

## DATA SHEET



### HIGHLIGHTS

- Delivers chassis-level performance and availability, providing an optimal user experience for streaming video, VDI, UC, and other critical applications
- Offers unprecedented stacking performance with 320 Gbps of stacking bandwidth, eliminating inter-switch bottlenecks
- Provides up to 1 Tbps of total switching capacity with up to 384 1 GbE and 64 10 GbE per stack for campus network edge and aggregation layers
- Provides unmatched availability with four redundant 40 Gbps stacking ports per switch, hitless stacking failover, hot switch replacement, and dual hot-swappable power supplies and fans
- Simplifies network operations and protects investments with the Ruckus HyperEdge® Architecture, enabling consolidated network management and advanced services sharing across heterogeneous switches

### CHASSIS-LIKE CAPABILITIES IN A STACKABLE FORM FACTOR

Today's enterprise networks are expected to deliver services thought impossible just a few years ago. High-Definition (HD) video conferencing, real-time collaboration, Unified Communications (UC), and Virtual Desktop Infrastructure (VDI) are only a few of the applications that organizations are deploying to enhance employee productivity, improve customer service, and create a competitive advantage. These same networks must also provide anytime, anywhere mobile access and scale to meet rising user expectations. At the same time, organizations face continued pressure to reduce costs and do more with less. More than ever, campus networks need to quickly and efficiently evolve with the ever-changing business environment.

### COMBINING THE BEST OF A CHASSIS AND A STACKABLE SWITCH

The Brocade® ICX® 6610 Switch redefines the economics of enterprise networking by providing unprecedented levels of performance, availability, and flexibility in a stackable form factor—delivering the capabilities of a chassis with the flexibility and cost-effectiveness of a stackable switch.

#### Class-Leading Performance for Today and Tomorrow

The Brocade ICX 6610 delivers wire-speed, non-blocking performance across all ports to support latency-sensitive applications such as real-time voice/video streaming and VDI. Brocade ICX 6610 Switches can be stacked using four full-duplex 40 Gbps stacking ports that provide an unprecedented 320 Gbps of backplane stacking bandwidth with full redundancy, eliminating inter-switch bottlenecks. Additionally, each switch can provide up to eight 10 Gigabit Ethernet (GbE) ports for high-speed connectivity to the aggregation or core layers.

#### High Availability

When every second matters, Brocade ICX 6610 Switches help deliver continuous availability to optimize the user experience. Ruckus stacking technology delivers high availability, performing real-time state synchronization across the stack and enabling instantaneous hitless failover to a standby controller in the unlikely event of a failure of the master stack controller. Organizations also can use hot-insertion/removal of stack members to avoid interrupting service when adding a switch to increase the capacity of a stack or replacing a switch that needs servicing.

In addition to stack-level high availability, Brocade ICX 6610 Switches include system-level high-availability features, such as dual hot-swappable, load-sharing, and redundant power supplies. The modular design also has dual hot-swappable fan trays. These features provide another level of availability for the campus wiring closet

in a compact form factor. Additional design features include intake and exhaust temperature sensors and fan spin detection to quickly identify abnormal or failed operating conditions—helping to minimize mean time to repair.

## Unmatched Simplicity and Investment Protection

The Brocade ICX 6610 is easy to deploy, manage, and integrate into both new and existing networks. Organizations can buy only what they need today and easily scale up as demand grows and new technologies emerge.

The flexibility of a stackable switch allows organizations to forgo investing in a chassis upfront and put precious capital to better use elsewhere. Organizations can purchase an initial switch to get started and add a new Brocade ICX 6610 Switch to the stack as their business grows.

With capabilities such as bandwidth on demand, the Brocade ICX 6610 enables organizations to grow their networks when necessary. Organizations can initially deploy 1 GbE uplink ports and upgrade to 10 GbE ports when desired with an easy-to-activate software license.

Organizations also have peace of mind with the Ruckus Assurance® Limited Lifetime Warranty. This warranty can help improve Total Cost of Ownership (TCO) while freeing up both capital and resources to re-invest into the business. For warranty details, visit [www.ruckuswireless.com/warranty](http://www.ruckuswireless.com/warranty).

The Brocade ICX 6610 uses standard 40 GbE ports and QSFP cables for stacking. This not only delivers class-leading stacking performance and availability, but also increases cabling options and reduces cable costs—unlike competitive offerings, which rely on proprietary stacking ports and cables.

Support for MACsec, SDN, and 40 GbE standards provides maximum future-proofing and investment protection. This enables organizations to deploy these capabilities as needed when more network devices supporting them become available.



**Figure 1:** Brocade ICX 6610 Switches can be stacked using four standard 40 Gbps QSFP ports that provide a fully redundant virtual chassis backplane with 320 Gbps of stacking bandwidth.

## BUILT FOR THE MOST DEMANDING ENTERPRISE NETWORK ENVIRONMENTS

Ruckus stacking technology makes it possible to stack up to eight Brocade ICX 6610 Switches into a single logical chassis switch, providing simple and robust expandability for future growth at the network edge or aggregation layer. Also, this stacked virtual switch has only a single IP address to simplify management, and offers transparent forwarding across a pool of up to 384 1 GbE and 64 10 GbE ports. When new switches are added to the stack, they automatically inherit the stack's existing configuration file, enabling true plug-and-play network expansion.

Ruckus stacking technology also delivers high availability, performing real-time state synchronization across the stack and enabling instantaneous hitless failover to a standby controller, if the master stack controller fails. In addition, organizations can use hot-insertion/removal of stack members to avoid interrupting service.

Brocade ICX 6610 Switches offer four dedicated full-duplex 40 Gbps stacking ports that provide full redundancy and an unprecedented 320 Gbps of stacking bandwidth, essentially eliminating the need to work around inter-switch bottlenecks (see Figure 1).

Unlike competitive offerings that use proprietary stacking ports, the use of standard 40 Gbps QSFP ports offers optimum flexibility and future-proofing. These dedicated stacking ports free up the 10 GbE ports for high-speed connectivity to the aggregation or core layers.

## Up to Eight 10 GbE Ports on Demand per Switch

Brocade ICX 6610 Switches offer eight dual-mode Small Form-Factor Pluggable (SFP)/SFP+ ports, enabling high-bandwidth connectivity to the aggregation or core layers. These ports can be upgraded from 1 GbE to 10 GbE by simply applying a software license, eliminating the need to install a hardware module. In addition, organizations can aggregate these ports across the stack to provide high-speed, redundant links between the wiring closet and the aggregation layer, or between the aggregation and the core layer. With the ability to use short-range and long-range optics, along with copper Twinax cables, the Brocade ICX 6610 supports flexible and cost-effective network architectures (see Figure 2).



**Figure 2:** Brocade ICX 6610 Switches support eight dual-mode 1 GbE/10 GbE SFP/SFP+ ports (left) and up to 48 1 GbE RJ-45 or 24 1 GbE SFP ports (right).

The Brocade ICX 6610 delivers industry-leading 8-port 10 GbE density in a 1U switch, providing up to 80 Gbps of uplink bandwidth to the aggregation or core layers of the network. This bandwidth enables a 1:1 subscription ratio throughout the network. As a result, organizations can deploy highly utilized networks to avoid congestion during peak hours.

### Built to Power Next-Generation Edge Devices

The Brocade ICX 6610 can deliver both power and data across network connections, providing a single-cable solution for the latest edge devices. Brocade ICX 6610 Switches are compatible with industry-standard VoIP equipment as well as legacy IP phones. In addition, they support the Power over Ethernet (PoE+) standard (802.3at) to provide up to 30 watts of power to each device. This high-powered solution simplifies wiring for next-generation edge devices, such as video conferencing and Voice over IP (VoIP) phones, pan/tilt 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. With a 1500-watt power budget per switch (with two power supplies), the Brocade ICX 6610 24- and 48-port PoE models can supply up to Class 4 PoE+ (30 watts) power to every port.

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

The Brocade ICX 6610 supports 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 UC. Configuring IP endpoints such as VoIP phones can be a complex task, requiring manual and time-consuming configuration. LLDP and LLDP-MED address this challenge by providing a standard, open method for configuring, discovering, and managing network infrastructure. The LLDP protocols also help 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.

### Flexible Cooling Options

All Brocade ICX 6610 Switches support reversible front-to-back airflow options. This data center-friendly design improves mounting flexibility in racks, while adhering to the cooling guidelines of the hosting environment. Organizations can specify airflow direction at the time of order and can reverse the direction after deployment by swapping the power supplies and fan assembly (see Figure 3).

### Full Layer 3 Capabilities

Brocade ICX 6610 Switches also offer powerful IPv4 and IPv6 Layer 3 switching capabilities. Organizations can use premium Layer 3 features—such as IPv4/IPv6 OSPF and RIP routing, Policy-Based Routing (PBR), VRRP, and Protocol-Independent Multicast (PIM)—to reduce complexity and enhance the reliability of large enterprise networks by bringing Layer 3 capabilities to the network edge and/or aggregation layer. Advanced Layer 3 capabilities include BGP routing, enabling remote offices to connect Brocade ICX 6610 Switches to service provider networks. Premium and advanced routing capabilities can be added to any Brocade ICX 6610 Switch model through software key-based activation.

### SDN-ENABLED PROGRAMMATIC CONTROL OF THE NETWORK

Software-Defined Networking (SDN) is a powerful new network paradigm designed for the world's most demanding networking environments and promises breakthrough levels of customization, scale, and efficiency. The Brocade ICX 6610 enables SDN by supporting the OpenFlow 1.3 protocol, which allows communication between an OpenFlow controller and an OpenFlow-enabled switch. Using this approach, organizations can control their networks programmatically, transforming the network into a platform for innovation through new network applications and services. The Brocade ICX 6610 delivers OpenFlow in true hybrid port mode. With Ruckus hybrid port mode, organizations can simultaneously deploy traditional Layer 2/3 forwarding with OpenFlow on the same port. This unique capability provides a pragmatic path to SDN by enabling network administrators to progressively integrate OpenFlow into existing networks, giving them the programmatic control offered by SDN for specific flows while the remaining traffic is forwarded as before. Brocade ICX 6610 hardware support for OpenFlow enables organizations to apply these capabilities at line rate.



**Figure 3:** The Brocade ICX 6610 provides four 40 Gbps high-performance QSFP stacking ports (center) and dual, hot-swappable load-sharing power supplies and fan trays (left and right).

## RUCKUS HYPEREDGE ARCHITECTURE

The Ruckus 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 Ruckus 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 Domains 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 is achieved with Ruckus wireless solutions using controller-less or controller-shared license deployment options.

## SIMPLIFIED, SECURE STANDARDS-BASED MANAGEMENT AND MONITORING

The Brocade ICX 6610 provides simplified, standards-based management capabilities that help organizations reduce administrative time and effort while securing their networks.

### sFlow-based “Always-On” Network Monitoring

sFlow is a modern, standards-based network export protocol (RFC 3176) that addresses many of the challenges that network managers face today. By embedding sFlow into the Brocade ICX 6610, Ruckus delivers an “always-on” technology that operates with wire-speed performance. sFlow dramatically reduces implementation costs compared to traditional network monitoring solutions that rely on mirrored ports, probes, and line-tap technologies. Moreover, sFlow gives organizations full, enterprise-wide monitoring capability for every port in the network.

### Simplified Deployment with Auto-Configuration

The Brocade ICX 6610 supports auto-configuration, simplifying deployment with a truly plug-and-play experience. Organizations can use this feature to automate IP address and feature configuration of the switches without requiring a highly trained network engineer onsite. When the switches power up, they automatically receive an IP address and configuration from DHCP and Trivial File Transport Protocol (TFTP) servers. At this time, the switches can also automatically receive a software update to be at the same code revision as currently installed switches.

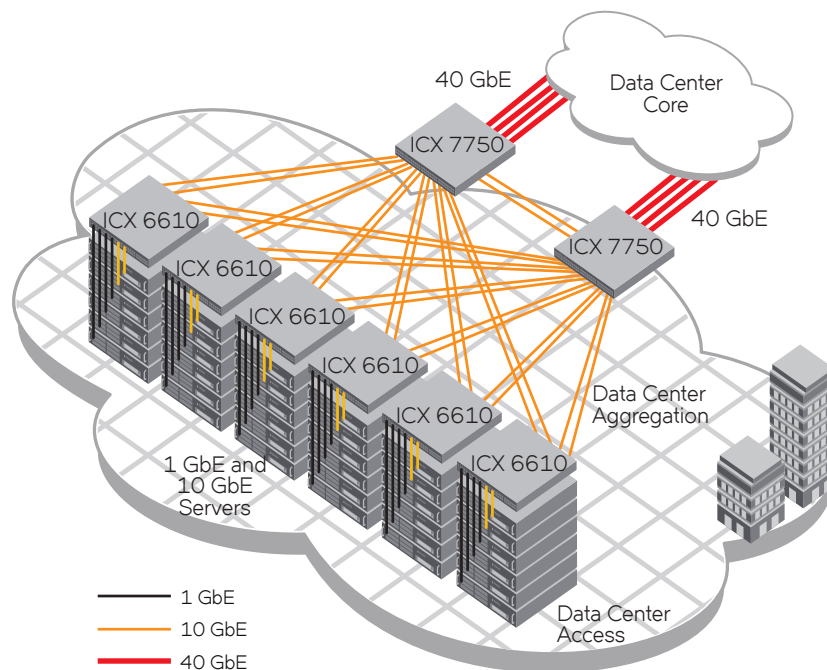


Figure 4: The Brocade ICX 6610 provides ToR 1 GbE and 10 GbE server connectivity with the Brocade ICX 7750 providing data center aggregation.

## Open-Standards Management

The Brocade ICX 6610 includes an industry-standard Command Line Interface (CLI) and supports Secure Shell (SSHv2), Secure Copy (SCP), and SNMPv3 to restrict and encrypt management communications to the system. In addition, support for Terminal Access Controller Access Control System (TACACS/TACACS+) and RADIUS authentication helps ensure secure operator access.

## Out-of-Band Management

The Brocade ICX 6610 includes a 10/100/1000 Mbps RJ-45 Ethernet port dedicated to out-of-band management, providing a remote path to manage the switches, regardless of the status or configuration of the data ports.

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

Thanks to its class-leading 10 GbE port count, the Brocade ICX 6610 is an ideal solution as a Top-of-Rack (ToR) switch in a mixed 1 GbE/10 GbE server connectivity environment. It is designed to fit in server racks, consuming only one rack unit and offering dual integrated power supplies and fan assemblies with reversible front-to-back/back-to-front airflow for flexible cooling options. In data center environments where most servers have 1 GbE and some 10 GbE network interfaces, the Brocade ICX 6610 provides a compact and cost-effective 1 GbE/10 GbE ToR switch (see Figure 4). This configuration uses 10 GbE links to connect to Brocade ICX data center aggregation switches.

## UNIFIED WIRED/WIRELESS NETWORK MANAGEMENT WITH BROCADE NETWORK ADVISOR

Managing enterprise campus networks continues to become more complex due to the growth in services that rely on wired and wireless networks. Services such as Internet, e-mail, video conferencing, real-time collaboration, and distance learning all have specific configuration and management requirements. At the same time, organizations face increasing demand to provide uninterrupted services for high-quality voice and Unified Communications (UC), wireless mobility, and multimedia applications.

To reduce complexity and the time spent managing these environments, the easy-to-use Brocade Network Advisor discovers, manages, and deploys configurations to groups of IP devices. By using Brocade Network Advisor, organizations can configure Virtual LANs (VLANs) within the network, manage wireless access points, and execute commands on specific IP devices or groups of IP devices. sFlow-based proactive monitoring is ideal for performing network-wide troubleshooting, generating traffic reports, and gaining visibility into network activity from the edge to the core. Brocade Network Advisor centralizes management of the entire family of Ruckus wired products.

## WARRANTY

The Brocade ICX 6610 Switch is covered by the Brocade Assurance Limited Lifetime Warranty. For details, visit [www.ruckuswireless.com/warranty](http://www.ruckuswireless.com/warranty).

## MAXIMUM OPERATIONAL-EFFICIENCY AND INVESTMENT PROTECTION

To further improve operational efficiency, Brocade ICX 6610 Switches come with 90 days of free technical support from the Ruckus Technical Assistance Center and free software updates. With these capabilities, organizations gain peace of mind while freeing up IT budget and resources to grow their businesses.

## RUCKUS GLOBAL SERVICES

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

## MAXIMIZING INVESTMENTS

To help optimize technology investments, Ruckus and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Ruckus sales partner or visit [support.ruckuswireless.com/programs](http://support.ruckuswireless.com/programs).

## BROCADE ICX 6610 FEATURE AND MODEL COMPARISON

	24 or 48 RJ-45 Ports		24 SFP Ports	24 or 48 PoE+ Ports	
	Brocade ICX 6610-24	Brocade ICX 6610-48	Brocade ICX 6610-24F	Brocade ICX 6610-24P	Brocade ICX 6610-48P
<b>Switching capacity</b> <i>(data rate, full duplex)</i>	528 Gbps	576 Gbps	528 Gbps	528 Gbps	576 Gbps
<b>Forwarding capacity</b> <i>(data rate, full duplex)</i>	396 Mpps (wire speed)	432 Mpps (wire speed)	396 Mpps (wire speed)	396 Mpps (wire speed)	432 Mpps (wire speed)
<b>Aggregated stacking bandwidth</b>	1,280 Gbps	1,280 Gbps	1,280 Gbps	1,280 Gbps	1,280 Gbps
<b>Units per stack</b>	8	8	8	8	8
<b>Long-distance stacking</b> <i>(maximum distance between two stacked switches)</i>	150 m	150 m	150 m	150 m	150 m
<b>10/100/1000 Mbps RJ-45 ports</b>	24	48	N/A	24	48
<b>100/1000 Mbps SFP ports</b>	N/A	N/A	24	N/A	N/A
<b>Dual-mode 1/10 GbE SFP/SFP+ ports</b> <i>(10 GbE SFP+ optional upgrade license)</i>	8	8	8	8	8
<b>40 Gbps QSFP stacking ports</b>	4	4	4	4	4
<b>PoE power budget</b> <i>(two AC power supplies)</i>	N/A	N/A	N/A	1,500 W	1,500 W
<b>PoE power budget</b> <i>(two DC power supplies)</i>	N/A	N/A	N/A	516 W	516 W
<b>Maximum PoE Class 3 ports</b>	N/A	N/A	N/A	24 (one power supply)	48 (one power supply)
<b>Maximum PoE+ ports</b>	N/A	N/A	N/A	24 (one power supply)	48 (two power supplies)
<b>Redundant/load sharing; hot-swappable power supplies</b> <b>Max output</b> <i>(second optional)</i>	2x250 W	2x250 W	2x250 W	2x1,000 W	2x1,000 W
<b>Weight</b> <i>(one power supply/one fan tray)</i>	6.42 kg (14.15 lb)	6.78 kg (14.95 lb)	6.69 kg (14.75 lb)	7.10 kg (15.65 lb)	7.46 kg (16.45 lb)
<b>Dimensions</b>	429 mm (16.880 in.) W x 406.4 mm (16.00 in.) D x 44 mm (1.732 in.) H - 1U				
<b>Airflow</b>	Front to back (reversible)				
<b>MTBF</b> <i>(25°C, CL: 60%)</i>	474,527 hours	408,144 hours	400,449 hours	416,567 hours	336,984 hours

## BROCADE ICX 6610 SPECIFICATIONS

SYSTEM ARCHITECTURE		
Connector options	<ul style="list-style-type: none"> <li>• 10/100/1000 ports: RJ-45</li> <li>• 1 Gbps SFP ports: SX, LX, LHA, LHB, 1000Base-BX, CWDM</li> <li>• 10 Gbps SFP+ ports: Direct-attached copper (Twinax), SR, LR</li> <li>• Stacking ports: 40 GbE QSFP for use with direct-attached 1 meter or 5 meter stacking cable</li> <li>• Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45</li> <li>• Console management: RJ-45 serial</li> </ul>	
Maximum MAC addresses	<ul style="list-style-type: none"> <li>• 32,000</li> </ul>	
Maximum VLANs	<ul style="list-style-type: none"> <li>• 4,096</li> </ul>	
Maximum STP (spanning trees)	<ul style="list-style-type: none"> <li>• 254</li> </ul>	
Maximum routes (in hardware)	<ul style="list-style-type: none"> <li>• 16,000</li> </ul>	
Trunking	<ul style="list-style-type: none"> <li>• Maximum ports per trunk: 8</li> <li>• Maximum trunk groups: 124</li> </ul>	
Maximum jumbo frame size	<ul style="list-style-type: none"> <li>• 9,216 bytes</li> </ul>	
Layer 2 switching	<ul style="list-style-type: none"> <li>• 802.1s Multiple Spanning Tree</li> <li>• 802.1x Authentication</li> <li>• Auto MDI/MDIX</li> <li>• BPDU Guard, Root Guard</li> <li>• Dual-Mode VLANs</li> <li>• Dynamic VLAN Assignment</li> <li>• Dynamic Voice VLAN Assignment</li> <li>• Fast Port Span</li> <li>• GARP VLAN Registration Protocol</li> <li>• IGMP Snooping (v1/v2/v3)</li> <li>• Link Fault Signaling (LFS)</li> <li>• MAC Address Locking; Port Security</li> <li>• MAC-Layer Filtering</li> <li>• MAC Learning Disable</li> <li>• MLD Snooping (v1/v2)</li> <li>• Multi-device Authentication</li> <li>• Per-VLAN Spanning Tree (PVST/PVST+/PVRST)</li> <li>• Mirroring - Port-based, ACL-based, MAC Filter-based, and VLAN-based</li> <li>• Port Loop Detection</li> <li>• Private VLAN</li> <li>• Protected Link Groups</li> <li>• Protocol VLAN (802.1v), Subnet VLAN</li> <li>• Remote Fault Notification (RFN)</li> <li>• Single-instance Spanning Tree</li> <li>• Single-link LACP</li> <li>• Trunk Groups</li> <li>• Uni-Directional Link Detection (UDLD)</li> </ul>	
Base Layer 3 routing	<ul style="list-style-type: none"> <li>• IPv4 static routes</li> <li>• ECMP</li> <li>• Port-based Access Control Lists</li> <li>• L3/L4 ACLs</li> <li>• Host routes</li> <li>• Virtual Interfaces</li> <li>• Routed Interfaces</li> <li>• Route-only Support</li> <li>• Routing Between Directly Connected Subnets</li> <li>• HyperEdge service propagation</li> </ul>	
Premium Layer 3 routing	<ul style="list-style-type: none"> <li>• IPv4 and IPv6 static and dynamic routes</li> <li>• OSPF v2, OSPF v3 (IPv6)</li> <li>• PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality)</li> <li>• PBR</li> <li>• RIP v1/v2, RIPng (IPv6)</li> <li>• Virtual Route Redundancy Protocol (VRRP)</li> <li>• VRRP-E, VRRP-E (IPv6)</li> <li>• VRRPv3 (IPv6)</li> </ul>	
Advanced Layer 3 routing	<ul style="list-style-type: none"> <li>• BGP4, BGP4+(IPv6)</li> <li>• GRE</li> <li>• IPv6 over IPv4 tunnels</li> <li>• VRF (IPv4 and IPv6)</li> </ul>	
SDN features	<ul style="list-style-type: none"> <li>• Support for OpenFlow v1.0 and v1.3</li> <li>• OpenFlow support with true hybrid port mode</li> <li>• OpenFlow support with stacking, including mixed stacks</li> <li>• Operates seamlessly under OpenDaylight SDN Controllers</li> </ul>	
Metro features	<ul style="list-style-type: none"> <li>• Metro-Ring Protocol (v1, v2)</li> <li>• Virtual Switch Redundancy Protocol (VSRP)</li> <li>• VLAN Stacking (Q-in-Q)</li> <li>• VRRP</li> <li>• Topology Groups</li> </ul>	

## BROCADE ICX 6610 SPECIFICATIONS

<b>Quality of Service (QoS)</b>	<ul style="list-style-type: none"> <li>• ACL Mapping and Marking of ToS/DSCP</li> <li>• ACL Mapping and Marking of 802.1p</li> <li>• ACL Mapping to Priority Queue</li> <li>• ACL Mapping to ToS/DSCP</li> <li>• Classifying and Limiting Flows Based on TCP Flags</li> <li>• DHCP Relay</li> </ul>	<ul style="list-style-type: none"> <li>• DiffServ Support</li> <li>• Honoring DSCP and 802.1p</li> <li>• MAC Address Mapping to Priority Queue</li> <li>• Priority Queue Management using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP</li> </ul>
<b>IEEE standards compliance</b>	<ul style="list-style-type: none"> <li>• 802.1AB LLDP/LLDP-MED</li> <li>• 802.1D-2004 MAC Bridging</li> <li>• 802.1p Mapping to Priority Queue</li> <li>• 802.1s Multiple Spanning Tree</li> <li>• 802.1w Rapid Spanning Tree</li> <li>• 802.1x Port-based Network Access Control</li> <li>• 802.3 10 Base-T</li> <li>• 802.3ab 1000 Base-T</li> <li>• 802.3ad Link Aggregation (Dynamic and Static)</li> <li>• 802.3ae 10 Gigabit Ethernet</li> </ul>	<ul style="list-style-type: none"> <li>• 802.3af Power over Ethernet</li> <li>• 802.3at Power over Ethernet Plus</li> <li>• 802.3u 100 Base-TX</li> <li>• 802.3x Flow Control</li> <li>• 802.3z 1000Base-SX/LX</li> <li>• 802.3 MAU MIB (RFC 2239)</li> <li>• 802.3ba 40 Gbps Ethernet</li> <li>• 802.1AE MACsec</li> <li>• 802.1Q VLAN Tagging</li> </ul>
<b>Traffic management</b>	<ul style="list-style-type: none"> <li>• ACL-based inbound rate limiting and traffic policies</li> <li>• Broadcast, multicast, and unknown unicast rate limiting</li> </ul>	<ul style="list-style-type: none"> <li>• Inbound rate limiting per port</li> <li>• Outbound rate limiting per port and per queue</li> </ul>
<b>High availability</b>	<ul style="list-style-type: none"> <li>• Redundant hot-swappable internal power supplies</li> <li>• Hot-swappable fan trays</li> <li>• L3 VRRP protocol redundancy</li> <li>• Real-time state synchronization across the stack</li> </ul>	<ul style="list-style-type: none"> <li>• Hitless failover from master to standby stack controller</li> <li>• Protected link groups</li> <li>• Hot insertion and removal of stacked units</li> </ul>
<b>MANAGEMENT</b>		
<b>Management and control</b>	<ul style="list-style-type: none"> <li>• Auto Configuration</li> <li>• Ruckus HyperEdge technology</li> <li>• Configuration Logging</li> <li>• Digital Optical Monitoring</li> <li>• Display Log Messages on Multiple Terminals</li> <li>• Embedded Web Management</li> <li>• Embedded DHCP Server</li> <li>• Industry-standard Command Line Interface (CLI)</li> <li>• Key-based activation of optional software features</li> <li>• Integration with HP OpenView for Sun Solaris, HP-UX, IBM AIX, and Windows</li> <li>• Brocade Network Advisor support</li> <li>• MIB Support for MRP, Port Security, MAC Authentication, and MAC-based VLANs</li> <li>• Out-of-band Ethernet Management</li> <li>• RFC 783 TFTP</li> <li>• RFC 854 TELNET Client and Server</li> <li>• RFC 951 Bootp</li> <li>• RFC 1157 SNMPv1/v2c</li> <li>• RFC 1213 MIB-II</li> </ul>	<ul style="list-style-type: none"> <li>• RFC 1493 Bridge MIB</li> <li>• RFC 1516 Repeater MIB</li> <li>• RFC 1573 SNMP MIB II</li> <li>• RFC 1643 Ethernet Interface MIB</li> <li>• RFC 1643 Ethernet MIB</li> <li>• RFC 1724 RIP v1/v2 MIB</li> <li>• RFC 1757 RMON MIB</li> <li>• RFC 2068 Embedded HTTP</li> <li>• RFC 2131 DHCP Server and DHCP Relay</li> <li>• RFC 2570 SNMPv3 Intro to Framework</li> <li>• RFC 2571 Architecture for Describing SNMP Framework</li> <li>• RFC 2572 SNMP Message Processing and Dispatching</li> <li>• RFC 2573 SNMPv3 Applications</li> <li>• RFC 2574 SNMPv3 User-based Security Model</li> <li>• RFC 2575 SNMP View-based Access Control Model SNMP</li> <li>• RFC 2818 Embedded HTTPS</li> <li>• RFC 3176 sFlow</li> <li>• SNTP Simple Network Time Protocol</li> <li>• Support for Multiple Syslog Servers</li> </ul>
<b>Embedded security</b>	<ul style="list-style-type: none"> <li>• 802.1X Accounting</li> <li>• MAC Authentication</li> <li>• Bi-level Access Mode (Standard and EXEC Level)</li> </ul>	<ul style="list-style-type: none"> <li>• EAP pass-through support</li> <li>• IEEE 802.1X username export in sFlow</li> <li>• Protection against Denial of Service (DoS) attacks</li> </ul>
<b>Secure management</b>	<ul style="list-style-type: none"> <li>• Authentication, Authorization, and Accounting (AAA)</li> <li>• Advanced Encryption Standard (AES) with SSHv2</li> <li>• RADIUS/TACACS/TACACS+</li> </ul>	<ul style="list-style-type: none"> <li>• Secure Copy (SCP)</li> <li>• Secure Shell (SSHv2)</li> <li>• Username/Password</li> <li>• Web authentication</li> </ul>



## BROCADE ICX 6610 SPECIFICATIONS

ENVIRONMENT			
Temperature	<ul style="list-style-type: none"> <li>Operating temperature: 0°C to 55°C (32°F to 131°F)</li> <li>Storage temperature: -25°C to 70°C (-13°F to 158°F)</li> </ul>		
Humidity	<ul style="list-style-type: none"> <li>Relative humidity: 5% to 95%, non-condensing</li> </ul>		
Altitude	<ul style="list-style-type: none"> <li>Storage altitude: 10,000 ft (3,000 m) maximum</li> </ul>		
Acoustic	<ul style="list-style-type: none"> <li>From 39.6 dB (24 ports, 1 fan, 1 PSU) to 48.7 dB (48 ports, 2 fans, 2 PSUs)</li> </ul>		
POWER			
Power supplies	<ul style="list-style-type: none"> <li>Up to two internal, redundant, field-replaceable, load-sharing AC or DC power supplies with dedicated system and PoE power</li> </ul>		
Power inlet	<ul style="list-style-type: none"> <li>C13</li> </ul>		
Input voltage	<ul style="list-style-type: none"> <li>Typical 100 to 240 VAC</li> </ul>		
Input line frequency	<ul style="list-style-type: none"> <li>50 to 60 Hz</li> </ul>		
POWER DRAW (NO POE LOADS)			
Models	With 1 Power Supply	With 2 Power Supplies	
Brocade ICX 6610-24	120 W	140 W	
Brocade ICX 6610-48	165 W	185 W	
Brocade ICX 6610-24F	125 W	145 W	
Brocade ICX 6610-24P	120 W	140 W	
Brocade ICX 6610-48P	165 W	185 W	
COMPLIANCE/CERTIFICATION			
Electromagnetic emissions	<ul style="list-style-type: none"> <li>FCC Class A (Part 15); EN 55022/CISPR-22 Class A; VCCI Class A; ICES-003 Electromagnetic Emission; AS/NZS 55022; EN 61000-3-2 Power Line Harmonics; EN 61000-3-3 Voltage Fluctuation and Flicker; EN 61000-6-3 Emission Standard (supersedes: EN 50081-1)</li> </ul>		
Safety	<ul style="list-style-type: none"> <li>CAN/CSA-C22.2 NO. 60950-1-07; UL 60950-1 Second Edition; IEC 60950-1 Second Edition; EN 60950-1:2006 Safety of Information Technology Equipment; EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification, Requirements and User's Guide; EN 60825-2 Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems</li> </ul>		
Immunity	<ul style="list-style-type: none"> <li>EN 61000-6-1 Generic Immunity and Susceptibility (supersedes EN 50082-1); EN 55024 Immunity Characteristics (supersedes EN 61000-4-2 ESD); EN 61000-4-3 Radiated, Radio Frequency, Electromagnetic Field; EN 61000-4-4 Electrical Fast Transient; EN 61000-4-5 Surge; EN 61000-4-6 Conducted Disturbances Induced by Radio-Frequency Fields; EN 61000-4-8 Power Frequency Magnetic Field; EN 61000-4-11 Voltage Dips and Sags</li> </ul>		
Environmental regulatory compliance	<ul style="list-style-type: none"> <li>RoHS-compliant (6 of 6); WEEE-compliant</li> </ul>		

## BROCADE ICX 6610 ORDERING INFORMATION

PART NUMBER	DESCRIPTION
ICX6610-24-E	24-port 1 GbE RJ45, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 250 W power supply. Base software.
ICX6610-24-PE	24-port 1 GbE RJ45, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 250 W power supply. Premium software.
ICX6610-24-I	24-port 1 GbE RJ45, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 250 W power supply. Base software.
ICX6610-24-PI	24-port 1 GbE RJ45, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 250 W power supply. Premium software.
ICX6610-24P-E	24-port 1 GbE RJ45 PoE+, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 1,000 W power supply. Base software.
ICX6610-24P-PE	24-port 1 GbE RJ45 PoE+, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 1,000 W power supply. Premium software.
ICX6610-24P-I	24-port 1 GbE RJ45 PoE+, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 1,000 W power supply. Base software.
ICX6610-24P-PI	24-port 1 GbE RJ45 PoE+, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 1,000 W power supply. Premium software.
ICX6610-24F-E	24-port 1 GbE SFP, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 250 W power supply. Base software.
ICX6610-24F-PE	24-port 1 GbE SFP, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 250 W power supply. Premium software.
ICX6610-24F-I	24-port 1 GbE SFP, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 250 W power supply. Base software.
ICX6610-24F-PI	24-port 1 GbE SFP, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 250 W power supply. Premium software.
ICX6610-48-E	48-port 1 GbE RJ45, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 250 W power supply. Base software.
ICX6610-48-PE	48-port 1 GbE RJ45, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 250 W power supply. Premium software.
ICX6610-48-I	48-port 1 GbE RJ45, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 250 W power supply. Base software.
ICX6610-48-PI	48-port 1 GbE RJ45, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 250 W power supply. Premium software.
ICX6610-48P-E	48-port 1 GbE RJ45 PoE+, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 1,000 W power supply. Base software.
ICX6610-48P-PE	48-port 1 GbE RJ45 PoE+, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side exhaust, hot-swappable fan assembly and 1,000 W power supply. Premium software.
ICX6610-48P-I	48-port 1 GbE RJ45 PoE+, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 1,000 W power supply. Base software.
ICX6610-48P-PI	48-port 1 GbE RJ45 PoE+, plus 8x1 GbE SFPP uplink ports (upgradable to 10 GbE). 4x40 GbE QSFP stacking ports. 1 power-supply-side intake, hot-swappable fan assembly and 1,000 W power supply. Premium software.

## BROCADE ICX 6610 ORDERING INFORMATION

ACCESSORIES AND OPTIONS	
ICX6610-PREM-LIC	Brocade ICX 6610 premium software license
ICX6610-ADV-LIC	Brocade ICX 6610 advanced software license
ICX6610-ADV-UPG-LIC	Brocade ICX 6610 premium to advanced software upgrade
ICX6610-10G-LIC-POD	License to upgrade 4 ports of 1 GbE SFPP uplink to 10 GbE
RPS15-E	Brocade ICX 6610/6650 non-PoE 250 W PSU, power-supply-side exhaust airflow
RPS15-I	Brocade ICX 6610/6650 non-PoE 250 W PSU, power-supply-side intake airflow
RPS16-E	1,000 W power supply for Brocade ICX 6610 PoE models, power-supply-side exhaust airflow
RPS16-I	1,000 W power supply for Brocade ICX 6610 PoE models, power-supply-side intake airflow
RPS16DC-E	510 W DC power supply for Brocade ICX 6610, power-supply-side exhaust airflow
RPS16DC-I	510 W DC power supply for Brocade ICX 6610, power-supply-side intake airflow
ICX6610-FAN-E	Power-supply-side exhaust airflow fan for the Brocade ICX 6610 (two fans required with two power supplies)
ICX6610-FAN-I	Power-supply-side intake airflow fan for the Brocade ICX 6610 (two fans required with two power supplies)
40G-QSFP-C-0101	40 GbE QSFP direct-attached copper cable, 1 m, one-pack
40G-QSFP-C-0501	40 GbE QSFP direct-attached copper cable, 5 m, one-pack
BR-NTWADV-IP-BASE	Brocade Network Advisor IP management software license for up to 50 devices; required for initial purchase of IP-only management; minimum of one year of support is required.