LENOVO FLEX SYSTEM FC5022
8/16 Gb SAN SCALABLE SWITCH

▶ Network complexity in data centers is growing and you have to make a range of important decisions for any new deployment. You can't afford to add risk to your environment so you need to address network capacity planning for your current and future needs with the following considerations in mind:

- Cost—current demands and future growth
- Interoperability with existing environment
- Reliability—especially crucial for SAN planning

The Lenovo® Flex System™ FC5022 SAN Scalable Switch meets the demands of hyper-scale, private cloud networked

▶ storage environments by delivering market-leading 16/8 Gbps Fibre Channel technology as well as expert optimized, automated and integrated capabilities. The switch is designed to support highly virtualized computing and Storage Area Network (SAN) environments with high performance, reliability and usability. The Flex System FC5022 SAN Scalable Switch is available as a 12-port base model, 24-port model and a 24-port Enterprise model. The enterprise model includes a powerful enterprise software bundle of advanced SAN fabric services. Through Feature on Demand license keys, customers can now activate additional ports on the base switch, or enable advanced

▶ capabilities such as fabric watch and ISL trunking, by applying software license keys. Customers have complete choice of one or more of the following options to apply to the base hardware:

PRICE/PERFORMANCE

The Flex System FC5022 SAN Scalable Switch delivers exceptional price/performance for growing SAN workloads through a combination of market-leading 1,600 MB/sec throughput per port and an affordable high-density form factor. The available 48 Fibre Channel ports can produce an aggregate 768 Gbps full-duplex throughput, plus any external eight ports can be

► trunked for 128 Gbps Inter-Switch Links (ISLs). As 16 Gbps port technology dramatically reduces the number of ports and associated optics/cabling required through 8/4 Gbps consolidation, the cost savings as well as simplification benefits are substantial.

Accelerating deployment

Diagnostic Ports (D_Ports)—a new port type—enable you to quickly identify and isolate 16 Gbps optics, port and cable problems, reducing fabric deployment and diagnostic times. And if the optical media is found to be the source of the problem, it can be transparently replaced as 16 Gbps optics are hot-pluggable.

Cloud storage

The Flex System FC5022 SAN Scalable Switch supports multi-tenancy in cloud environments through VM-aware end-to-end visibility and monitoring, Quality of Service (QoS), and fabric-based advanced zoning features. The Flex System FC5022 SAN Scalable Switch enables secure distance extension to virtual private or hybrid clouds with dark fibre support, as well as in-flight encryption and data compression. Internal fault-tolerant and enterprise-class RAS features help minimize downtime to support mission-critical cloud environments.

Simplified interconnect

The Flex System FC5022 SAN Scalable Switch can be deployed as a full-fabric switch or as an Access Gateway, which simplifies fabric topologies and heterogeneous fabric connectivity. Access Gateway mode utilizes N_Port ID Virtualization (NPIV) switch standards to present physical and virtual servers directly to the core of SAN fabrics. This makes it transparent to the SAN fabric, greatly reducing management of the network edge. The Flex System FC5022 SAN Scalable Switch in Access Gateway mode can connect servers to NPIV-enabled SAN fabrics.

FEATURE ON DEMAND (FOD) LICENSE KEYS

UPGRADES	Flex System FC5022 16 Gb SAN Scalable Switch (Upgrade 1)	Flex System FC5022 16 Gb SAN Scalable Switch (Upgrade 2)	Flex System FC5022 16 Gb Fabric Watch Upgrade	Flex System FC5022 16 Gb ISL Trunking Upgrade
BASE SWITCHES	88Y6382 Allows clients to enable 12 more ports on the base 12 port switch	88Y6386 Allows clients to enable 24 more ports on the base 24 port switches	00Y3320 Fabric Watch allows clients to enable SAN health monitoring.	00Y3322 ISL/Trunking allows clients to reduce storage traffic congestion on base switches
FLEX SYSTEM FC5022 16GB SAN SCALABLE SWITCH (88Y6374)	✓ (Pre-Req. for 88Y6386)	✓ (Reqs. 88Y6382)	✓	✓
FLEX SYSTEM FC5022 24-PORT 16GB SAN SCALABLE SWITCH (00Y3324)	-	✓	✓	✓
FLEX SYSTEM FC5022 24-PORT 16GB ESB SAN SCALABLE SWITCH (90Y9356)	-	✓	Included	Included

SPECIFICATIONS

PART NUMBERS	88Y6376 (12-port), 00Y3324 (24-port) and 90Y9358 (Enterprise 24-port)
FC PORT SCALABILITY	Dynamic Ports On Demand allows efficient use of port licenses; (88Y6382) for Flex System™ F5022 16 Gb SAN Scalable Switch (Upgrade 1), and (88Y6386) for Flex System F5022 16 Gb SAN Scalable Switch (Upgrade 2)
MAXIMUM FC PORTS	48 total physical ports: 28 internal, 20 external; 48 virtual channels per port
FC SPEED SUPPORT	Internal ports: 16/8 Gbps; External ports: 16/8/4 Gbps; auto-sensing
MAXIMUM DATA RATE	14,025 Gbps (1600 MB/sec) per port, full duplex
FC PORT TYPES	D_Port (Diagnostic Port, 16 Gbps optics only), E_Port, EX_Port, F_Port, M_Port (Mirror Port); Access Gateway mode: F_Port and NPIV-enabled N_Port; self-discovery based on switch type (U_Port); optional port type control
NPIV LOGINS	255 N_Port logins per physical port
CONSOLE PORT	One external RS-232 port with a mini-USB interface for serial console management (IPv4 and IPv6 support)
ETHERNET PORT	One external 10/100/1000 Base-T RJ-45 Ethernet port with integral LEDs for link/activity and speed for debugging and field support
FABRIC SCALABILITY	Full fabric architecture with a maximum of 239 switches
AGGREGATE BANDWIDTH	768 Gbps end-to-end full duplex
MAXIMUM FABRIC LATENCY	Latency for locally switched ports is 700 ns; encryption/compression is 5.5 µsec per node; Forward Error Correction (FEC) adds 400 ns between E_Ports (enabled by default)
PERFORMANCE	420 million frames switch per second
EXTENSION	• 8,192 buffers for up to 3,750 km extended distance at 4 Gbps FC Fibre Channel, in-flight compression encryption (AES-GCM-256) on up to two external ports; no license required
HOT-PLUG COMPONENTS	SAN Scalable Switch and SFP+ optics hot-pluggable
CHASSIS CONNECTIVITY	Up to four switches per chassis
OPTICAL MEDIA SUPPORTED (EXTERNAL PORTS)	16/8/4 Gbps and 8/4/2 Gbps Fibre Channel LC-style pluggable (SFP+) SWL (850 nm); data rate auto-sensing; hot pluggable; end-to-end optics and link validation
MAXIMUM FRAME SIZE/BUFFERS	2112 byte payload/8192 dynamically allocated

SPECIFICATIONS

CLASSES OF SERVICE	Class 2 and Class 3 frames
DATA TRAFFIC TYPES	Fabric switches supporting unicast
NON-DISRUPTIVE CODE LOAD	Non-disruptive code load in Native mode and Access Gateway mode; FTP support for firmware upgrades
FLEX SYSTEM CMM SUPPORT	Capable of sending switch events and system logs to Flex System Chassis Management Module (CMM); two I2C connections to redundant CMMs
ADVANCED SAN FABRIC SERVICES (LICENSED)	• Access Gateway, Enhanced Group Management (Network Advisor, base edition) and Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning incl. Virtual Private SANs) standard and pre-installed on both base and Enterprise models • ISL Trunking (00Y3322), Adaptive Networking (Ingress Rate Limiting, Traffic Isolation, QoS), Advanced Performance Monitoring (including Top Talkers for E_Ports), Fabric Watch (00Y3320), Extended Fabrics and Server Application Optimization optional on base model and standard/pre-installed on the Enterprise model which includes the Enterprise Software Bundle (ESB) • Network Advisor ProPlus and Enterprise editions optional for both base and Enterprise models
ADVANCED SAN FABRIC SERVICES (NON-LICENSED)	Bottleneck Detection; Dynamic Fabric Provisioning (DFP); Dynamic Path Selection (DPS); Enhanced BB credit recovery; FDMI; Frame Redirection; Frame-based Trunking; FSPF; IPoFC; Management Server; NPIV; NTP v3; Port Fencing; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Simple Name Server (SNS)
SOFTWARE MANAGEMENT	HTTP, SNMP v1/v3 (FE MIB, FC Management MIB), SSH; Auditing, Syslog; APM, Network Advisor (base edition standard, ProPlus or Enterprise optional license); Command Line Interface (CLI); SMI-S compliant; Administrative Domains
SECURITY MANAGEMENT	AES-GCM-256 encryption on ISLs; DH-CHAP (between switches and end devices), FCAP switch authentication; FIPS 140-2 L2-compliant, HTTPS, IPsec, IP filtering, LDAP with IPv6, Port Binding, RADIUS, User-defined Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, SFTP, SSH v2, SSL, Switch Binding, Trusted Switch
MANAGEMENT ACCESS	10/100 Mbps Ethernet (RJ-45), in-band over Fibre Channel, serial port (RJ-45), and one USB port
DIAGNOSTICS	D_Port offline diagnostics (16 Gbps optics only) including electrical/optical loopback and link traffic/latency/distance; POST and embedded online/offline diagnostics, including environmental monitoring, FCping and Pathinfo (FC traceroute), frame viewer, non-disruptive daemon restart, port mirroring, optics health monitoring, power monitoring, RAStrace logging, and Rolling Reboot Detection (RRD)

SPECIFICATIONS

FABRIC OPERATING SYSTEM (FOS) SUPPORT	FOS version 7.0.0 or above required
INTEROPERABILITY	For information about switch and device interoperability, visit: **ibm.com**/systems/support/storage/ssic
REGULATORY COMPLIANCE	For information about hardware regulatory compliance, visit: http://publib.boulder.ibm.com/infocenter/flexsys/information/index.jsp
INDUSTRY SAN STANDARDS	For information about supported SAN standards, visit: http://publib.boulder.ibm.com/infocenter/flexsys/information/index.jsp
FORM FACTOR DIMENSIONS	Height: 30.7 mm (1.21 in.); Width: 299.3 mm (11.78 in.); Depth incl. ejectors: 310.6 mm (12.23 in.)
WEIGHT	3.2 Kg (7.05 lbs.)
AIRFLOW	LFM
OPERATING TEMPERATURE NON-OPERATING TEMPERATURE	0º C to 35º C/32º F to 95º F (dry bulb) 5º C to 45º C/41º F to 113º F (dry bulb)
OPERATING HUMIDITY NON-OPERATING HUMIDITY	20% to 80% (relative, non-condensing at 29º C) 8% to 80% (relative, non-condensing at 38º C)
ALTITUDE OPERATING/ NON-OPERATING	Up to 3.05 km (10,000 ft.) above sea level
SHOCK OPERATING SHOCK NON-OPERATING	20G, 6ms 50G with a velocity change of 4,216 mm/sec squared
VIBRATION OPERATING VIBRATION NON-OPERATING	0.4G, 5-500 Hz, 60 minutes 0.5G, 2-200 Hz, 15 minutes; 1.04 GRMS random for 15 minutes
POWER DISSIPATION	90 W (maximum 20 external ports populated with 16 Gbps SWL optics) 80 W (empty switch with no optics)
OPERATING VOLTAGE	12 V

Lenovo

WHY LENOVO

Lenovo is the leading provider of x86 systems for the data center. The portfolio includes rack, tower, blade, dense and converged systems, and supports enterprise-class performance, reliability and security. Lenovo also offers a full range of networking, storage, software and solutions, and comprehensive services supporting business needs throughout the IT lifecycle.

FOR MORE INFORMATION

To learn more about the Flex System FC5022 SAN Scalable Switch, contact your Lenovo representative or Business Partner or visit **lenovo.com**/servers

NEED STORAGE?
Learn more about Lenovo Storage
lenovo.com/systems/storage

NEED SERVICES?
Learn more about Lenovo Services
lenovo.com/services