

Brocade ICX Switch Family

Highlights

- Provides a range of fixed form-factor enterprise-class switches to deliver innovative access, aggregation, and core network solutions.
- Features a scale-out networking architecture to incrementally add ports across the campus when and where needed, in a cost-effective manner.
- Leverages open standards-based technology to aggregate Brocade ICX switches into a single logical switch over distances up to 10 km
- Reduces operational costs by consolidating management, eliminating network layers and individual switch touch points.
- Maximizes investment through shared network services that allow premium and entry-level switches to share advanced Layer 2/3 network services.
- Meets compliance and data

confidentiality requirements across networks and cloud deployments with integrated IPsec VPN security within the Brocade ICX 7450 Switches.

- Provides OpenFlow support in hybrid port mode, enabling a gradual transition to Software-Defined Networking (SDN) without disruption.



Scalable Fixed Form-Factor Switches for Next-Generation IP Networks

The Brocade® ICX® family of fixed form-factor switches works together to deliver a complete, scalable, and high-performance network solution that supports today's demanding video, Unified Communications (UC), VDI, and mobile applications. They leverage the innovative Brocade Campus Fabric technology, which provides simplified network deployment and management, scale out networking, and investment protection with the industry's lowest total cost of ownership. In addition, the Brocade ICX 7450 is the industry's first stackable switching solution to extend traditional site-to-site IPsec VPN encryption from the wiring closet, reducing costs and providing pervasive data security and integrity across corporate networks and cloud deployments.

Brocade Campus Fabric Technology

Brocade Campus fabric technology

brings campus networks into the modern era to better support seamless wireless mobility, security, and ease of application deployment. This innovative technology collapses multiple network layers into a single logical switch, flattening the network and eliminating deployment complexity while simplifying network management and reducing operating costs.

Brocade Campus Fabric technology enables organizations to build networks that deliver:

- Consolidated management: Reduces unnecessary network layers to create large management domains that eliminate individual switch touch points, reducing maintenance time and costs.
- Shared network services: Allows premium and entry-level switches to mesh together into a single logical switch and share advanced Layer 2/3 services, delivering lower price-per-port functionality without compromising performance.

- Scale-out networking: Integrates high-performance, fixed form-factor switches to create a single distributed logical switch that is independent of physical location and allows organizations to add ports whenever and wherever needed across the campus without adding complexity.

Brocade Campus Fabric Deployment

Brocade Campus Fabric technology, available on the Brocade ICX 71501, 7250, 7450, and 7750 Switches, extends network options and scalability. It integrates premium Brocade ICX 7750 Switches with Brocade ICX 7450, Brocade ICX 7250, and Brocade ICX 7150 Switches, collapsing network access, aggregation, and core layers into a single logical switch. This logical device shares network services while reducing management touch points and network hops through a single layer design spanning the entire campus network. These powerful deployments deliver equivalent or better functionality than large, rigid modular chassis systems, but with significantly lower costs and smaller carbon footprints. As a result, Campus Fabric technology offers a

level of flexibility, ease of deployment, and total cost of ownership unmatched by traditional access, aggregation, and small-core chassis solutions.

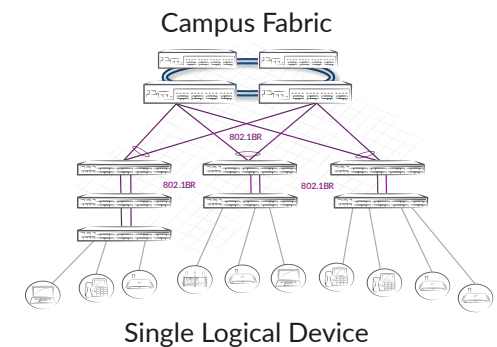
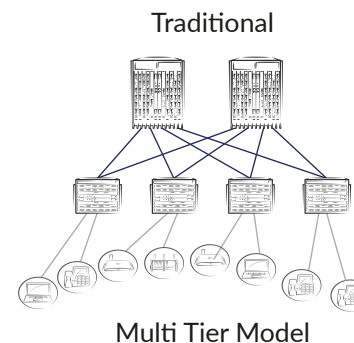
Brocade ICX switches support a Distributed Chassis deployment model that uses standards-based optics and cabling interface connections to ensure maximum distance between campus switches—up to 10 km—and minimum cabling costs—up to 50 percent less than incumbent solutions. This gives organizations the flexibility to deliver ports wherever they are needed on campus at a fraction of the cost. The Distributed Chassis design future proofs campus networks by allowing networks to easily and cost-effectively expand in scale and capabilities.

Mixed Stack Deployment

The mixed stack-enabling technology integrates premium Brocade ICX 6610 and entry-level Brocade ICX 6450 Switches to collapse the network access and aggregation layers into a single domain. This domain shares network services while reducing management

touch points and network hops (due to fewer network layers) as compared to legacy three-tier designs.

Mixed stacking provides all the benefits of traditional stacking, in which all switch members are alike, all links within the stack are active (no Spanning Tree Protocol STP), and management is accomplished from a single IP address. However, by adding the unique capability to share network services between switches, a HyperEdge® mixed stack becomes a powerful solution. HyperEdge shared services enable the extension of premium switch services to all ports of all members of the stack, including entry-level switches. This capability provides two distinct advantages: significant per-port cost reduction and long-term investment protection.



Ensuring End-to-End Data Privacy

As organizations move to a hybrid cloud architecture with geographically dispersed business partners, concerns about security breaches are increasing. Many organizations seek to better meet compliance and protect their data in transit—whether across the Internet or the enterprise network. Brocade offers an industry-first stackable switching solution that delivers encryption from the wiring closet, providing a cost-effective way to ensure data security and integrity across the premises without needing to purchase dedicated encryption products.

The Brocade ICX 7450 switch with the integrated IPsec VPN service module consolidates network switching and encryption to provide

unprecedented VPN deployment flexibility and cost savings. It can interoperate with a Brocade MLX Router equipped with an IPsec hardware encryption module to deliver an end-to-end data privacy solution. By initiating an IPsec tunnel from the Brocade ICX 7450 for transporting selected traffic, organizations save time and reduce the costs from having to install and manage encryption software on individual computers or deploy purpose-built encryption products.

The Brocade 7450 Service Module provides hardware-based acceleration for IPsec VPNs using Advanced Encryption Standards (AES). It leverages programmable hardware technology to future-proof data protection, enabling more features to be added to IPsec VPN deployments as business needs evolve. The Brocade 7450 Service Module accelerates IPsec traffic performance by offloading the mathematically intensive part of the process while relying on the switch processor to identify traffic for encryption, negotiate the security associations, and forward encrypted traffic. Thus, the Brocade switch processor extends traditional Layer 3 routing capabilities to include

routing encryption with Suite B algorithms and support for 128-bit and 256-bit AES. With 10 Gbps throughput per service module, a single Brocade ICX 7450 Switch or stack helps ensure that service levels are not impacted as compliance requirements and security needs increase.

SDN-Enabled Programmatic Control of the Network

Software-Defined Networking (SDN) is a powerful new network paradigm designed for the world's most demanding networking environments and promises breakthrough levels of customization, security, and efficiency. The Brocade ICX Switches enable SDN by supporting the OpenFlow 1.3 protocol, which facilitates communication between the Brocade SDN Controller and the underlying network infrastructure.

In today's increasingly mobile world, organizations are looking to OpenFlow and SDN to achieve programmability in the campus LAN. The business needs driving SDN deployment are improved Quality of Service (QoS), enhanced security and management simplification.

With new policies such as BYOD significantly impacting campus networks, SDN is a powerful solution that better prioritizes and forwards traffic based on the context of a flow and to easily enforce granular policies for regulatory compliance or security reasons.

With hybrid-port mode support on the Brocade ICX Switches, organizations can run traditional protocols and OpenFlow directed flows at the same time. With the Brocade SDN Controller and additional controller support from the Brocade ICX family, IT organizations can receive the benefits of programmatic control while gradually introducing parts of their network into the controller domain without disruption.

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.

Flexible, Long-Distance Stacking for the Most Demanding Enterprise Environments

Brocade stacking technology makes it possible to stack up to 12 Brocade ICX switches into a single logical switch using standard SFP+ or QSFP+ Ethernet connections. This allows Brocade ICX switches to provide class-leading backplane bandwidth, between 80 Gbps and 240 Gbps, as well as simple and robust expandability for future growth at the network edge.

A selection of standard SFP+ and QSFP+ copper cables or optics can be used to stack Brocade ICX switches together, enabling stacking over distances of up to 10 km and thereby eliminating the need for stacked switches to be colocated in the same wiring closet. This stacked logical switch also has only a single IP address to simplify management and offers transparent STP-free traffic forwarding and shared Link Aggregation Groups (LAG) across a pool of up to 576 1 GbE or 10 GbE ports (depending on the platform deployed). When new switches join the stack, they automatically inherit the stack's existing configuration file, enabling true plug-and-play network

expansion.

Brocade stacking technology also delivers high availability, enabling instantaneous hitless failover to a standby stack controller if the master stack controller fails. In addition, organizations can use hot-insertion and removal of stack members to avoid interrupting network services.

Simplified, Open-Standards-based Management and Monitoring

Brocade ICX 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 modern, standards-based network export protocol (RFC 3176) that addresses many of the challenges that network managers face today. By embedding sFlow hardware support into Brocade ICX 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 full, enterprise-wide monitoring capability for every port in the network.

Simplified, Automated Deployment with Auto-Provisioning

Brocade ICX 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 of the switches without requiring a highly trained network engineer onsite. When the switches power up, they automatically receive an IP address and configuration from DHCP and Trivial File Transport Protocol (TFTP) servers. At this time, the switches can also automatically receive a software update to be at the same code revision as currently installed switches.

Open-Standards Management Brocade ICX 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.

Enterprise-Class Availability

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

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

closet, all in a compact form factor.

The Brocade ICX 7000 Series Switches support stack-level In Service Software Upgrade (ISSU)¹, a unique Brocade capability that enables a stack of Brocade ICX Switches to go through a software upgrade without service interruption, enabling continuous operation during system upgrades.

Silent Operation

The Brocade ICX 7150 can operate silently through either a fanless design or a “fanless mode” configuration option. This capability enables the PoE switches to operate with the fan disabled while providing a PoE budget of 150 Watts for the 24-port model and 150 Watts for the 48-port model.

This Brocade-exclusive feature enables the Brocade ICX 7150 Switches to be deployed outside of the wiring closet without disrupting the environment. This capability is critical for certain verticals such as hospitality, education, healthcare, and retail where networking equipment needs to be deployed into a work environment or living space such as a classroom, hotel

room, patient room, operating room, or retail space with minimal disruption.

Key Solution Areas

The Brocade ICX family provides high-performance, cost-effective solutions for many types of campus and data center environments, including 1 GbE access, 10/40 GbE core and aggregation of campus access switches, Top-of-Rack (ToR) server connectivity, and HPC environments.

Traditional Three-Tier Enterprise Campus Networks

The comprehensive range of products in the Brocade ICX family offers many options for campus access aggregation and core deployment. The Brocade ICX 6430, 6450, 7150, and 7250 deliver a cost-effective access solution without sacrificing features or performance. The Brocade ICX 7450 and 6610 provide high modularity and flexibility with the highest performance in their class, offering a highly scalable solution for campus access and 1 GbE campus aggregation. In addition, the Brocade ICX 7750 provides the necessary

advanced Layer 2 and Layer 3 features, high 10/40 GbE port density, and high-availability capabilities to be deployed as a campus aggregation or core solution.

Collapsed Campus Aggregation/Core

Traditional three-tier network design, with “big-box” chassis at the aggregation and core layers, requires a significant up-front investment and

offers limited deployment flexibility and future-proofing. In contrast, a distributed “multi-box” architecture at the aggregation and core layers can deliver much greater scalability and future-proofing with an easier “upgrade as you go” model. This type of architecture enables network architects to add capacity exactly where it is needed in the network, unlike a big-box chassis approach, with all ports located in the same closet.

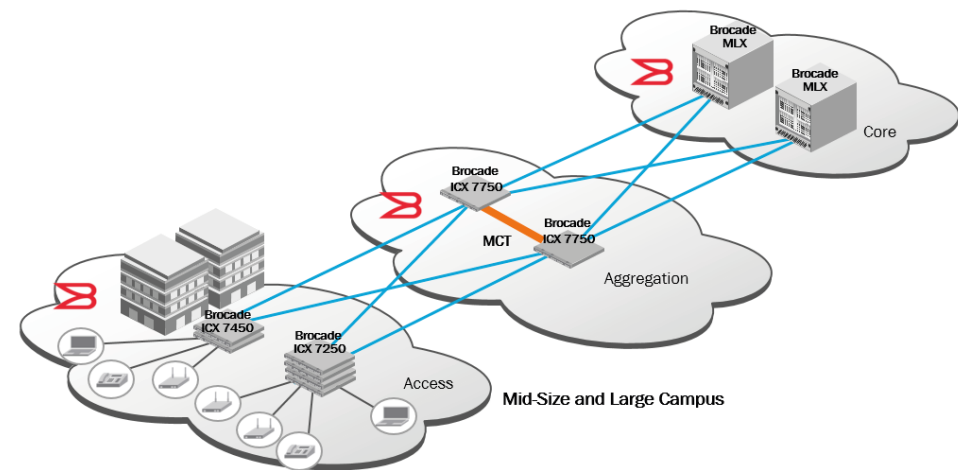


Figure 3: The Brocade ICX 7750 is an ideal solution for deployment as a cost-effective, high-performance campus aggregation solution, thanks to its market-leading 10/40 GbE density, high availability, and Layer 2 and Layer 3 features.

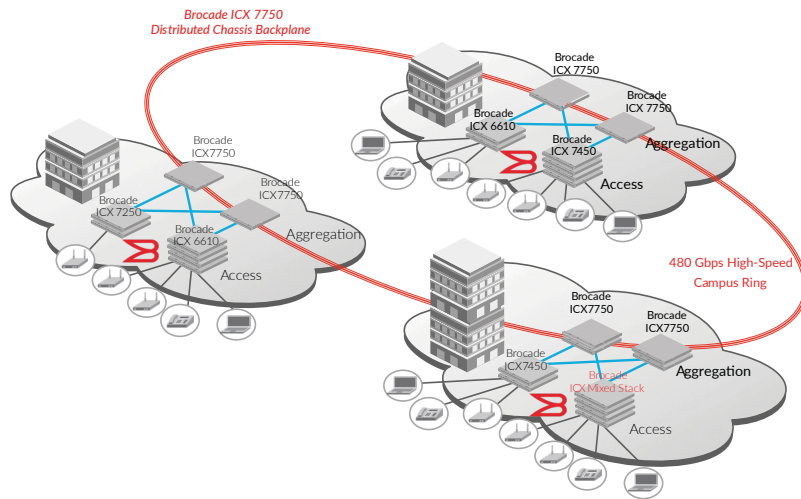


Figure 4: Legacy three-tier architectures can be simplified with the stackable Brocade ICX 7750, ideal for deployment as a cost-effective, high-performance solution, forming a single campus-wide ring and combining the aggregation and core layers in a single logical device.

Leveraging rapid technology evolution and innovative thinking, Brocade is able to offer the first stackable solution for campus aggregation and small core that delivers higher performance and port density than a traditional midsize chassis, while offering the same level of reliability and availability. Brocade long-distance stacking technology enables a ring of Brocade ICX 7750 Switches interconnected with 40 GbE stacking links and separated by up to

10 km each to be used as a combined aggregation and core layer for midsize campuses (see Figure 4).

Data Center 10 GbE ToR Server Connectivity

The Brocade ICX 7750 is designed to fit in server racks, and it consumes only one rack unit. To simplify cabling, the 10 GbE Network Interface Cards (NICs) in the servers connect to Brocade ICX 7750 10 GbE ports using fiber and SFP+ optical transceivers, SFP+ direct-attached copper cable, or standard copper Ethernet twisted pair cables with 10GBASE-T (see Figure 5).

If any servers in the rack have only 1 GbE-capable NICs, organizations can connect them to the same Brocade ICX 7750 Switch using a 10 GbE port as a 1 GbE port through an SFP or copper port. As a ToR switch, the Brocade ICX 7750 switch can connect to the data center middle-of-row/ end-of-row aggregation chassis with either 10 GbE or 40 GbE, usually through link aggregation.

The Brocade ICX 7750 provides data center ToR access while Brocade MLXe Routers provide an aggregation/core solution.

Cost-Effective 10 GbE Aggregation

In data center environments where most servers are 1 GbE-capable, the Brocade ICX 7750 provides a compact and cost-effective 10 GbE aggregation switch. It connects to the data center core through 10 GbE or 40 GbE ports, and it uses 10 GbE links to connect to Brocade ICX ToR switches at the edge of the network (see Figure 6).

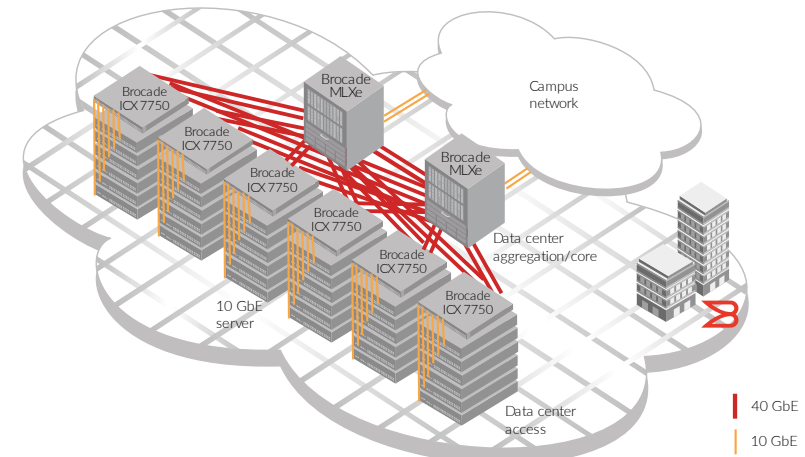


Figure 5: The Brocade ICX 7750 provides data center ToR access while Brocade MLXe routers provide an aggregation/core solution.

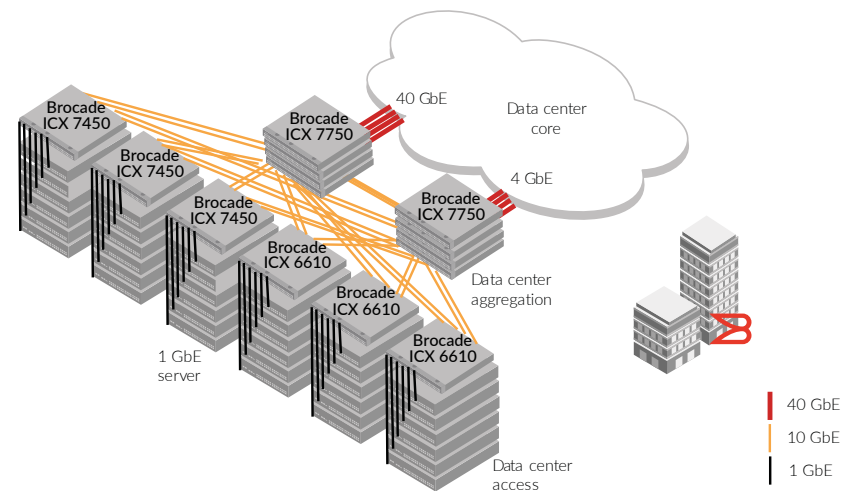


Figure 6: The Brocade ICX 7750 provides data center aggregation with Brocade ICX 6610 and 7450 Switches providing ToR access.