**DATA SHEET**

CISCO FABRIC MANAGER

Integrated, topology-aware fabric and switch management simplifies configuration, monitoring, and troubleshooting for Cisco® MDS 9000 Family multilayer switches from Cisco Systems®.

INTRODUCTION

Cisco Fabric Manager is a responsive, easy-to-use, Web-based application that simplifies the management of Cisco MDS 9000 Family switches in storage area networks (SANs) through an integrated approach to switch and fabric administration. Cisco Fabric Manager offers storage administrators fabric-wide management capabilities, including discovery, multiple switch configuration, continuous network monitoring, and troubleshooting. This powerful approach greatly reduces switch setup times, increases overall fabric reliability, and provides robust diagnostics for resolving network problems and configuration inconsistencies.

With the Cisco Fabric Manager intuitive graphical interface, storage administrators can compare switch configurations side by side, perform configuration policy checks across Cisco MDS 9000 Family switches, set alarm thresholds for reporting into third-party fault-management applications, view individual device and aggregate statistics in real time, and analyze historical performance statistics. All these capabilities are available through a secure interface that facilitates remote management from almost any location (Figure 1).

Figure 1. Cisco Fabric Manager User Interface
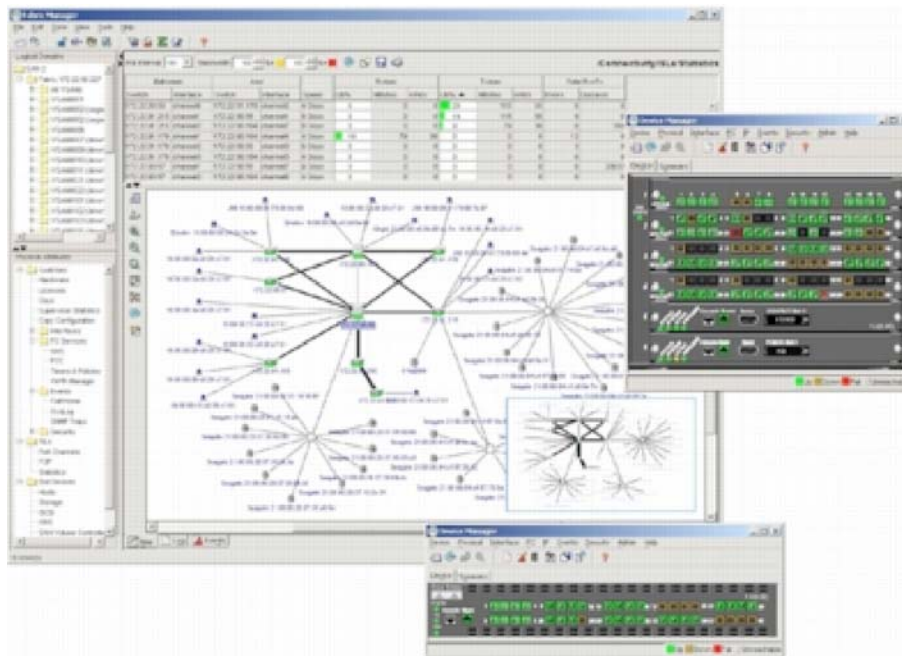
CISCO FABRIC MANAGER HIGHLIGHTS

The Cisco Fabric Manager includes the following features:

- **Switch-Embedded Java Application**—This application integrates switch and fabric management in a single, performance-optimized tool that ships with every Cisco MDS 9000 Family switch.
- **Fabric Visualization**—Cisco Fabric Manager performs centralized, automated discovery, and displays storage network topology, connectivity, and zone and virtual SAN (VSAN) highlighting, allowing identification of network health and configuration issues at a glance.
- **Multiple Views, Including Fabric, Device, Summary, and Operational**—Cisco Fabric Manager simplifies configuration and monitoring of multiple switches and facilitates configuration replication.
- **Comprehensive Configuration Across Multiple Switches**—Cisco Fabric Manager provides integrated fabric-, switch-, and port-level configuration; it also simplifies zone, VSAN, Fibre Channel over IP (FCIP), Small Computer System Interface (SCSI), IBM Fiber Connection (FICON), and intelligent services configuration.
- **Flexible Monitoring and Alerts**—Cisco Fabric Manager real-time and historical performance-monitoring statistics are presented in tabular and graphical formats. Performance-monitoring thresholds and configuration of Cisco MDS 9000 Family threshold-based alerts, including Call Home, facilitate rapid response to exception conditions.
- **Historical Performance Monitoring**—Cisco Fabric Manager provides tabular and graphical reports showing daily, weekly, monthly, and yearly traffic for Inter-Switch Links (ISLs), host and storage connections, and traffic between specific Fibre Channel sources and destinations. Top 10 and daily summary reports present fabric-wide statistics that greatly simplify network hotspot analysis.
- **Powerful Configuration Analysis**—Cisco Fabric Manager performs zone-merge analysis and configuration checking, simplifying resolution of problems, facilitating successful fabric merges, and resolving configuration inconsistencies automatically.
- **Network Diagnostics**—Cisco Fabric Manager probes network and switch health with Fibre Channel ping and traceroute, allowing administrators to rapidly pinpoint network connectivity and performance problems.
- **Comprehensive Network Security**—Cisco Fabric Manager protects against unauthorized management access with Simple Network Management Protocol Version 3 (SNMPv3), Secure Shell (SSH) Protocol, and role-based access control (RBAC).

DEVICE DISCOVERY AND TOPOLOGY MAPPING

Cisco Fabric Manager provides extensive device-discovery, topology-mapping, and information-viewing capabilities. All functions are available through a single, unified interface. Discovery is based on fabric information contained within Cisco MDS 9000 Family switches. This switch-based discovery provides quick and accurate topology representations and allows Cisco Fabric Manager to manage multiple fabrics efficiently from a single application.

Device Discovery

Cisco Fabric Manager uses standards-based discovery protocols, including Fibre Channel Generic Services (FC-GS), Fabric Shortest Path First (FSPF), and SCSI-3 to automatically discover all devices and interconnects on one or more fabrics. Discovery is centralized for consistent, efficient network management. All available switches, host bus adapters (HBAs), and storage devices are discovered. Information discovered includes device names, software revision levels, vendor, ISLs, PortChannels, and VSANs, which can be viewed in the topology map and in tabular form. Fabric Device Management Interface (FMDI) support allows HBA model, serial number and firmware version, and host operating-system type and version discovery without host agents.

Topology Mapping

Cisco Fabric Manager provides an accurate view of multiple fabrics in a single window by displaying topology maps based on device-discovery information. The user can modify the topology-map icon layout with an easy-to-use, drag-and-drop interface. The topology map visualizes device interconnections, and highlights configuration information such as zones, VSANs, and ISLs exceeding utilization

thresholds. The topology map also provides a visual context for launching command-line interface (CLI) sessions, configuring PortChannels, and opening device managers.

Flexible Views

The Cisco Fabric Manager user interface is optimized for efficiency, with multiple views available simultaneously. The integrated approach of Cisco Fabric Manager to fabric and switch management helps ensure all switch statistics and standard configuration parameters are readily accessible through the fabric view, device view, summary view, and operational view. Information in the fabric view can be filtered to limit what is displayed to the items of greatest interest. For even greater efficiency, the basic user interface mode can be enabled to streamline access to features used most frequently. Access to related views and configuration parameters is only a click away.

Fabric View

The main Fabric View window (Figure 2) provides a high-level view and central point to manage multiple Cisco MDS 9000 Family switches. The fabric view displays a comprehensive overview of a storage network fabric, incorporating all switches and storage devices. The navigation tree provides logical, hierarchical access to available fabric services, events, networking, and administrative options. For example, VSANs or zones can be displayed with a single click. The fabric view presents parameters and status from multiple switches side by side, making it easy to spot inconsistencies and copy settings quickly from one switch to another. In addition, topology maps, historical performance reports, log information, and traps can be displayed for the entire fabric.

Figure 2. Main Fabric View Window
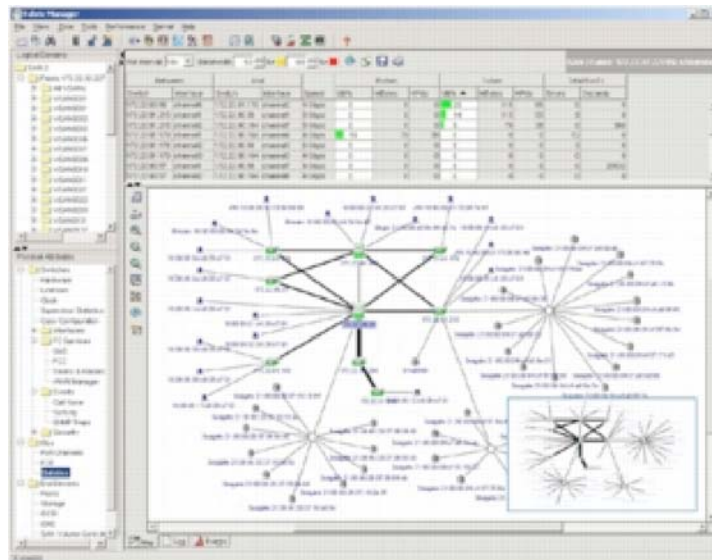
Device View

Clicking a switch icon in the fabric view activates the device view, enabling administrators to focus on a specific switch and determine its overall status at a glance. The device view provides realistic, graphical representations of Cisco MDS 9000 Family switches. Color-coded status indicators are provided for all major components, including the chassis, fans, power supplies, supervisor-engine modules, switching modules, and individual ports. Clicking a particular component provides immediate access to detailed status information and configuration parameters (Figure 3).
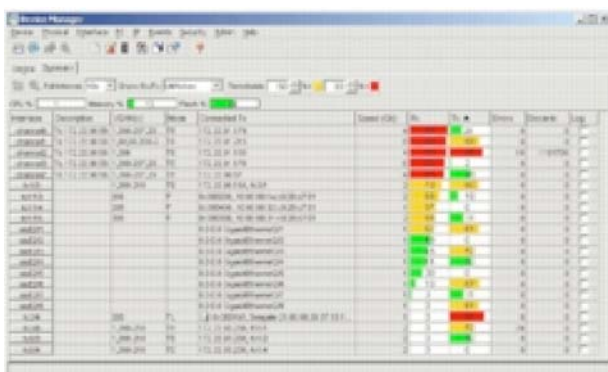
Figure 3. Cisco MDS 9000 Family Device Views

Summary View

The summary view allows administrators to analyze performance issues, diagnose problems, and change parameters to resolve problems or inconsistencies. This view shows aggregated statistics for the active supervisor module and all active switch ports (Figure 4). Capabilities such as column reorganization, sorting, and color coding enhance information accessibility and clarity. Capability also is provided to access in-depth statistics. Real-time statistics are presented in tabular or graphical formats, with bar, line, area, and pie-chart options. To document settings or statistics, users can export the current state of information to a file or output it to a printer.

Figure 4. Summary View Window

Operational View

The operational view provides remote access to historical performance reports, Cisco MDS 9000 Family inventory information, and fabric events through a standard Web-browser (client) interface (Figure 5). It provides convenient access to important information needed to assess SAN health and performance for day-to-day operations. Inventory and events can be filtered to provide reports on all SANs being monitored, or for a specific SAN, physical fabric, or VSAN. Historical performance reports can be filtered to show statistics for the last day, week, month, or year, for host or storage connections, ISLs, or traffic between specific Fibre Channel sources and destinations. Performance statistics are

presented in tabular form and as charts for throughput and error trend analysis. The operational view can be transparently integrated with CiscoWorks as a drop-in application for more comprehensive Cisco network management from a single console.

Figure 5. Operational View Windows
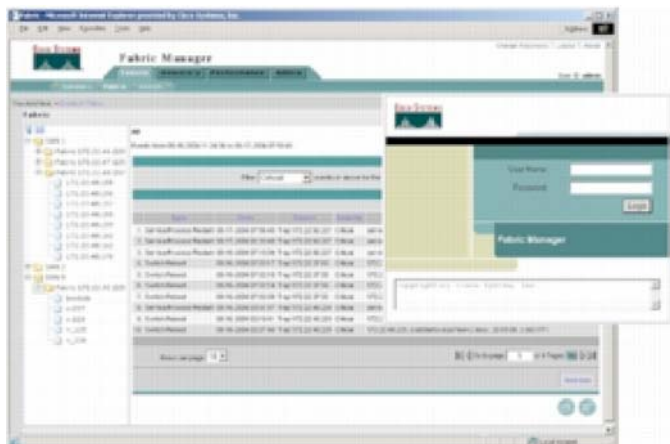
CONFIGURATION

Cisco Fabric Manager offers powerful configuration capabilities for installing Cisco MDS 9000 Family switches, tuning the fabric after it is operational, and setting up zones, network security, and VSANs. Wizards are provided to accelerate configuration and eliminate errors configuring zones, Inter-VSAN Routing, PortChannels, FCIP tunnels, and IP access control lists (ACLs), and performing software updates (Figure 6). Switch parameters—readily accessible through the navigation tree—can be edited quickly within the information tables. This full-featured, fabric-oriented management tool provides an ideal method for making immediate configuration changes to one or many switches. There is no need to switch back and forth between CLI and Cisco Fabric Manager, because all operational statistics and configuration parameters are accessible through both.

Figure 6. PortChannel, FCIP, and IP ACL Configuration Wizards
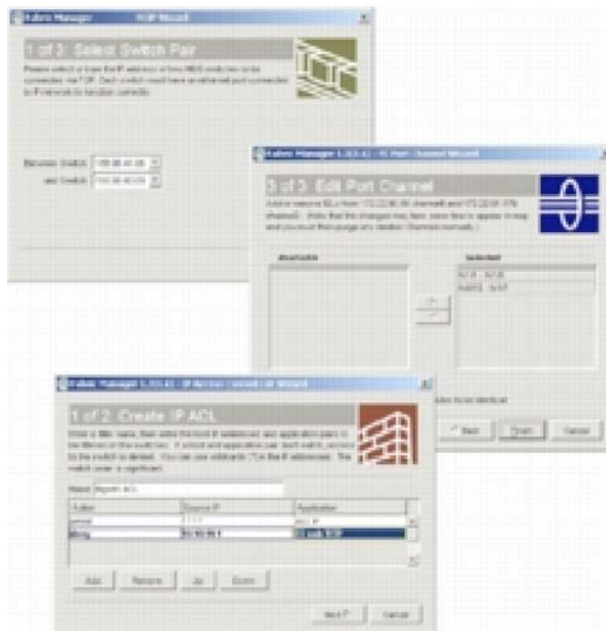
Switch software and configuration downloads also can be managed with ease. Cisco Fabric Manager can initiate software-image and configuration-file downloads to the Cisco MDS 9000 Family to apply critical updates and load new or saved configurations.

Fabric-Wide Configuration

All Fibre Channel fabric services can be monitored and configured from Cisco Fabric Manager. With a fabric-wide view, rapid configuration of multiple switches is simple and efficient because parameters for multiple switches are displayed collectively, allowing quick detection of inconsistencies and easy application of changes on multiple switches using a simple copy-and-paste process.

Special attention has been given to optimize the Cisco Fabric Manager interface for complex or frequently performed tasks. Because zone management is a critical and potentially complex task, a tree structure has been provided to facilitate browsing the complete zone database and active zone sets. Zones can be created and modified easily using cloning and drag-and-drop techniques. VSANs also can be easily managed across the fabric. Topology-map highlighting is provided to explore current and proposed configuration changes for VSANs and zones.

Switch-Level Configuration

Element management is simplified with multiple views of the switch and comprehensive access to CLI configuration commands. Cisco Fabric Manager presents a realistic, graphical representation of the switch chassis, fans, power supplies, supervisor-fabric modules, and switching modules. It gives status at a glance and intuitive access to configuration dialogs for single, switch-oriented management tasks. An administrator can click on any portion of the displayed chassis for more detailed information.

Port-Level Configuration

Cisco Fabric Manager provides configuration for a single port or multiple ports. One or more ports can be selected using the device view, or a tabular listing of ports in the fabric view. Configurable attributes include port mode, port speed, and trunk mode. The network manager also can label the port with a user-friendly text alias. Link-aggregation support is provided for PortChannels, which can be created for up to 16 ports from any switching modules to build high-bandwidth ISLs.

Configuration Checking

Automated tools providing configuration analysis are included with Cisco Fabric Manager. The fabric configuration-analysis tool allows administrators to compare multiple switches against a particular switch or a saved reference configuration to identify issues that could result in performance degradation or failures. Administrators can define test policies that determine which inconsistencies and issues to search for and flag. More than 200 individual checks can be performed on switch and fabric parameters. The fabric configuration-analysis tool also can resolve inconsistencies automatically. Users simply select one or more identified issues and click the "Resolve Issues" button to restore network consistency.

The Cisco Fabric Manager zone merge analyzer identifies specific configuration issues that would prevent a successful merge when combining fabrics. By running the zone merge analyzer before combining fabrics, issues with active zone set naming and zone membership can be resolved proactively.

Health and Performance Monitoring

Cisco Fabric Manager provides continuous health and event monitoring for the Cisco MDS 9000 Family using SNMP traps and device polling. New devices are added automatically to the topology map and changes adversely affecting existing devices and interconnects are clearly highlighted, allowing problems to be pinpointed with ease. Fabric events are filtered to eliminate redundant log entries. Color-coding and sorting capabilities further enhance accessibility of critical event-log information.

Real-Time Performance Monitoring

Cisco Fabric Manager includes real-time network statistics collection with flexible display options. Summary views of statistics with drilldown capability allow easy identification of out-of-range values. Information is presented in tabular or graphical format, with bar, line, area, and pie-chart options for any combination of parameters in a table. The graphs can be scaled and changed to different formats in seconds.
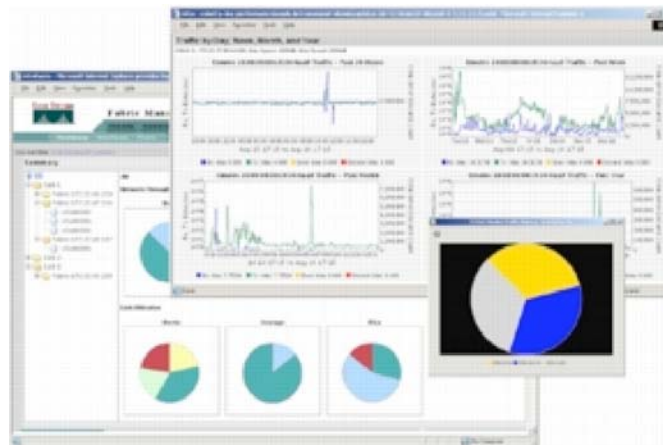
Historical Performance Monitoring

Performance statistics for ISLs, host and storage-device connections, and traffic between specific Fibre Channel sources and destinations (flows) are monitored continuously. Reports and graphs for daily, weekly, monthly, and yearly intervals are available for network hotspot analysis (Figure 7). In context application launch of Cisco Traffic Analyzer with Fibre Channel device naming information passing provides transparent drilldown to SCSI I/O-level or Fibre Channel frame-level details.

Up to two different event thresholds can be set for each throughput statistic monitored by Cisco Fabric Manager Server (FMS). Threshold values can be set with user-specified levels or with baseline values automatically calculated from performance history. The automatic baseline feature profiles the performance and updates the thresholds hourly to help identify meaningful deviations from historical performance trends.

The Cisco Traffic Analyzer allows determination of throughput for traffic between specific Fibre Channel sources and destinations, all traffic in a particular VSAN, or all Switched Port Analyzer (SPAN) traffic. Round-trip response times, SCSI I/Os per second, SCSI read-versus-write traffic throughput and frame counts, SCSI session status, and management task information are provided. Additional statistics also are available on Fibre Channel frame sizes and network-management protocols.

Figure 7. Performance Monitoring

Historical performance statistics can be collected and managed effortlessly. Wizards are provided to quickly select information to monitor, set up flows, and estimate performance database storage requirements. After initial setup, host and storage-device selections automatically adapt to switch-port changes to maintain performance history continuity. The integrated Round Robin Database (RRD) automatically maintains a constant size by rolling up information to reduce the number of discrete samples for the oldest data points; hence it requires no manual maintenance of storage space.

Event Management

Sophisticated event-management configuration is another important Cisco Fabric Manager feature. Remote Monitoring (RMON) alert thresholds, event filtering, and Call Home setup provide the level of sophistication necessary for discovery and notification of issues before they become failures. Additionally, these alerts can be configured for reporting into third-party fault and alerting applications for on-call dispatching, trouble ticketing, and audit tracking.
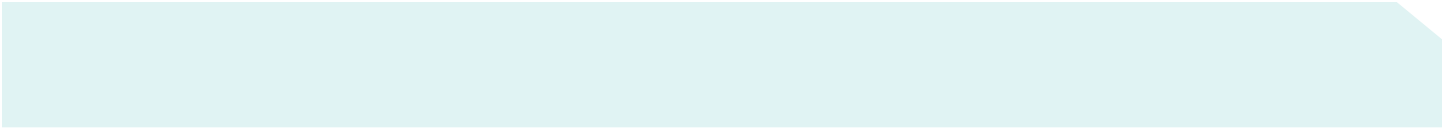
Diagnostics

Cisco Fabric Manager includes very powerful Fibre Channel network diagnostic tools that are industry firsts. These diagnostic tools, known as Fibre Channel traceroute and Fibre Channel ping, provide comprehensive connectivity analysis. Traceroute offers a powerful way to trace paths from any two points within the Fibre Channel network. Hop-by-hop latency calculations are displayed in tabular form, and switches in routes can be highlighted on the topology map, allowing quick identification of routing problems.

The integrated Fibre Channel ping tool offers multipoint connectivity analysis for thorough network connectivity testing and round-trip latency performance validation. The user-defined latency threshold feature allows flagging of out-of-range values. Storage administrators can perform periodic connectivity analysis between all endpoints and run in-depth switch-health analysis to help ensure network reliability between storage devices and application servers.

Network Security

Cisco Fabric Manager configures the extensive Cisco MDS 9000 Family security measures that prevent unauthorized management access and snooping, including RADIUS authentication support, SNMPv3, SSH, and RBAC. VSAN and zone management also enhance network security.

From a workstation or laptop running the Cisco Fabric Manager Java console, an administrator can connect to any Cisco MDS 9000 Family switch in the enterprise using the secure SNMPv3.

Enterprise-wide switch security administration also is supported. User account setup, role creation, and RADIUS server-access configuration allows uniform application of secure RBAC enterprise-wide, keeping unauthorized users from accessing management capabilities through the Cisco Fabric Manager or CLI.

Cisco Fabric Manager facilitates configuration and monitoring of VSANs, providing secure SAN domains by creating hardware-based isolated environments within a single SAN fabric. Zones of devices can be created within each VSAN to further segment secure domains of devices. If security needs to be changed based on time of day or other parameters, alternative zone sets can be maintained for any VSAN, and activated with a single operation.

ADVANCED FEATURES

Cisco Fabric Manager supports configuration of advanced Cisco MDS features, including worldwide names, domain parameters, and name servers, so the administrator can easily monitor and configure Fibre Channel fabric services.

A server can be set up to continuously run Cisco Fabric Manager services, such as discovery, health and event monitoring, and historical performance monitoring. Up to 16 Cisco Fabric Manager client-user interfaces can concurrently access this Cisco FMS.

Many Fibre Channel fabrics can be monitored by each management server, facilitating rapid access to configuration parameters and topology maps for multiple fabrics; there is no need to reopen the application to navigate to another fabric.

Roaming user profiles allow application of users' preference settings and topology-map layout changes whenever the Cisco Fabric Manager user interface (client) is opened, maintaining a consistent interface regardless of which computer is used for management.

Cisco FMS proxy services help isolate private IP networks used for Cisco MDS management from the LANs or WANs used for remote connectivity. The Cisco FMS proxy services also enhance resiliency by transporting management traffic between the Cisco Fabric Manager client and server over TCP/IP.

SPECIFICATIONS

System Requirements

The hardware and software requirements for the Cisco Fabric Manager clients and servers are as follows:

- Processor
    - Intel Pentium III 900-MHz processor (minimum) for Windows and Linux
    - Sun UltraSPARC 900-MHz processor (minimum) for Solaris
- Memory
    - Client with local services: 256 MB (minimum)
    - Server with performance manager, database, and Web server: 512 MB (minimum)
- Disk space
    - Cisco Fabric Manager application: 9 MB
    - Java Virtual Machine: 35 MB
    - Historical performance statistics
        - 76 KB per flow monitored
        - 152 KB per port monitored
- Software
    - Windows 2000 or XP, Solaris 2.8, or Red Hat Linux operating systems
    - Java Virtual Machine Version 1.40 or later
    - TCP/IP software stack
- Web browser
    - Microsoft Internet Explorer 5.0 or later
    - Netscape 5.0 or later

Protocols

Cisco Fabric Manager uses the following standard protocols:

- SNMP versions 1, 2c, and 3
- HTTP
- Remote Method Invocation (RMI)

Ordering Information

Cisco Fabric Manager software is embedded in every Cisco MDS 9000 Family switch. This software is transferred from the switch and installed automatically through Java Web Start.

The standard Cisco Fabric Manager software that is included at no charge with the Cisco MDS switches provides basic switch configuration and troubleshooting capabilities. The Cisco FMS package extends the standard Cisco Fabric Manager by providing historical performance monitoring for network traffic hotspot analysis, centralized management services, and advanced application integration. All standard Cisco Fabric Manager features and functions are fully integrated with the Cisco FMS capabilities. Table 1 compares the standard and extended Cisco FMS functions.

For additional details and ordering information, refer to the Cisco FMS package fact sheet at:
http://www.cisco.com/en/US/products/hw/ps4159/ps4358/products_data_sheets_list.html

Table 1.   Cisco Fabric Manager Feature Comparison

Feature	Standard Cisco Fabric Manager	Cisco Fabric Manager with FMS Package
Switch-embedded Java application	X	X
Fibre Channel fabric visualization	X	X
Fabric, device, and summary views	X	X
Port-, switch-, and fabric-level configuration	X	X
Cisco MDS event and security management	X	X
Configuration wizards	X	X
Cisco MDS configuration-analysis tools	X	X
Network diagnostic and troubleshooting tools	X	X
Real-time performance monitoring	X	X
Multiple fabric management (concurrently)	—	X
Web client for operational view	—	X
Centralized management server with discovery	—	X
Continuous health and event monitoring	—	X
Historical performance monitoring and reporting	—	X
Performance-monitoring thresholds	—	X
Cisco FMS proxy services	—	X
Cisco Fabric Analyzer integration	—	X
Roaming user profiles	—	X

World Headquarters
Storage Technology Corporation
One StorageTek Drive
Louisville, Colorado 80028 USA
1.800.877.9220 or 01.303.673.5151

About StorageTek®
Storage Technology Corporation (NYSE: STK) is a $2 billion global company that enables businesses, through its information lifecycle management strategy, to align the cost of storage with the value of information. The company's innovative storage solutions manage the complexity and growth of information, lower costs, improve efficiency and protect investments. For more information, visit www.storagetek.com, or call 1.800.275.4785 or 01.303.673.2800.

NC0006A 05/05