FCX, Brocade FastIron SX 800/1600, and Brocade ICX 6610, ICX 6450, and ICX 6430 products will be provided access to software maintenance updates and software defect repairs to maintain the compliance of the software with published specifications, release notes, and industry-standards compliance. A software maintenance update or release may include defect repairs and limited platform-specific improvements to ensure that the product features available to the device on the original purchase date continue to function in the customer network.

Q Are software upgrades included with the Brocade FastIron and ICX campus products?

A For the Brocade FastIron and ICX switches, "software upgrades" mean moving from the FastIron Base features image to a Premium or Advanced routing image, or moving from a Premium to an Advanced routing image. These forms of software upgrades require the purchase of an upgrade license and are not included with the products. Optional software upgrades are available for purchase.

Q Are new features and functionality included with the software downloads?

A Brocade does not guarantee that any new features or functionality will be developed and made available to the end user in future software revisions or releases. A current Essential Support contract inclusive of software downloads is required to gain access to new features and functionality for the software license level that is purchased for and installed on the device.

Q Are power supplies and fans covered under the warranty?

A Internal and hot-swappable power supplies and fans purchased with the Brocade FastIron and ICX switches are covered under the product warranty.

MYBROCADE REFERENCE CARD
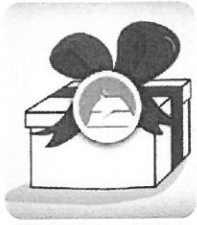
Click the image on the left or visit http://www.brocade.com/microsites/mybrocade-support-tools/index.html for a brief overview of the new MyBrocade Online Support Tools. You will be introduced to new features that will improve your ability to conduct business.

At Brocade, our goal is to be as responsive, flexible, and highly disciplined as possible in order to help you achieve your business goals.

MYBROCADE ONLINE SUPPORT TOOLS

- Access through https://login.brocade.com/
- View specialized features for Support customers and partners
  - My Cases (Online Case Management)
  - Knowledge Base
  - Software Downloads and Documentation
  - Community/Forums
  - Network Monitoring (subscription required)

GETTING STARTED WITH ONLINE SUPPORT TOOLS

New to MyBrocade?

Visit: https://my.brocade.com/wps/portal/registration

- Enter serial number with a valid Brocade Technical Support contract
- Enter existing Brocade ID (if applicable)
- Receive access to Online Support Tools within one business day

What is a "Brocade ID"?

- A group of serial numbers located under a Brocade Support contract, which will enable customers and partners to control case management
- Multiple Brocade IDs can be set up to group assets based on location, technical expertise, and more
- Additional Brocade IDs may be requested by:
  - E-mailing customer care at: webcustomercare@brocade.com
  - Clicking the "Contact Us" tab in My Cases

WHO CAN ACCESS ONLINE SUPPORT TOOLS ON MYBROCADE?

Customers with a Brocade Technical Support contract:

- Brocade Direct Support (BDS)
- Brocade Supplemental Support (BSS)
- Brocade Premier Support

Partners with a Technical Support contract:

- Support Delivery Partner (SDP)
- Professional Services Partner (PSP)
- OEM Partner

BROCADE SUPPORT PARTNERS

How to Grant Customers Access to MyBrocade

1. Customer must register with a valid SN
2. Customer will receive confirmation e-mail and registration instructions within one business day
3. Customer will receive access to:
   - Downloads
   - My Cases (view-only access)

MY CASES (ONLINE CASE MANAGEMENT)

1. Log in at http://my.brocade.com
2. Click the "My Cases" tab
   - Open, update, track, and search service requests
   - Group, view, and add assets using Brocade IDs
   - View asset info including SLA and contract status

KNOWLEDGE BASE

1. Log in at http://my.brocade.com
2. Click the "Knowledge Base" tab
   - Search engine for solutions to technical issues
   - View product news and monitored content using rich analytics
   - Send and receive notifications to articles of interest
   - Browse and subscribe to content channels
   - Search Brocade resources including: Community forums, technical support bulletins, software release notes, product manuals, white papers, FAQs, and KB Help

SOFTWARE DOWNLOADS AND DOCUMENTATION

1. Log in at http://my.brocade.com
2. Click the "Downloads" tab in the MyBrocade top navigation
   - Firmware updates, new releases, and licensing tools
   - Management applications
   - Management Information Base (MIB) and Utilities

KEY CONTACTS FOR YOUR ONLINE SUPPORT TOOLS NEEDS

- MyBrocade assistance: webcustomercare@brocade.com
- Purchase Technical Support: maintcontracts@brocade.com
- Brocade products assistance: support@brocade.com
  - 1-800-752-8061 (International number)

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