

Brocade 6505 and 6510 FC SAN Switches for Lenovo

Product Guide (withdrawn product)

The Brocade 6505 and 6510 FC SAN Switches for Lenovo (Machine Type 3873) provide exceptional price/performance value by delivering market-leading 16 Gb Gen 5 Fibre Channel technology and combining flexibility, simplicity, and enterprise-class functionality that supports highly virtualized environments to meet the demands of hyper-scale, private cloud storage.

Designed to enable maximum flexibility and reliability, the Brocade 6505 and 6510 are compact 1U rack-mount switches that offer low-cost access to industry-leading Storage Area Network (SAN) technology while providing “pay-as-you-grow” scalability to meet the needs of an evolving storage environment.

The Brocade 6505 offers up to 24 ports (12 ports licensed by default; the remaining 12 ports can be licensed by purchasing a 12-port software license pack), and the Brocade 6510 offers up to 48 ports (24 ports licensed by default; the remaining ports can be licensed in 12-port increments). Brocade FC SAN switch ports support 2/4/8/16 Gbps speeds to deliver easy integration into the existing SAN environments while realizing the benefits of Gen 5 Fibre Channel connectivity. The switches offer a rich set of standard software features with the options to expand their capabilities as needed.

The Brocade 6505 and 6510 feature the EZSwitchSetup wizard and can be configured in the Brocade Access Gateway mode of operation to simplify deployment. The switches provide full non-blocking performance with Ports On Demand scalability to support SAN expansion and enable long-term investment protection. The following figure shows the Brocade 6510.



Figure 1. Brocade 6510

Did you know?

Brocade is the market share leader in Fibre Channel networking and is deployed in 90% of the Fortune 1000 data centers.

The Brocade 6505 and 6510 offer dual functionality as either a full-fabric SAN switch or as an N_Port ID Virtualization (NPIV)-enabled Brocade Access Gateway that simplifies server connectivity.

Brocade Fabric Vision technology, an extension of Gen 5 Fibre Channel, provides unprecedented insight and visibility across the SAN with powerful built-in monitoring, management, and diagnostic tools.

With Brocade FC SAN Switch offerings that are available from Lenovo, Lenovo can be your trusted partner that offers "one stop shop" and single point of contact for delivery of leading edge technologies and innovations from Lenovo and other leading IT vendors. These offerings can satisfy the wide range of your end-to-end IT infrastructure needs, including handheld devices, notebooks, personal computers, servers, storage, networking, services, management software, and financing.

Key features

The Brocade 6505 and 6510 FC SAN switches offer the following features and benefits:

- Provide exceptional price/performance value, combining flexibility, simplicity, and enterprise-class functionality in a 24-port (Brocade 6505) or 48-port (Brocade 6510) switch
- Deliver up to 24 ports (Brocade 6505) or 48 ports (Brocade 6510) of 16 Gbit/sec performance in an energy-efficient, optimized 1U form factor to support the most demanding server and cloud deployments.
- Consume less than 3.3 watts (Brocade 6505) or 2.3 watts (Brocade 6510) of power per 16 Gbps port for exceptional power and cooling efficiency.
- Simplify configuration and management with easy-to-use Brocade EZSwitch Setup.
- Enable “pay-as-you-grow” scalability from single-switch fabric to full-fabric enterprise capabilities with Ports On Demand scalability from 12 or 24 to 24 or 48 ports in 12-port increments.
- Optimize fabric behavior and ensure sufficient bandwidth for mission-critical applications with advanced traffic management capabilities and adaptive networking.
- Offer dual functionality as either a full-fabric SAN switch or as an NPIV-enabled Brocade Access Gateway (requires 24 ports [Brocade 6505] or 48 ports [Brocade 6510] be licensed) that enhances fabric scalability and simplifies management.
- Protect existing device investments with auto-sensing 2, 4, 8, and 16 Gbit/sec capabilities and native operation with Brocade and Brocade M-Series fabrics.
- Run Brocade Fabric OS, which delivers distributed intelligence throughout the network and enables a wide range of value-added features.
- Leverage Brocade Fabric Vision technology’s powerful monitoring, management, and diagnostic tools to simplify administration, increase uptime, and reduce costs.
- Supply a rich set of standard features at no extra cost, including fabric services, advanced zoning, adaptive networking, full fabric and access gateway operations, and diagnostic tools.
- Expand fabric capabilities with optional licensed functions, including trunking, advanced monitoring and alerting, long-distance fabrics, and FC-FC routing (Brocade 6510 only).
- Compress and encrypt in-flight data on up to two ports for more efficient link utilization and higher security (Brocade 6510 only).
- Virtualize physical FC SAN switches and fabrics into logical entities for better flexibility, utilization, management, and efficiency (Brocade 6510 only).
- Maximize resiliency with non-disruptive software upgrades and redundant hot-swap power supplies.
- Accelerate troubleshooting with built-in advanced diagnostics tools featuring Brocade ClearLink Diagnostics with D_Ports on 16 Gb FC optics and select adapters from QLogic and Emulex.

The following figure shows the Brocade 6505.



Figure 2. Brocade 6505

Components and connectors

The following figure shows the port-side view of the Brocade 6505.

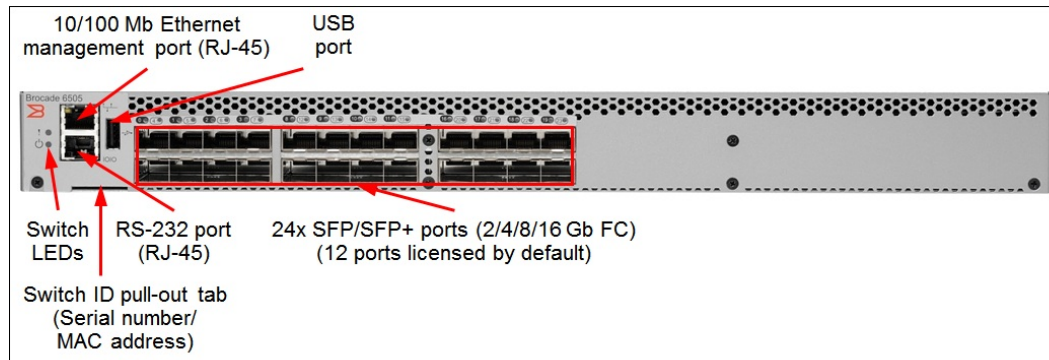


Figure 3. Brocade 6505 port-side view

The following figure shows the port-side view of the Brocade 6510.

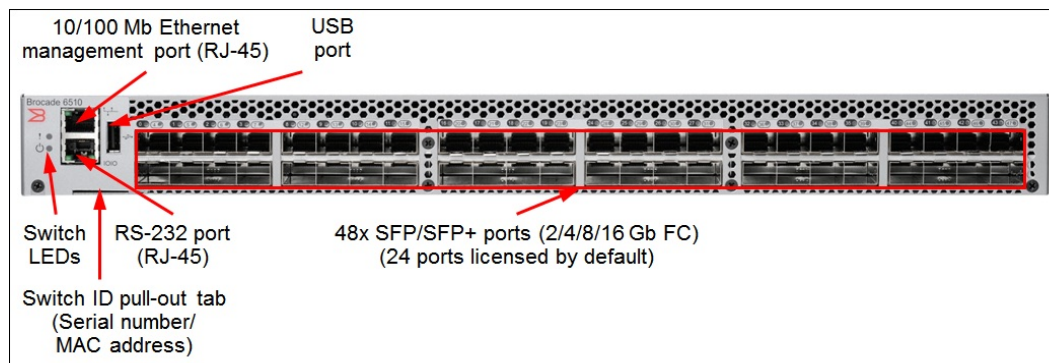


Figure 4. Brocade 6510 port-side view

The following figure shows the non-port side view of the Brocade 6505 and 6510.

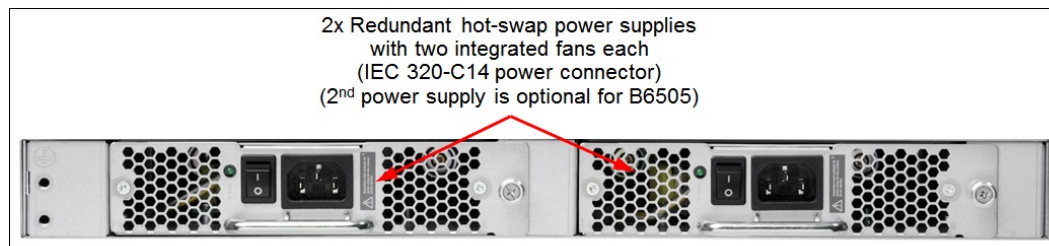


Figure 5. Brocade 6505 and 6510 non-port-side view

System specifications

The following table lists the Brocade 6505 and 6510 system specifications.

Table 1. System specifications

Component	Specification
Form factor	Standalone or 1U rack mount
Ports	<ul style="list-style-type: none"> Brocade 6505: Up to 24 SFP/SFP+ ports. 12 ports licensed by default; optional 12-port license pack. Brocade 6510: Up to 48 SFP/SFP+ ports. 24 ports licensed by default; up to two optional 12-port license packs.
Media types	8 Gb FC and 16 Gb SFP+ transceivers: short-wave (SW), long-wave (LW), extended long-wave (ELW).
Port speeds	2/4/8 Gbps auto-sensing, full-duplex (8 Gb FC SFP+ transceivers) 4/8/16 Gbps auto-sensing, full-duplex (16 Gb FC SFP+ transceivers)
FC port types	Full Fabric mode: FL_Port, F_Port, M_Port (Mirror Port), E_Port, D_Port (ClearLink Diagnostic Port). Brocade Access Gateway mode: F_Port and NPIV-enabled N_Port.
Data traffic types	Unicast (Class 2 and Class 3), multicast (Class 3 only), broadcast (Class 3 only).
Classes of service	Class 2, Class 3, Class F (inter-switch frames).
Standard software	Full Fabric mode, Access Gateway, Advanced Zoning, Adaptive Networking, Advanced Diagnostic Tools, Virtual Fabrics (Brocade 6510 only), In-flight Compression (Brocade 6510 only), In-flight Encryption (Brocade 6510 only).
Optional software	ISL Trunking, Fabric Vision, Extended Fabric, Integrated Routing (Brocade 6510 only).
Performance	Non-blocking architecture with wire-speed forwarding of traffic: <ul style="list-style-type: none"> 2.125 Gbit/sec line speed, full duplex 4.25 Gbit/sec line speed, full duplex 8.5 Gbit/sec line speed, full duplex 14.025 Gbit/sec line speed, full duplex Aggregated throughput <ul style="list-style-type: none"> Brocade 6505: 384 Gbps Brocade 6510: 768 Gbps Up to 0.7 microseconds local switching latency <ul style="list-style-type: none"> Forward error correction (FEC): Adds up to 0.4 microseconds between E_Ports Encryption/compression: Adds up to 5.5 microseconds per node
Scalability	<ul style="list-style-type: none"> Maximum number of switches in the fabric: 239 Maximum frame size: 2,112-byte payload Maximum number of frame buffers per switch: 8,192 Maximum number of ports per ISL trunk: 8 (Requires an optional license)
Cooling	Two fans built into each power supply; 2+2 cooling redundancy with two power supplies. Non-port to port side airflow.
Power supply	Up to two redundant hot-swap 150 W AC (100 - 240 V) power supplies (IEC 320-C14 connector).
Hot-swap parts	SFP/SFP+ transceivers, power supplies with fans.
Management ports	One 10/100 Mb Ethernet port (UTP, RJ-45); one RS-232 port (RJ-45); one USB port (for additional firmware/log/configuration files storage).
Management interfaces	EZSwitch Setup; Web-based GUI (Brocade Web Tools); CLI; SMI-S; SNMP. Optional Brocade Network Advisor (available from Brocade).

Component	Specification
Security features	Secure Socket Layer (SSL); Secure Shell (SSH); Secure Copy (SCP); Secure FTP (SFTP); user level security, Role-based Access Control (RBAC); LDAP, RADIUS, and TACACS+ authentication; access control lists (ACLs); IP security (IPsec)
Hardware warranty	One-year customer-replaceable unit, parts-only warranty with 9x5 next business day terms. Optional warranty service upgrades are available through Lenovo: On-site coverage, 24x7 coverage, 2-hour or 4-hour response time, 1-year or 2-year warranty extensions, Remote Technical Support.
Software maintenance	One-year software support and subscription license is included. Optional 1-year and 2-year software support extension licenses are available through Lenovo.
Dimensions	Height: 43 mm (1.7 in.); width: 438 mm (17.2 in.); depth: 443 mm (17.4 in.)
Weight	<ul style="list-style-type: none"> Brocade 6505 (with one power supply, without SFPs): 7.8 kg (17.3 lb) Brocade 6510 (with two power supplies, without SFPs): 9.2 kg (20.2 lb)

Models

The following table lists the Brocade 6505 and 6510 models.

Product availability: Models of the Brocade 6505 and 6510 FC SAN Switches described in this Product Guide are withdrawn and no longer available for ordering from Lenovo. The replacement products are [Lenovo B6505 and B6510 FC SAN Switches](#).

Table 2. Brocade 6505 and 6510 models

Description	Part number	Feature code (3873-HC2)	Feature code (3873-HC3)
Brocade 6505 FC SAN Switch	3873AR2	ASJX	None
Brocade 6510 FC SAN Switch	3873BR1	None	ASJY

The Brocade 6505 and 6510 part numbers come standard with the following items:

- One Brocade 6505 or 6510 FC SAN Switch
- Serial cable (DB-9/RJ-45 to RJ-45)
- Rubber feet for setting up the switch as a standalone unit
- Fixed rack mount kit
- EZSwitch Setup CD
- Brocade 6505 or 6510 QuickStart Guide
- Access Gateway Quick Start Guide
- Documentation CD
- Warranty information

Note: The switches come standard without power cords; one or two power cables must be purchased together with the switch (see "Power supplies and cables" for details).

The Brocade 6505 comes standard with 12 licensed ports. The remaining 12 unlicensed ports can be activated by purchasing and installing the Brocade Ports on Demand (POD) software license pack. By default, ports 0 through 11 are enabled on the Brocade 6505. To enable ports 12 through 23, install a POD license key.

The Brocade 6510 comes standard with 24 licensed ports. The remaining 24 unlicensed ports can be activated in 12-port increments by purchasing and installing the Brocade Ports on Demand (POD) software license packs. By default, ports 0 through 23 are enabled on the Brocade 6510. To enable ports 24 through 35, install a POD license key. To enable ports 36 through 47, install another POD license.

The following table lists additional POD licenses for the Brocade 6505 and 6510.

Table 3. POD license options

Description	Part number	Feature code	Max qty supported
POD software license for the Brocade 6505			
Brocade 6505 12 Port Software License Pack (POD)	00MT457	ASK5	1
POD software license for the Brocade 6510			
Brocade 6510 12 Port Software License Pack (POD)	00MT459	ASK6	2

If needed, the Brocade 6505 and 6510 can be mounted in a 2-post rack cabinet by using the optional mid-mount rack kit that is listed in the following table.

Table 4. Rack-mount options

Description	Part number	Feature code	Max qty supported
Lenovo B65xx Mid-mount Rack Kit	00MY760	ASKL	1

The optional mid-mount rack kit for the Brocade 6505 and 6510 is shown in the following figure.

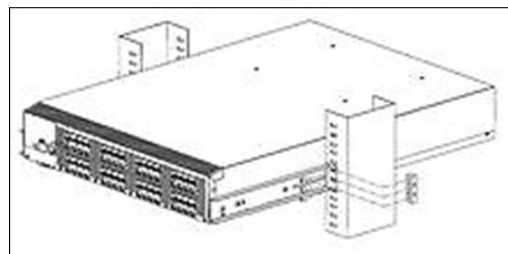


Figure 6. Lenovo B65xx Mid-mount Rack Kit

Transceivers and cables

The Brocade 6505 and 6510 come without SFP+ media; SFP+ transceivers must be ordered together with the switch. The following table lists the supported SFP+ options and optical cables.

Table 5. Supported SFP+ transceivers and optical cables

Description	Part number	Feature code	Max qty supported (6505/6510)
16 Gb FC SFP+ transceivers			
Brocade 16Gb SW SFP+ Optical Transceiver	88Y6393	A22R	24 / 48
Brocade 16Gb 10km LW SFP+ Transceiver	00MY768	ASK2	24 / 48
Brocade 16Gb 25km ELW SFP+ Transceiver	00MY770	ASK3	24 / 48*
8 Gb FC SFP+ transceivers			
Brocade 8Gb SW SFP+ Optical Transceiver	88Y6416	5084	24 / 48
Brocade 8Gb 10km LW SFP+ Transceiver	00MY764	ASK0	24 / 48
Brocade 8Gb 25km ELW SFP+ Transceiver	00MY766	ASK1	24 / 48*

Description	Part number	Feature code	Max qty supported (6505/6510)
Optical cables for 8 Gb and 16 Gb FC SW SFP+ transceivers			
Lenovo 0.5m LC-LC OM3 MMF Cable	00MN498	ASR5	24 / 48
Lenovo 1m LC-LC OM3 MMF Cable	00MN502	ASR6	24 / 48
Lenovo 3m LC-LC OM3 MMF Cable	00MN505	ASR7	24 / 48
Lenovo 5m LC-LC OM3 MMF Cable	00MN508	ASR8	24 / 48
Lenovo 10m LC-LC OM3 MMF Cable	00MN511	ASR9	24 / 48
Lenovo 15m LC-LC OM3 MMF Cable	00MN514	ASRA	24 / 48
Lenovo 25m LC-LC OM3 MMF Cable	00MN517	ASRB	24 / 48
Lenovo 30m LC-LC OM3 MMF Cable	00MN520	ASRC	24 / 48

* When using ELW SFP+ transceivers over distances over 10 km, the Extended Fabric feature is required on a SAN switch to drive the maximum bandwidth over the extended links (see Table 7 for ordering information).

The following table lists the cabling requirements for the switch.

Table 6. Brocade 6505 and 6510 cabling requirements

Transceiver	Cable	Connector
16 Gb Fibre Channel		
16 Gb FC SW SFP+ Module	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 2); 850 nm OM4 multimode fiber (up to 125 m at 16 Gbps; up to 150 m at 8 Gbps; up to 400 m at 4 Gbps); 850 nm OM3 multimode fiber (up to 100 m at 16 Gbps; up to 150 m at 8 Gbps; up to 380 m at 4 Gbps)	LC
16 Gb FC LW SFP+ Module	1310 nm single-mode fiber cable (9 μ) up to 10 km	LC
16 Gb FC ELW SFP+ Module	1310 nm single-mode fiber cable (9 μ) up to 25 km	LC
8 Gb Fibre Channel		
8 Gb FC SW SFP+ Module	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 2); 850 nm OM3 multimode fiber (up to 150 m at 8 Gbps; up to 380 m at 4 Gbps; up to 500 m at 2 Gbps)	LC
8 Gb FC LW SFP+ Module	1310 nm single-mode fiber cable (9 μ) up to 10 km	LC
8 Gb FC ELW SFP+ Module	1310 nm single-mode fiber cable (9 μ) up to 25 km	LC
Management ports		
10/100 Mb Ethernet management port	UTP Category 5, 5E, and 6 up to 100 meters	RJ-45
RS-232 management port	DB-9/RJ-45-to-RJ-45 console cable (comes with the switch)	RJ-45

Software

The Brocade 6505 and 6510 come standard with the following software features:

- Advanced Fabric Services
 - Full Fabric mode: Enables high performance 8 Gb or 16 Gb switching in multi-switch fabric.
 - Brocade Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning)
 - Dynamic fabric provisioning (DFP): Fabric-assigned port World Wide Names (FA-PWWNs).
 - Dynamic path selection (DPS): Distributes input traffic across multiple paths proportionally to the bandwidth of each path.
 - Dynamic load sharing (DLS): Distributes traffic across multiple equivalent paths between switches.
 - Fabric Shortest Path First (FSPF)
 - Buffer-to-Buffer (BB) credit flow control
 - Enhanced BB credit loss recovery
 - Fabric Device Management Interface (FDMI)
 - Frame order delivery
 - Frame redirection
 - FC login services
 - Registered State Change Notification (RSCN)
 - Reliable Commit Service (RCS)
 - Simple Name Server (SNS)
 - Fibre Channel Authentication Protocol (FCAP) switch authentication
 - Management Server (MS): Assists in the autodiscovery of switch-based fabrics.
 - In-flight compression on up to two ports (Brocade 6510 only)
 - In-flight encryption on up to two ports (Brocade 6510 only)
- Adaptive Networking
 - Bottleneck detection: Identifies devices attached to the fabric that are slowing down traffic.
 - Ingress rate limiting: Restricts the speed of traffic from a particular device to the switch port.
 - Traffic isolation zoning (TIZ): Creates a dedicated path for traffic flowing from a specific set of source ports (F_Ports).
 - Quality of Service (QoS): SID/DID traffic prioritization
- Virtualization
 - N_Port ID virtualization (NPIV): Enables a single FC port to appear as multiple, distinct ports with separate port identification within the fabric.
 - Access Gateway: Leverages NPIV to connect to any fabric without adding switch domains to reduce management complexity.
 - Virtual Fabrics (Logical Switch, Logical Fabric): Allows SAN design and management at the granularity of a port (Brocade 6510 only).
- Management
 - IPv4 and IPv6 addressing
 - Firmware upload and download
 - Hot code load and activation
 - Network Time Protocol (NTP) v3
 - EZ Switch Setup Wizard
 - Command line interface (CLI)
 - Brocade Web Tools
 - Brocade Network Advisor (purchased separately)
 - SNMPv1, SNMPv3, and MIBs
 - SMI-S compliant
 - Syslog
- Security
 - Local switch user accounts
 - LDAP, RADIUS, TACACS+ user authentication
 - Role-based access control (RBAC)
 - Administrative Domains: Partition the fabric into logical groups and allocate administration of

- these groups to different user accounts
 - IP Security (IPsec)
 - IP filtering
 - HTTPS
 - Secure Copy (SCP)
 - Secure RPC
 - Secure FTP (SFTP)
 - Secure Shell (SSH) v2
 - Secure Sockets Layer (SSL)
 - Federal Information Processing Standards (FIPS) 140-2 L2-compliant
- Advanced Diagnostic Tools
 - Power-on self-test (POST)
 - MAPS basic monitoring: Monitors system resources and overall switch health status.
 - Event logging
 - Environmental monitoring
 - FCping
 - Pathinfo (FC traceroute)
 - Non-disruptive daemon restart
 - Port mirroring
 - Port fencing: Disables a port if specified error conditions are met.
 - RAS trace logging
 - Brocade ClearLink Diagnostics with Diagnostic Port (D_Port) (16 Gb optics only): Helps ensure optical and signal integrity for Gen 5 Fibre Channel optics and cables.
 - Optics health monitoring
 - Power monitoring
 - Rolling Reboot Detection (RRD)

The following optional software features are available for the Brocade 6505 and 6510:

- ISL Trunking: Allows frame-based consolidation of up to 8 inter-switch links (ISLs) into fault-tolerant and load-balanced trunks with bandwidth of up to 128 Gbps.
- Fabric Vision
 - Monitoring and Alerting Policy Suite (MAPS): Provides a policy-based, fabric-wide threshold monitoring and alerting tool.
 - Flow Vision: Allows to identify, monitor, and analyze specific application flows.
 - Top Talkers: Provide real-time information about the top bandwidth-consuming flows passing through a specific port in the network.
- Extended Fabric: Extends Fibre Channel SANs beyond 10 km distance limitations for replication and backup at full bandwidth.
- Integrated Routing (Brocade 6510 only): The FC-FC routing service provides Fibre Channel routing between two or more fabrics without merging those fabrics.

The following table lists ordering information for the optional software features for the Brocade 6505 and 6510 (one software license per switch).

Table 7. Optional software features

Description	Part number	Feature code
Software licenses for Brocade 6505		
Lenovo B300/6505 S/W, ISL Trunking	00MY787	ASK7
Lenovo B300/6505 S/W, Fabric Vision	00MY788	ASK8
Lenovo B300/6505 S/W, Extended Fabric	00MY789	ASK9
Lenovo B300/6505 S/W, Enterprise Bundle (TRK, FV, EF)*	00MY790	ASKB
Software licenses for Brocade 6510		
Lenovo B6510 S/W, ISL Trunking	00MY778	ASKC
Lenovo B6510 S/W, Fabric Vision	00MY779	ASKD
Lenovo B6510 S/W, Extended Fabric	00MY780	ASKF
Lenovo B6510 S/W, Integrated Routing	00MY776	ASKG
Lenovo B6510 S/W, Enterprise Bundle (TRK, FV, EF)*	00MY781	ASKJ

* Enterprise Bundle includes ISL Trunking, Fabric Vision, and Extended Fabric licenses.

Software subscription and maintenance is included in the Brocade 6505 and 6510 base warranty (see the Warranty section for details), which provides 1-year software support with the option to extend it up to 7 years in 1-year or 2-year increments.

Ordering information for the software maintenance extension options is listed in the following table.

Table 8. Software maintenance extension options

Description	Part number	Feature code
Software maintenance extension for Brocade 6505		
Brocade 6505 FC SAN FW Renewal, 1-Year	00YH952	ATW7
Brocade 6505 FC SAN FW Renewal, 2-Year	00YH953	ATW8
Software maintenance extension for Brocade 6510		
Brocade 6510 FC SAN FW Renewal, 1-Year	00YH960	ATW9
Brocade 6510 FC SAN FW Renewal, 2-Year	00YH961	ATWA

Notes:

- In order to receive code updates for Brocade switches, a support case needs to be opened with Lenovo with the switch machine type and serial number. Lenovo support will provide the code once entitlement has been validated.
- The delivery of firmware is standard business hours from Lenovo L3 USA - please be advised that the firmware delivery may be next business day depending on time of the service call and location.

Fibre Channel standards

The Brocade 6505 and 6510 support the following standards:

- FC-AL-2 INCITS 332-1999
- FC-BB-2 INCITS 372-2003
- FC-BB-3 INCITS 414-2006
- FC-BB-4 INCITS 419-2008
- FC-BB-5 INCITS 462-2010 + Amendment 1
- FC-BB-6 INCITS 509-2014
- FC-DA INCITS TR-36-2004
- FC-DA-2 INCITS TR-49-2012
- FC-FLA INCITS TR-20-1998
- FC-FS INCITS 373-2003
- FC-FS-2 ANSI/INCITS 424-2006
- FC-FS-3 INCITS 470-2011
- FC-GS-4 ANSI INCITS 387-2004
- FC-GS-5 ANSI INCITS 427-2007
- FC-GS-6 INCITS 463-2010
- FC-IFR INCITS 475-2011
- FC-LS INCITS 433: 2007
- FC-LS-2 INCITS 477-2011
- FC-MI-2 ANSI/INCITS TR-39-2005
- FC-MI-3 INCITS TR-48-2012
- FCP ANSI X3.269-1996
- FCP-2 INCITS 350-2003
- FCP-3 INCITS 416-2006
- FCP-4 INCITS 481-2012
- FC-PI INCITS 352-2002
- FC-PI-2 INCITS 404-2005
- FC-PI-3 INCITS 460-2012
- FC-PI-4 INCITS 450-2009
- FC-PI-5 INCITS 449-2011
- FC-PLDA INCITS TR-19-1998
- FC-SB ANSI X3.271-1996
- FC-SB-2 INCITS 374-2001
- FC-SB-3 INCITS 374-2003 + Amendment 1
- FC-SB-4 INCITS 466-2011
- FC-SB-5 INCITS 485-2014
- FC-SP INCITS 426-2007
- FC-SP-2 INCITS 496-2012 + Amendment 1
- FC-SW-3 INCITS 384-2004
- FC-SW-4 INCITS 418-2006
- FC-SW-5 INCITS 461-2010
- FC-TAPE INCITS TR-24-1999
- FC-VI INCITS 357-2002
- INCITS 332:1999/AM 1-2003
- INCITS 332:1999/AM 2-2006
- MIB-FA INCITS TR-32-2003
- RFC 4044 Fibre Channel Management MIB
- RFC 4338 Transmission of IPv6, IPv4, and ARP over FC
- SNIA Storage Management Initiative Specification (SMI-S) Version 1.03 ISO standard IS24775-2006 (replaces ANSI INCITS 388: 2004)
- SNIA Storage Management Initiative Specification (SMI-S) Version 1.1
- SNIA Storage Management Initiative Specification (SMI-S) Version 1.2
- SNIA Storage Management Initiative Specification (SMI-S) Version 1.4

Power supplies and cables

The Brocade 6505 and 6510 support up to two redundant hot-swap 150 W AC power supplies. Each power supply has an IEC 309-C14 connector.

The Brocade 6505 comes standard with one power supply, and the Brocade 6510 comes standard with two power supplies. The following table lists ordering information for the optional power supply for the Brocade 6505.

Table 9. Power supply for the Brocade 6505.

Description	Part number	Feature code
Lenovo B6505 Redundant Power Supply	00MY807	ASKT

The switches come standard without a power cord; one or two rack power cables or line cords must be ordered together with the switch depending on the quantity of power supplies in the switch (see the following table).

Table 10. Part numbers and feature codes for ordering power cords

Description	Part number	Feature code
1.5m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	39Y7937	6201
1.8m, 10A/100-250V, 2xC13PM to IEC 320-C14 Rack Power Cable	None*	6568
2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	None*	6311
2.8m, 10A/100-250V, C13 to IEC 320-C20 Rack Power Cable	39Y7938	6204
4.3m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	39Y7932	6263
10A/125V C13 to NEMA 5-15P 4.3m line cord	39Y7931	6207
10A/250V C13 to NEMA 6-15P 2.8m line cord	46M2592	A1RF
Argentina 10A/250V C13 to IRAM 2073 2.8m line cord	39Y7930	6222
Australia/NZ 10A/250V C13 to AS/NZ 3112 2.8m line cord	39Y7924	6211
Brazil 10A/125V C13 to NBR 6147 2.8m line cord	39Y7929	6223
China 10A/250V C13 to GB 2099.1 2.8m line cord	39Y7928	6210
Denmark 10A/250V C13 to DK2-5a 2.8m line cord	39Y7918	6213
European 10A/230V C13 to CEE7-VII 2.8m line cord	39Y7917	6212
India 10A/250V C13 to IS 6538 2.8m line cord	39Y7927	6269
Israel 10A/250V C13 to SI 32 2.8m line cord	39Y7920	6218
Italy 10A/250V C13 to CEI 23-16 2.8m line cord	39Y7921	6217
Japan 12A/125V C13 to JIS C-8303 2.8m line cord	46M2593	A1RE
Korea 12A/250V C13 to KETI 2.8m line cord	39Y7925	6219
South Africa 10A/250V C13 to SABS 164 2.8m line cord	39Y7922	6214
Switzerland 10A/250V C13 to SEV 1011-S24507 2.8m line cord	39Y7919	6216
Taiwan 10A/250V C13 to CNS 10917-3 2.8m line cord	00CG265	A53E
Taiwan 15A/125V C13 to CNS 10917-3 2.8m line cord	00CG267	A53F
United Kingdom 10A/250V C13 to BS 1363/A 2.8m line cord	39Y7923	6215

* Available for factory-built custom configurations and solutions only.

Physical specifications

The Brocade 6505 and 6510 have the following dimensions and weight (approximate):

- Height: 43 mm (1.7 in.)
- Width: 438 mm (17.2 in.)
- Depth: 443 mm (17.4 in.)
- Weight (without SFPs):
 - Brocade 6505 (with one power supply): 7.8 kg (17.3 lb)
 - Brocade 6510 (with two power supplies): 9.2 kg (20.2 lb)

Operating environment

The Brocade 6505 and 6510 are supported in the following environment:

- Air temperature:
 - Operating: 0°C to 40°C (32°F to 104°F)
 - Non-operating: -25°C to +70°C (-13°F to 158°F)
- Maximum altitude:
 - Operating: 3,000 m (9,842 ft)
 - Non-operating: 12,000 m (39,370 ft)
- Humidity:
 - Operating: 10% to 85% at 40°C (104°F)
 - Non-operating: 10% to 90% at 70°C (158°F)
- Electrical power:
 - Voltage range: 100 V AC - 240 V AC (nominal)
 - Frequency: 50 Hz - 60 Hz (nominal)
 - Power consumption:
 - Brocade 6505:
 - Idle: 60 watts
 - Maximum: 80 watts
 - Brocade 6510:
 - Idle: 72 watts
 - Typical: 110 watts
 - Maximum: 123 watts
- Heat dissipation:
 - Brocade 6505 (maximum): 338 BTU per hour
 - Brocade 6510 (typical): 375 BTU per hour
 - Brocade 6510 (maximum): 420 BTU per hour
- Acoustical noise emission: 70 dB

Warranty

The Brocade 6505's and 6510's hardware has a one-year Customer Replaceable Unit (CRU), parts-only warranty with 9x5/next business day (NBD) terms. Lenovo offers the service upgrades through warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

Lenovo warranty service upgrade offerings are region-specific. Not all warranty service upgrades are available in every region. For more information about Lenovo warranty service upgrade offerings that are available in your region, refer to the Data Center Advisor and Configurator Tool (DCACT; formerly known as LESC): <http://lesc.lenovo.com>

The warranty service definitions for the Brocade 6505 and 6510 are listed in the following table.

Table 11. Warranty service definitions

Term	Description
On-site service	A service technician arrives at the client's location for equipment service.
24x7x2 hour	A service technician is scheduled to arrive at the client's location within two hours after remote problem determination is completed. Lenovo provides service around the clock, every day, including Lenovo holidays.
24x7x4 hour	A service technician is scheduled to arrive at the client's location within four hours after remote problem determination is completed. Lenovo provides service around the clock, every day, including Lenovo holidays.
9x5x4 hour	A service technician is scheduled to arrive at the client's location within four business hours after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday - Friday, excluding Lenovo holidays. For example, if a customer reports an incident at 3:00 pm on Friday, the technician will arrive by 10:00 am the following Monday.
9x5 next business day	A service technician is scheduled to arrive at the client's location on the business day after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday - Friday, excluding Lenovo holidays. Calls received after 4:00 pm local time require an extra business day for service dispatch. Next business day service is not guaranteed.

In general, the following types of Lenovo warranty service upgrades for the Brocade 6505 and 6510 are available:

- Warranty and maintenance service upgrades:
 - Onsite support for 9x5 NBD coverage
 - One, three, four, or five years of 9x5 or 24x7 service coverage
 - Onsite response from next business day to four or two hours
 - Up to five years of warranty extension for all service levels in one or two year increments
- Remote Technical Support Services (RTS) - 1 or 3 years
 RTS provides comprehensive technical call center support. RTS can reduce problem resolution time, which decreases the cost to address technical problems and increases uptime.

Regulatory compliance

The Brocade 6505 and 6510 FC SAN Switches conform to the following regulations:

- Electromagnetic compatibility
 - FCC Part 15, Subpart B (Class A)
 - EN 55022 (Class A)
 - EN 55024
 - ICES-003 (Class A)
 - VCCI (Class A)
 - KN22 and KN24
 - GB 9254-2008
 - CNS 13438
 - CISPR22
- Safety
 - UL/CSA 60950-1
 - EN 60950-1
 - IEC 60950-1
 - GB 4943.1-2011
 - CNS 14336-1:99
 - EU RoHS

Interoperability

Lenovo provides end-to-end FC SAN compatibility testing to deliver interoperability throughout the network. The Brocade SAN switches support connectivity to Lenovo System x, ThinkServer, BladeCenter, and Flex System hosts, storage systems, and tape backup units by using FC or FC over Ethernet (FCoE) storage connectivity protocols.

FC SAN storage systems

The following table lists the external storage systems that are offered by Lenovo that can be used in Brocade FC SAN solutions.

Table 12. FC SAN storage systems

Description	Part number
Lenovo Storage S2200	
Lenovo Storage S2200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64114B1
Lenovo Storage S2200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64114B2
Lenovo Storage S2200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64114B3
Lenovo Storage S2200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64114B4
Lenovo Storage S3200	
Lenovo Storage S3200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64116B1
Lenovo Storage S3200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64116B2
Lenovo Storage S3200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64116B3
Lenovo Storage S3200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64116B4
IBM Storwize	
IBM Storwize V3500 3.5-inch Dual Control Storage Controller Unit	6096CU2
IBM Storwize V3500 2.5-inch Dual Control Storage Controller Unit	6096CU3
IBM Storwize V3700 3.5-inch Storage Controller Unit	6099L2C
IBM Storwize V3700 2.5-inch Storage Controller Unit	6099S2C
IBM Storwize V3700 2.5-inch DC Storage Controller Unit	6099T2C
IBM Storwize V5000 LFF Control Enclosure	6194L2C
IBM Storwize V5000 SFF Control Enclosure	6194S2C
IBM Storwize V7000 2.5-inch Storage Controller Unit	6195SC5

For more information, see the list of Product Guides in the following categories:

- Lenovo Storage
<https://lenovopress.com/storage/san/lenovo>
- IBM Storage
<https://lenovopress.com/storage/san/ibm>

FC SAN tape backup units

The following table lists the external backup options that are offered by Lenovo that can be used in Brocade FC SAN solutions.

Table 13. External backup options

Description	Part number
External tape backup libraries	
IBM TS3100 Tape Library Model L2U	61732UL
IBM TS3200 Tape Library Model L4U	61734UL
Fibre Channel backup drives for TS3100 and TS3200 Tape Libraries	
6173 LTO Ultrium 5 Fibre Channel Drive	00NA107
6173 LTO Ultrium 5 Half High Fibre Drive Sled	00NA113
6173 LTO Ultrium 6 Fibre Channel Drive	00NA115
6173 LTO Ultrium 6 Half High Fibre Drive Sled	00NA119
6173 LTO Ultrium 7 Fibre Channel Drive	00WF765
6173 LTO Ultrium 7 Half High Fibre Drive Sled	00WF769

For more information, see the list of Product Guides in the Backup Units category:

<http://lenovopress.com/servers/options/backup>

FC SAN switches

The following table lists the FC SAN switches that are offered by Lenovo that can be used in Brocade FC SAN solutions.

Table 14. FC SAN switches

Description	Part number
Rack-mount switches - 8 Gb FC	
Brocade 300 FC SAN Switch	3873AR1
Lenovo B300, 8 ports activated w/ 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR3
Lenovo B6505, 12 ports activated w/ 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR4
Lenovo B6510, 24 ports activated w/ 8Gb SWL SFPs, 2 PS, Rail Kit	3873BR2
Rack-mount switches - 16 Gb FC	
Lenovo B6505, 12 ports activated w/ 16Gb SWL SFPs, 1 PS, Rail Kit	3873AR5
Lenovo B6510, 24 ports activated w/ 16Gb SWL SFPs, 2 PS, Rail Kit	3873BR3
Embedded FC SAN modules for Flex System - 16 Gb FC	
Lenovo Flex System FC5022 16Gb SAN Scalable Switch	88Y6374
Lenovo Flex System FC5022 24-port 16Gb SAN Scalable Switch (includes two 16 Gb SFPs)	00Y3324
Lenovo Flex System FC5022 24-port 16Gb ESB SAN Scalable Switch	90Y9356
Embedded FC SAN modules for Flex System - 8 Gb FC	
Lenovo Flex System FC3171 8Gb SAN Switch	69Y1930
Lenovo Flex System FC3171 8Gb SAN Pass-thru	69Y1934
Embedded FC SAN modules for BladeCenter - 8 Gb FC	
Brocade 10-port 8Gb SAN Switch Module for BladeCenter	44X1921
Brocade 20-port 8Gb SAN Switch Module for BladeCenter	44X1920
Brocade Enterprise 20-port 8Gb SAN Switch Module for BladeCenter	42C1828
QLogic 20-port 8Gb SAN Switch Module for BladeCenter	44X1905
QLogic 8Gb Intelligent Pass-thru Module for BladeCenter	44X1907

For more information, see the list of Product Guides in the following categories:

- Rack-mount SAN switches
<http://lenovopress.com/storage/switches/rack>
- Embedded SAN switches
<http://lenovopress.com/storage/switches/embedded>

FCoE/FC SAN gateways

The following table lists the converged switches that are offered by Lenovo that can be used as FCoE/FC gateways in Brocade FC SAN solutions.

Table 15. Converged switches

Description	Part number
Rack-mount switches - Converged 10 GbE and 8 Gb FC (FCoE/FC gateway)	
Lenovo RackSwitch G8264CS (Rear to Front)	7159DRX
Embedded switches for Flex System - Converged 10 GbE and 8 Gb FC (FCoE/FC gateway)	
Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch	00FM510
Embedded switches for Flex System - Converged 10 GbE and 16 Gb FC (FCoE/FC gateway)	
Lenovo Flex System EN4023 10Gb Scalable Switch	94Y5212

For more information, see the list of Product Guides in the following categories:

- 10 Gb Top-of-Rack Switches
<http://lenovopress.com/networking/tor/10gb>
- 10 Gb Embedded Switches
<http://lenovopress.com/networking/embedded/10gb>

Rack cabinets

The following table lists the rack cabinets that are offered by Lenovo that can be used in Brocade FC SAN solutions.

Table 16. Rack cabinets

Description	Part number
11U Rack Office Enablement Kit	201886X
25U S2 Standard Rack	93072RX
25U Static S2 Standard Rack	93072PX
42U S2 Standard Rack	93074RX
42U 1100mm Enterprise V2 Dynamic Rack	93634PX
42U 1100mm Enterprise V2 Dynamic Expansion Rack	93634EX
42U 1200mm Deep Dynamic Rack	93604PX
42U 1200mm Deep Static Rack	93614PX
42U Enterprise Rack	93084PX
42U Enterprise Expansion Rack	93084EX

For more information, see the list of Product Guides in the Rack cabinets category:
<http://lenovopress.com/servers/options/racks>

Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo that can be used in Brocade FC SAN solutions.

Table 17. Power distribution units

Description	Part number
0U Basic PDUs	
0U 12 C19/12 C13 32A 3 Phase PDU with IEC 309 3P+N+Gnd line cord	46M4143
Switched and Monitored PDUs	
1U 9 C19/3 C13 Switched and Monitored DPI PDU (without line cord)	46M4002
1U 9 C19/3 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord	46M4003
1U 12 C13 Switched and Monitored DPI PDU (without line cord)	46M4004
1U 12 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord	46M4005
0U 24 C13 Switched and Monitored 30A PDU with NEMA L6-30P line cord	46M4116
0U 12 C19/12 C13 Switched and Monitored 32A 3 Phase PDU with IEC 309 3P+N+Gnd cord	46M4137
0U 12 C19/12 C13 Switched and Monitored 50A 3 Phase PDU with CS8365L 3P+Gnd cord	46M4134
Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)	
Ultra Density Enterprise C19/C13 PDU Module (without line cord)	71762NX
Ultra Density Enterprise C19/C13 PDU 60A/208V/3ph with IEC 309 3P+Gnd line cord	71763NU
C13 Enterprise PDUs (12x IEC 320 C13 outlets)	
DPI C13 Enterprise PDU+ (without line cord)	39M2816
DPI Single Phase C13 Enterprise PDU (without line cord)	39Y8941
C19 Enterprise PDUs (6x IEC 320 C19 outlets)	
DPI Single Phase C19 Enterprise PDU (without line cord)	39Y8948
DPI 60A 3 Phase C19 Enterprise PDU with IEC 309 3P+G (208 V) fixed line cord	39Y8923
Front-end PDUs (3x IEC 320 C19 outlets)	
DPI 30amp/125V Front-end PDU with NEMA L5-30P line cord	39Y8938
DPI 30amp/250V Front-end PDU with NEMA L6-30P line cord	39Y8939
DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8934
DPI 60amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8940
DPI 63amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8935
Universal PDUs (7x IEC 320 C13 outlets)	
DPI Universal 7 C13 PDU (with 2 m IEC 320-C19 to C20 rack power cord)	00YE443
DPI Universal Rack PDU with US LV and HV line cords	39Y8951
DPI Universal Rack PDU with CEE7-VII Europe line cord	39Y8952
DPI Universal Rack PDU with Denmark line cord	39Y8953
DPI Universal Rack PDU with Israel line cord	39Y8954
DPI Universal Rack PDU with Italy line cord	39Y8955
DPI Universal Rack PDU with South Africa line cord	39Y8956
DPI Universal Rack PDU with UK line cord	39Y8957
DPI Universal Rack PDU with AS/NZ line cord	39Y8958
DPI Universal Rack PDU with China line cord	39Y8959
DPI Universal Rack PDU (Argentina)	39Y8962

Description	Part number
DPI Universal Rack PDU (Brazil)	39Y8960
DPI Universal Rack PDU (India)	39Y8961
NEMA PDUs (6x NEMA 5-15R outlets)	
DPI 100-127V PDU with Fixed NEMA L5-15P line cord	39Y8905
Line cords for PDUs that ship without a line cord	
DPI 32a Line Cord (IEC 309 3P+N+G)	40K9611
DPI 32a Line Cord (IEC 309 P+N+G)	40K9612
DPI 63a Cord (IEC 309 P+N+G)	40K9613
DPI 30a Line Cord (NEMA L6-30P)	40K9614
DPI 60a Cord (IEC 309 2P+G)	40K9615
DPI Australian/NZ 3112 Line Cord	40K9617

For more information, see the list of Product Guides in the Power Distribution Units category:
<http://lenovopress.com/servers/options/pdu>

Uninterruptible power supply units

The following table lists the uninterruptible power supply (UPS) units that are offered by Lenovo that can be used in Brocade FC SAN solutions.

Table 18. Uninterruptible power supply units

Description	Part number
RT1.5kVA 2U Rack or Tower UPS (100-125VAC)	55941AX
RT1.5kVA 2U Rack or Tower UPS (200-240VAC)	55941KX
RT2.2kVA 2U Rack or Tower UPS (100-125VAC)	55942AX
RT2.2kVA 2U Rack or Tower UPS (200-240VAC)	55942KX
RT3kVA 2U Rack or Tower UPS (100-125VAC)	55943AX
RT3kVA 2U Rack or Tower UPS (200-240VAC)	55943KX
RT5kVA 3U Rack or Tower UPS (200-240VAC)	55945KX
RT6kVA 3U Rack or Tower UPS (200-240VAC)	55946KX
RT8kVA 6U Rack or Tower UPS (200-240VAC)	55948KX
RT11kVA 6U Rack or Tower UPS (200-240VAC)	55949KX
RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)	55948PX
RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)	55949PX

For more information, see the list of Product Guides in the Uninterruptible Power Supply Units category:
<http://lenovopress.com/servers/options/ups>

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<http://www.lenovo.com/us/en/landingpage/lenovo-financial-services>

Related publications and links

For more information, see the following resources:

- Lenovo B6505 FC SAN Switch product page
<https://www3.lenovo.com/us/en/data-center/storage/storage-area-network/fibre-channel-switches/Lenovo-B6505-Fibre-Channel-Switch/p/WMD00000005>
- Lenovo B6510 FC SAN Switch product page
<https://www3.lenovo.com/us/en/data-center/storage/storage-area-network/fibre-channel-switches/Lenovo-B6510-Fibre-Channel-Switch/p/WMD00000006>
- US Announcement Letter
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS115-057>
- Brocade 6505 and 6510 FC SAN Switch product publications, available from the Brocade 6505 and 6510 Resource Libraries:
<http://www.brocade.com/en/products-services/storage-networking/fibre-channel/6505-switch.html>
<http://www.brocade.com/en/products-services/storage-networking/fibre-channel/6510-switch.html>
 - *Hardware Installation Guide*
 - *Access Gateway Administrator's Guide*
 - *EZSwitchSetup Administrator's Guide*
 - *Fabric OS Administrator's Guide*
 - *Flow Vision Administrator's Guide*
 - *Monitoring and Alerting Policy Suite Administrator's Guide*
 - *Web Tools Administrator's Guide*
 - *Fabric OS Troubleshooting and Diagnostics Guide*
 - *Fabric OS Command Reference*
 - *Fabric OS Message Reference*
 - *Fabric OS MIB Reference*

Related product families

Product families related to this document are the following:

- [Rack SAN Switches](#)

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