DATA SHEET

Brocade 7840 Extension Switch

HIGHLIGHTS

- Moves more storage data between data centers to meet increasing disaster recovery objectives with industry-leading performance and scalability

- Encrypts storage data flows over distance at full line rate without a performance penalty

- Provides load balancing and network resilience with Extension Trunking to increase WAN utilization and protect against WAN link failures

- Consolidates Fibre Channel, FICON, and IP storage traffic from heterogeneous devices for high-speed, high-availability, and secure transport between data centers

- Delivers holistic management over distance for greater control and insight

- Achieves always-on business operations with non-disruptive firmware upgrades

- Extends proactive monitoring between data centers to automatically detect WAN anomalies and avoid unplanned downtime

- Enables "pay-as-you-grow" scalability with capacity-on-demand upgrades

Unprecedented Performance and Availability for Replication and Backup Solutions

Today's IT organizations are under pressure to keep pace with the growing avalanche of data traffic between data centers and the changes driven by virtualized application workloads within Fibre Channel and IP storage environments. Also faced with rising Service Level Agreement (SLA) requirements and recovery expectations, enterprise data centers need their disaster recovery infrastructure to ensure fast, continuous, and easy replication of mission-critical data to anywhere in the world. Storage administrators need to replicate large amounts of data quickly, securely, reliably, and simply while minimizing operational and capital expenses.

To address this challenge, the Brocade® 7840 Extension Switch with Brocade Fabric Vision™ technology delivers unprecedented performance, strong security, continuous availability, and simplified management to handle the unrelenting transfer of data between data centers.

A purpose-built data center extension solution for Fibre Channel and IP storage environments, the Brocade 7840 is designed for high-speed, secure transport of data between data centers while maintaining uptime. This enterprise-class solution enables storage and mainframe administrators to optimize and manage the use of WAN bandwidth, secure data over distance, minimize the impact of disruptions, and maintain SLAs.

A Purpose-Built Extension Platform for Disaster Recovery

The Brocade 7840 is an ideal platform for building a high-performance data center extension infrastructure for replication and backup solutions (see Figure 1). It leverages any type of inter-data center WAN transport to extend open systems and mainframe storage applications over any distance. Without the use of extension, those distances are often impossible or impractical.

In addition, the Brocade 7840 addresses the most demanding disaster recovery requirements. Twenty-four 16 Gbps Fibre Channel/FICON® ports, sixteen 1/10 Gigabit Ethernet (GbE) ports, and two 40 GbE ports provide the bandwidth, port density, and throughput required for maximum application performance over WAN connections.

BROCADE 7840: UNPRECEDENTED PERFORMANCE

The Brocade 7840 Extension Switch is a purpose-built extension solution that securely moves more data over distance faster while minimizing the impact of disruptions. With Gen 5 Fibre Channel, IP extension capability, and Brocade Fabric Vision technology, this platform delivers unprecedented performance, strong security, continuous availability, and simplified management to handle the unrelenting growth of data traffic between data centers in Fibre Channel, FICON, and IP storage environments.
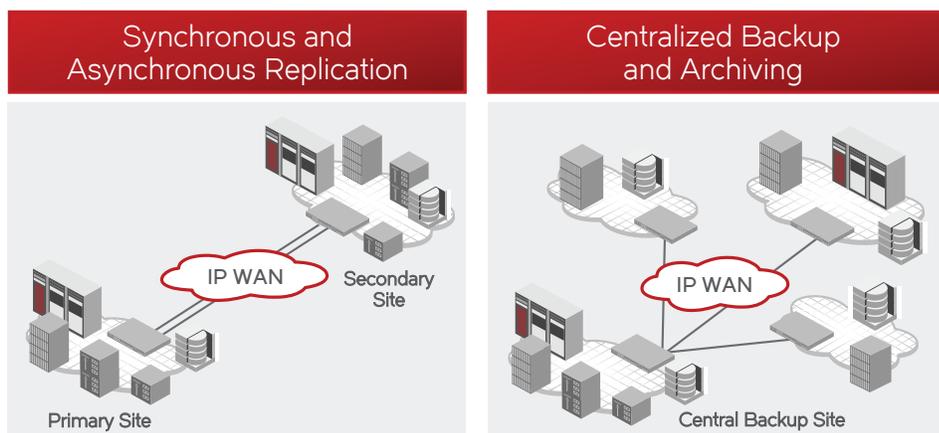
Figure 1: The Brocade 7840 provides scalable deployment options to extend multiprotocol disaster recovery and data protection storage solutions over long distances.

Designed for maximum flexibility, this enterprise-class extension switch offers "pay-as-you-grow" scalability with capacity-on-demand upgrades. To meet current and future requirements, organizations can quickly and cost-effectively scale their WAN rate from 5 Gbps to 40 Gbps per platform via software licenses. With compression enabled, organizations can scale up to 80 Gbps application throughput, depending on the type of data and the characteristics of the WAN connection.

The Brocade 7840 base configuration is a comprehensive bundle that includes a set of advanced services: FCIP, IP Extension, Brocade Fabric Vision technology, Extension Trunking, Adaptive Rate Limiting, IPsec, compression, Open Systems Tape Pipelining (OSTP), Fast Write, Adaptive Networking, and Extended Fabrics. Optional value-add licenses for Integrated Routing (FCR), FICON Management Server (CUP), and Advanced FICON Accelerator are available to address challenging extension and storage networking requirements in open system and mainframe environments.

The Brocade 7840 is a robust platform for large-scale, multi-site data center environments implementing block, file, and tape data protection solutions. It is ideal for:

- Data protection for open systems and mainframe
- Multi-site synchronous and asynchronous storage replication
- Centralized tape backup, recovery, and archiving
- Consolidation of Fibre Channel, FICON, and IP storage data flows from heterogeneous arrays

Moving More Data through Industry-Leading Performance and Scalability
The advanced performance and network optimization features of the Brocade 7840 enable replication and backup applications to send more data over metro and WAN links in less time, and optimize available WAN bandwidth. Supporting up to 250 ms Round-Trip Time (RTT) latency, the Brocade 7840 enables cost-effective extension solutions over distances up to 37,500 kilometers (23,400 miles).

The Brocade 7840 maximizes replication and backup throughput over distance using data compression, disk and tape protocol acceleration, WAN-optimized TCP, and other extension networking technologies. Advanced features and technologies include:

- **IPsec:** Ensures secure transport over WAN links by encrypting data-in-flight with hardware-implemented standard 256-bit AES algorithm without a performance penalty or excessive added latency.

- **Unparalleled, extremely efficient architecture:** Uniquely permits the high-speed, low-latency processing of IP datagrams and Fibre Channel/FICON frames, making extension of synchronous applications possible.

- **WAN-optimized TCP:** Is an aggressive TCP stack, optimizing TCP window size and flow control, and accelerating TCP transport for high throughput storage applications.

- **Streams:** Is a feature of WAN-optimized TCP and used with Brocade IP Extension to prevent Head-of-Line Blocking (HoLB) across the WAN.

- **PerPriority TCP Quality of Service (PTQ):** Provides high-, medium-, and low-priority handling of Fibre Channel and Brocade IP Extension flows within the same tunnel for transmission over the WAN using autonomous individual TCP sessions per QoS priority.

- **Extension Trunking:** Combines multiple WAN connections into a single, logical, high-bandwidth trunk, providing active load balancing and network resilience to protect against WAN link failures.

- **Lossless Link Loss (LLL):** Is part of Extension Trunking, providing recovery of data lost in-flight when a link goes offline. From the perspective of the storage applications, nothing ever happened because all data is delivered—and delivered in order.

- **Failover/failback with failover groups:** Circuits are assigned metrics and put in a failover group. If all circuits of the lower metric within the failover group go offline, the higher metric circuits take over. This uses LLL, and all data is delivered and delivered in order. The storage application will not know that a failover/failback has occurred.

- **Adaptive Rate Limiting:** Dynamically adjusts bandwidth sharing between minimum and maximum rate limits to optimize bandwidth utilization and maintain maximum WAN performance during disruptions.

- **Advanced compression architecture:** Provides multiple modes to optimize compression ratios for various throughput requirements.

- **FCIP Fast Write (FCIP-FW):** Accelerates SCSI write processing, maximizing performance of synchronous and asynchronous replication applications across high-latency WAN connections over any distance.

- **Open Systems Tape Pipelining (OSTP):** Accelerates read and write tape processing over distance, significantly reducing backup and recovery times over distance anywhere in the world.

- **Advanced Accelerator for FICON:** Uses advanced networking technologies, data management techniques, and protocol intelligence to accelerate IBM zGM, mainframe tape read and write operations, and z/OS host connection to Teradata warehousing systems over distance.

Ensuring Continuous Availability between Data Centers

Today's organizations depend on fast, reliable access to data wherever and whenever needed, regardless of location. The ramifications and potential business impact of an unreliable disaster recovery and data protection infrastructure are greater than ever.

The Brocade 7840 provides a suite of features—from pre-deployment validation to advanced network failure recovery technologies—to ensure a continuously available storage extension infrastructure.

The Brocade 7840 has built-in tools to validate conditions of the WAN links, network paths, and proper setup of configurations prior to deployment. Administrators can validate and troubleshoot the physical infrastructure with the built-in Flow Generator and WAN Test Tool (Wtool) to ease deployment and avoid potential issues.

Extension Trunking protects against WAN link failures with tunnel redundancy for lossless path failover and guaranteed in-order data delivery using LLL. The advanced Extension Trunking feature allows multiple network paths to be used simultaneously, and when there is a failure for a network path, Extension Trunking will retransmit the lost packets to maintain overall data integrity. The storage application will be protected with no disruption.

With Adaptive Rate Limiting, organizations can optimize bandwidth utilization and maintain full WAN performance of the link during periods when a path is offline due to an extension platform, IP network device, or array controller outage. Adaptive Rate Limiting uses dynamic bandwidth sharing between minimum (floor) and maximum (ceiling) rate limits to achieve maximum available performance during failure situations. In addition, with unprecedented amounts of storage data crossing extension connections and consuming larger, faster links, Brocade has enhanced Adaptive Rate Limiting to react 10 times faster to varying traffic patterns that compete for WAN bandwidth or use shared interfaces.

EXTENDING BROCADE FABRIC VISION TECHNOLOGY BETWEEN DATA CENTERS

Brocade Fabric Vision technology, an extension of Gen 5 Fibre Channel, is supported on Brocade extension products to provide unprecedented insight and visibility across the storage network. With its powerful built-in monitoring, management, and diagnostic tools, Fabric Vision technology enables organizations to:

Simplify monitoring:

• Deploy 15 years of best practices in one click to simplify the deployment of monitoring with pre-defined, threshold-based rules, actions, and policies

• Instantly identify latency and congestion issues in the storage extension network through increased instrumentation and granularity

• Gain comprehensive visibility into disaster recovery and business continuity network health and performance using browser-accessible dashboards with drill-down capabilities

Increase availability:

• Extend proactive monitoring between data centers to automatically detect WAN anomalies and address problems before they impact operations

• Facilitate planning to improve storage extension network capability, health, and stability through intuitive reporting and trend analysis

• Minimize downtime and accelerate troubleshooting with live monitoring, integrated diagnostics, and point-in-time playback

Dramatically reduce costs:

• Eliminate nearly 50 percent of maintenance costs through automated testing and diagnostic tools that validate the health, reliability, and performance of the network prior to deployment

• Save up to millions of dollars on CapEx costs by eliminating the need for expensive third-party tools through built-in monitoring and diagnostics

• Leverage specialized tools for pre-testing and validating IT infrastructure to accelerate deployment, simplify support, and reduce operational costs

The Brocade 7840 leverages the core technology of Brocade Gen 5 Fibre Channel platforms, consistently delivering 99.9999 percent uptime in the world's most demanding data centers. It combines enterprise-class availability with innovative features and the industry's only WAN-side, non-disruptive firmware upgrades to achieve always-on business operations and maximize application uptime. These capabilities enable a high-performance and highly reliable network infrastructure for disaster recovery and data protection.

Enhancing IP Storage Replication Local Performance Over Long Distance

IP storage arrays with native replication applications are not built to handle latency and packet loss. The Brocade 7840 provides a robust IP extension solution that delivers local performance at long distance—along with strong encryption—for comprehensive disaster recovery. It leverages Brocade TCP Acceleration to help achieve the fastest replication speeds possible from IP storage devices, and Brocade WAN-optimized TCP to ensure in-order lossless transmission of IP extension data.

Brocade IP extension solutions help to significantly increase the performance of IP storage applications across the WAN—even with encryption turned on. The more latency and packet loss between the data centers, the greater the gain. The Brocade 7840 can move 50 times more data than native TCP/IP stacks to meet rigorous recovery objectives. Such performance gains enable use cases that at one time were deemed unfeasible.

IP extension also offers other, more far-reaching benefits. The Brocade 7840 supports and manages Fibre Channel/FICON and IP-based data flows, enabling storage administrators to consolidate I/O flows from heterogeneous devices and multiple protocols. The consolidation of these applications into a single, managed tunnel between data centers across the WAN has real operational, availability, security, and performance value.

Consolidating IP storage flows, or both IP storage and Fibre Channel/FICON flows, into a single tunnel contributes significantly to operational excellence. Operational advantages are gained with Fabric Vision, MAPS (Monitoring Alerting Policy Suite), WAN Test Tool (Wtool), and Brocade Network Advisor. Using custom, browser-accessible dashboards for IP storage or combined Fibre Channel and IP storage, storage administrators have a centralized management tool to monitor the health and performance of their networks.

IP extension supports a range of commonly used storage applications, such as array native IP Remote Data Replication (RDR), IP-based centralized backup, VM replication, host-based and database replication over IP, NAS head replication between data centers, and data migration between data centers.

Simplified Management and Robust Network Analytics

Brocade Fabric Vision technology provides a breakthrough hardware and software solution that helps simplify monitoring, maximize network availability, and dramatically reduce costs. Featuring innovative monitoring, management, and diagnostic capabilities, Fabric Vision technology enables administrators to avoid problems before they impact operations, helping their organizations meet SLAs. The Brocade 7840 Extension Switch supports the following Fabric Vision technology features for storage extension management:

- **Monitoring and Alerting Policy Suite (MAPS):** Provides a pre-built, policy-based threshold monitoring and alerting tool that proactively monitors storage extension network health based on a comprehensive set of metrics at tunnel, circuit, and QoS (tunnel and circuit) layers. Administrators can configure multiple fabrics at one time using pre-defined or customized rules and policies for specific ports or switch elements.

- **Fabric Performance Impact (FPI) Monitoring:** Uses pre-defined thresholds and alerts in conjunction with MAPS to automatically detect and alert administrators to severe levels or transient spikes of latency and identifies slow drain devices that might impact the network. This feature uses advanced monitoring capabilities and intuitive MAPS dashboard reporting to indicate various latency severity levels, pinpointing exactly which devices are causing or are impacted by a bottlenecked port. This feature also provides automatic mitigation or recovery from the effects of slow drain devices.

- **Dashboards:** Provides integrated dashboards that display overall SAN and IP extension health, along with details on out-of-range conditions, and configuration drift to easily identify trends and quickly pinpoint issues occurring on a switch or in a fabric.

- **Configuration and Operational Monitoring Policy Automation Services Suite (COMPASS):** Simplifies deployment, safeguards consistency, and increases operational efficiencies of larger environments with automated switch and fabric configuration services. Administrators can configure a template or adopt an existing configuration as a template and seamlessly scale the configuration across the fabric.

In addition, they can ensure settings do not drift over time with COMPASS configuration and policy violation monitoring within Brocade Network Advisor dashboards.

- **Brocade ClearLink Diagnostics:** Ensures optical and signal integrity for Gen 5 Fibre Channel optics and cables, simplifying deployment and support of high-performance fabrics. ClearLink Diagnostic Port (D_Port) is an advanced capability of Gen 5 Fibre Channel platforms.

- **Flow Vision:** Enables administrators to identify, monitor, and analyze specific application flows in order to simplify troubleshooting, maximize performance, avoid congestion, and optimize resources. Flow Vision includes:

  - **Flow Monitor:** Provides comprehensive visibility into flows across a storage extension network, including the ability to automatically learn flows and non-disruptively monitor flow performance. Administrators can monitor all flows from a specific storage device that are writing to or reading from a destination storage device/LUNs, or across a storage extension network. Additionally, they can perform LUN-level monitoring of specific frame types to identify resource contention or congestion that is impacting application performance.

  - **Flow Generator:** Provides a built-in traffic generator for pre-testing and validating storage extension infrastructure—including route verification, QoS zone setup, extension trunking configuration, WAN access, IPsec policy setting, and integrity of optics, cables, and ports—for robustness before deploying applications.

- **Forward Error Correction (FEC):** Enables recovery from bit errors in ISLs, enhancing transmission reliability and performance.

- **Credit Loss Recovery:** Helps overcome performance degradation and congestion due to buffer credit loss.

Brocade Network Advisor

Brocade Network Advisor simplifies storage networking management with a simple, wizard-driven interface that dramatically reduces deployment, configuration, and troubleshooting time. Consolidated dashboard views across Gen 5 Fibre Channel and IP storage are available out-of-the-box, so teams can immediately start monitoring their storage network resources. Dashboard customization gives users flexibility to decide which health and performance indicators, including Fabric Vision data, are most critical for their operations. Problems identified in dashboard views can be quickly remediated from within the tool, and configuration changes can be made to avoid future issues. Remote access to dashboard, inventory, and report views through a Web browser delivers additional flexibility and further reduces mean time to problem resolution by improving team collaboration.

Integrated Architecture and Management

The Brocade 7840 utilizes the same Brocade Fabric OS® (FOS) that supports the entire Brocade Fibre Channel product family—from the Brocade 6505 Switch to the Brocade DCX® 8510 Backbone with Gen 5 Fibre Channel. This helps ensure seamless interoperability with advanced features in Brocade FOS version releases, such as Brocade Integrated Routing, FICON Management Service (FMS), Brocade Extension Trunking, Brocade Fabric Vision technology, Brocade Adaptive Networking, and Brocade Extended Fabrics.

In addition, organizations can perform management and administrative tasks through familiar Brocade management tools, including Brocade Network Advisor, Brocade Web Tools, Brocade SAN Health® utility tool, and Command Line Interface (CLI). Moreover, optional FICON Control Unit Port (CUP) capabilities enable legacy management applications to seamlessly support Brocade FICON environments.

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.

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.

Brocade 7840 Specifications

System Architecture

Enclosure	2U chassis designed to be mounted in a 19-in. cabinet
Fibre Channel ports	24 ports, 16 Gbps, universal (E, F, M, D, and EX ports)
Ethernet ports	16 ports of 1/10 GbE for LAN and WAN connectivity 2 ports of 40 GbE for WAN connectivity
Scalability	Full fabric architecture with 254 switches maximum
Certified maximum	Single fabric: 56 domains, 7 hops Multiprotocol routing fabric: 19 hops
Fibre Channel performance	2.125 Gbps line speed, full duplex; 4.25 Gbps line speed, full duplex; 8.5 Gbps line speed, full duplex; 14.025 Gbps line speed, full duplex; auto-sensing of 2, 4, 8, and 16 Gbps port speeds
Ethernet interfaces	1 GbE, 10 GbE, and 40 GbE
Brocade Trunking (BT)	Up to eight 16 Gbps ports per Brocade Trunk; up to 128 Gbps per trunk. There is no limit to how many trunk groups can be configured in the switch.
Fabric latency	700 ns with no contention, cut-through routing at 16 Gbps
Maximum Fibre Channel frame size	2,112-byte payload
Maximum IP MTU size	Jumbo Frames at 9,216 bytes
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Port types	F_Port, E_Port, EX_Port, (FCR E_Port), D_Port (Diagnostic), M_Port (Mirror), and self-discovery based on switch type (U_Port); VE_Port (FCIP and IP)
Data traffic types	Fabric switches supporting unicast, multicast (255 groups), and broadcast
USB	One USB port for system log file downloads or firmware upgrades
Media types	Fibre Channel: Brocade hot-pluggable Small Form Factor (SFP) and SFP+, short wavelength (SWL), long wavelength (LWL), and extended long wavelength (ELWL) transceivers (available wavelength options vary for 8 Gbps and 16 Gbps SFPs) Ethernet: Brocade hot-pluggable Small Form Factor (SFP) and SFP+, short reach wavelength (SRWL), long reach wavelength (LRWL), extended long wavelength (ELWL), and copper SFP/SFP+ transceivers (available reach options vary from 1 GbE, 10 GbE, and 40 GbE)
Fabric services	Simple Name Server (SNS); Registered State Change Notification (RSCN), NTP, RADIUS, RCS (Reliable Commit Service), Dynamic Path Selection (DPS), Exchange-based routing, device-based routing, port-based routing, lossless), Brocade Advanced Zoning, Web Tools, Extension Trunking, Adaptive Rate Limiting, WAN Test Tool (Wtool), Open Systems Tape Pipelining (OSTP), Fast Write, Adaptive Networking with QoS, Extended Fabrics, Fabric Vision technology, and Advanced Extension. Optional Fabric Services include: Integrated Routing (FCR), FICON CUP, FICON Management Server (FMS), and Advanced Accelerator for FICON.
Licensing options	The following optional extension features can be enabled via license keys: • **Brocade 7840 WAN Rate Upgrade License 1 and 2**: Enables additional WAN-side throughput to 10 Gbps and unlimited with enablement of 40 GbE ports • **FICON Management Server (FMS)**: Control Unit Port (CUP) enables host control of switches in mainframe environments • **Advanced Accelerator for FICON**: Accelerates IBM zGM (XRC), FICON tape read/writes, and z/OS host connection to Teradata systems

Brocade 7840 Specifications *(Continued)*

Management

Supported management software	SSH v2, HTTP/HTTPS, SNMP v1/v3, Telnet; SNMP (FE MIB, FC Management MIB); Brocade Web Tools; Brocade Network Advisor SAN Enterprise or Brocade Network Advisor Professional/Professional Plus (optional); Command Line Interface (CLI); SMI-S RADIUS, LDAP
Security	AES-GCM-256 encryption on ISLs, AES-GCM-256 IPsec encryption on virtual ISLs (VE_Port), DH-CHAP (between switches and end devices), FCAP switch authentication; FIPS 140-2 L2-compliant, HTTPS, IP filtering, LDAP with IPv6, OpenLDAP, Port Binding, RADIUS, TACACS+, User-defined Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, SFTP, SSH v2, SSL, Switch Binding, Trusted Switch
Management access	10/100/1000 Ethernet (RJ-45); serial port (RJ-45) and one USB port
Diagnostics	POST and embedded online/offline diagnostics, including D_Port, FCIP ping, FCIP traceroute, FCping, Pathinfo (FCtraceroute), Wtool, and Ftrace

Mechanical

Enclosure	Back-to-front airflow; 2U, 19-in. EIA-compliant, power from back
Size	Width: 44 cm (17.32 in.) Height: 8.64 cm (3.4 in.) Depth: 60.9 cm (24.0 in.)
System weight	20 kg (44.2 lb) with two power supplies, without SFP/SFP+

Environmental

Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating: −25°C to 70°C (−13°F to 158°F)
Humidity	Operating: 10% to 85% (non-condensing) Non-operating: 10% to 90% (non-condensing)
Altitude	Operating: Up to 3,000 m (9,842 ft) Storage: Up to 12 km (39,370 ft)
Shock	Operating: 20 g, 11 ms, half-sine Non-operating: 33 g, 11 ms, half-sine, 3/eg Axis
Vibration	Operating: 1.0 g sine, 0.5 grms random, 5 to 500 Hz Non-operating: 2.4 g sine, 1.1 grms random 5 to 500 Hz
Airflow	Maximum: 158 CFM

Power

Power supply	Dual hot-swappable redundant power supplies
Power inlet	C14; requires C13 plug
Input voltage	90 to 264 VAC nominal
Input line frequency	47 to 63 Hz nominal
Inrush current	Maximum of 40 amps for period of 10 to 150 ms
Power consumption	Short-range optics: Nominal 388 watts/1,324 BTU/hr; maximum 454 watts/1,550 BTU/hr Long-range optics: Nominal 426 watts/1,454 BTU/hr; maximum 492 watts/1,679 BTU/hr

For information about supported SAN standards, visit www.brocade.com/sanstandards.
For information about hardware regulatory compliance, visit www.brocade.com/regulatorycompliance.
For information about switch and device interoperability, visit www.brocade.com/interoperability.

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