

Cisco MDS 9000 Mainframe Package for Cisco MDS 9700 Series Multilayer Directors

Product Overview

The Cisco® MDS 9000 Mainframe Package for the Cisco MDS 9710 and 9706 Multilayer Directors enables the use of Cisco's new flagship Fibre Channel products in IBM System z data centers. The Cisco MDS 9700 Series Multilayer Directors brings a new level of reliability and resilience to the data center while at the same time providing access to the higher speeds needed for tomorrow's applications. By combining the features of the new Cisco MDS 9700 Series directors with Cisco's robust FICON feature set, the package provides a best-in-class solution for the IBM System z data center.



Cisco MDS 9710



Cisco MDS 9706

Cisco MDS 9710 and 9706 Features

The MDS 9700 Series provides the following hardware and software features:

- **Industry's highest performance:** With up to 384 (MDS 9710) or 192 (MDS 9706) line-rate 16-Gbps FICON and Fibre Channel ports, the MDS FICON directors have the raw bandwidth to handle the highest performance requirements for your data center. The MDS 9700 Series continues the heritage of the Cisco MDS 9500 Series Multilayer Directors by using an arbitrated cross-bar switch architecture that helps ensure the consistent and predictably fast switching times essential for the I/O requirements of the IBM System z. All ports support 4/8/16-Gbps, 2/4/8-Gbps, and 10-Gbps connections in either long-wave or short-wave mode depending on the optics used.
- **Ultra-high availability:** The MDS 9700 Series FICON directors provide outstanding availability and reliability. The MDS 9700 Series is the industry's first director-class switch to enable redundancy on all major components, including the fabric card. It provides grid redundancy on the power supply and 1+1 redundant supervisors. Users can add fabric cards to enable N+1 or even N+N fabric redundancy. The MDS 9700 Series combines nondisruptive software upgrades, stateful process restart and failover, and full redundancy of all major components for best-in-class availability.

- **Investment protection:** The MDS 9500 Series of FICON and Fibre Channel directors has been supported for more than 10 years throughout an evolution in speed, technology, and feature enhancements, consistently providing broad compatibility with older hardware generations. The MDS 9700 Series FICON directors are defining a new baseline for the next generation of FICON, Fibre Channel, and Fibre Channel over Ethernet (FCoE) solutions. The initial fabric cards provide twice the bandwidth needed for the 48-port 16-Gbps line card. Today, this capability allows increased fault tolerance for fabric failures, and it also facilitates transparent evolution to faster technologies as they become available. Similarly, the power subsystem today not only provides grid-level protection but also incorporates sufficient power for future enhancements.
- **Robust management:** In addition to the IBM FICON Control Unit Port (CUP) management capabilities specific to IBM System z built into the product (discussed later in this document), the Cisco MDS 9700 Series has a robust combination of Cisco Data Center Network Manager (DCNM) SAN and Cisco Device Manager available for FICON management. DCNM SAN provides fabric-level views and control of the FICON fabric along with time-saving wizards to simplify configuration. Device Manager provides a highly FICON-centric view for each switch individually, greatly simplifying the configuration and daily management of the FICON infrastructure.
- **Switch cascading:** Switch cascading supports a topology for FICON devices in which Cisco Inter-Switch Links (ISLs) can be used between a host and an I/O device. Thus, switch cascading facilitates creation of mainframe storage networks consisting of multiple switches.

Cisco MDS 9000 Mainframe Package Features

The Cisco MDS 9000 Mainframe Package on the Cisco MDS 9700 Series provides the following features:

- **Virtual SANs (VSANs):** Like logical partitions (LPARs) on IBM System z, VSANs provide hardware-based partitioning of a single physical infrastructure into multiple logical SANs. VSANs provide isolation of traffic, segregation of management, and management of fault domains. VSANs can be used to separate production environments from test or development environments, FICON from Fibre Channel Protocol (FCP) applications, and or even disk storage from tape storage. This separation can be achieved without compromising scalability, availability, manageability, and or network security. Cisco FICON directors support up to eight FICON VSANs, each with its own CUP device.
- **Dynamic port number assignment:** All FICON port numbers are virtualized in the MDS 9700 Series FICON directors, allowing any port address to be allocated on any port within the FICON VSAN using the full defined range of 0x00 to 0xFD. When multiple FICON VSANs are used for workload segregation, ports for each VSAN can be allocated on a per-port basis with no restrictions regarding line-card allocation or use of duplicate port numbers.
- **FICON CUP:** Implementation of the FICON control device (CUP) in the MDS 9700 Series enables in-band management of the director from IBM System z servers. The CUP device also provides periodic performance information to the System z I/O subsystem, which creates IBM Resource Management Facility (RMF) Type 74, Subtype 7, records that are logged to the IBM System Management Facility (SMF) database. This feature allows host performance management software (such as RMF) to create FICON director activity reports time-synchronized with the rest of the System z performance reports. On the MDS 9700 Series directors, the FICON VSAN also allocates special logical FICON port numbers for Fibre Channel over IP (FCIP) links and PortChannels so that performance of these special link types can be tracked at the IBM System z level.

- **Forward Error Correction (FEC) for 16-Gbps FICON channels, control units, and ISLs:** FEC is a technology long used on high-speed and long-distance networks, which may experience less-than-optimal optical conditions. FEC changes the way that data is sent, with the transmitter inserting parity bits for portions of the data payload. The receiver can then attempt to use these parity bits to re-create any data that is corrupted during transmission. The MDS 9700 Series FICON directors use FEC in the following ways:

- FEC is implemented as an optional feature for 16-Gbps FICON channel and control units.
- FEC is supported for 16-Gbps ISLs between MDS 9700 Series directors.

The MDS 9700 Series supports Forward Error Correction for System z environments beginning with Cisco MDS 9000 NX-OS Software Release 6.2(11c).

- **FICON cascaded directors:** Director cascading supports a topology for FICON devices in which ISLs can be used between IBM System z and I/O devices. Cisco's fabric binding feature, which is required for cascaded FICON, allows only preauthorized directors to participate in the FICON fabric, thus helping ensure high integrity for Cisco FICON fabrics. Multiple cascaded FICON director configurations are supported, including a newly supported zero-cost multi-hop configuration exclusively supported on the MDS 9700 Series FICON directors. For more information about the topologies that IBM System z supports, see the IBM Qualification Letters at <http://www.cisco.com/go/ficon>. The MDS 9710 is fully interoperable with dense wavelength-division multiplexing (DWDM) solutions in addition to offering 8- and 10-Gbps extended-reach optics to facilitate metropolitan-area applications.
- **FICON Dynamic Routing and Cisco originator exchange ID (OXID) - based routing:** In the past, all Cisco FICON directors supported only ISL routing based on the source and destination addresses for each FICON channel and control-unit combination. The Cisco MDS 9000 Family has long supported a more efficient ISL routing algorithm that uses the source and destination addresses and also the Fibre Channel OXID as factors in the load-balancing decision. The OXID value changes with each new I/O operation between the channel and the control unit, thus providing much better balancing across the available ISLs. This mechanism is the default (and preferred) ISL balancing algorithm for non-FICON environments. With the new IBM z13 processor, IBM is introducing the FICON Dynamic Routing feature, which is the same as Cisco's OXID-based routing feature.
- **Enhanced ISL aggregation:** The MDS 9710 and 9706, as well as all earlier FICON-capable directors, support the no-cost PortChannel feature. PortChannels are virtual interfaces that consist of multiple physical ISLs. PortChannels have two valuable attributes:
 - The member links can span any available ports on the installed line cards, with no port group or application-specific integrated circuit (ASIC) limitations.
 - The member links for a PortChannel can be different lengths.Given these two attributes, PortChannels provide an excellent mechanism for interconnecting metropolitan-area data centers with disparate-length site-to-site links. This flexibility also provides high availability by reducing the size of failure domains.
- **Lossless in-order delivery:** When PortChannels are used for cascaded FICON VSANs, member links for the PortChannel can be non-disruptively disabled or enabled. In fact, new links can even be added to or removed from an active PortChannel without IBM System z experiencing a single error.

Software Release

The Cisco MDS 9000 Mainframe Package for the MDS 9710 was first supported in MDS 9000 NX-OS 6.2(5a). The same mainframe package added support on the MDS 9706 in MDS 9000 NX-OS 6.2(11c).

License Information

The Cisco MDS 9000 Mainframe Package is licensed per director for all the ports on the director. For cascaded FICON environments, all directors in the FICON VSAN must have a mainframe package.

Ordering Information

Table 1 provides ordering information for the Cisco MDS 9000 Mainframe Package for the MDS 9710 and 9706.

Table 1. Ordering Information

Part Number	Description
M97FIC1K9	MDS 9700 Mainframe Package License for one MDS 9700 switch
M97FIC1K9=	MDS 9700 Mainframe Package License for one MDS 9700 switch Spare
L-M97FIC1K9=	E-Delivery MDS 9700 Mainframe Package License for one MDS 9700 switch Spare

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For More Information

For more information about the Cisco MDS 9700 Series directors, visit <http://www.cisco.com/go/storage> or contact your local account representative.

For more information about Cisco MDS FICON solutions, visit <http://www.cisco.com/go/ficon>.



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