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Cisco NX-OS 4.2(1b) and Cisco Fabric Manager 4.2 FICON Qualification Letter

International Business Machines Corporation (IBM) and Cisco Systems have successfully completed connectivity testing of switches and directors at NX-OS 4.2(1b) in **Table 1** with IBM System z servers listed in **Table 2**. This release contains the initial support for FC Link Encryption on 8 Gb/sec line cards; this feature is supported only on individual InterSwitch Links (ISLs) at this time. FC Link Encryption is not supported with Port Channels.

Table 1) Switches and directors tested	
Switches	Directors
MDS-9216i	MDS-9506
MDS-9222i	MDS-9509
MDS-9134	MDS-9513

Table 2) FICON (CHPID type FC) and FCP (CHPID type FCP) attachment of the tested switches and directors is supported on the following
zEnterprise 196 (z196) at driver 86E
System z10 Enterprise Class and System z10 Business Class (z10 EC and z10 BC) at driver 76D
System z9 Enterprise Class and System z9 Business Class (z9 EC and z9 BC) at driver 67L
zSeries 990 (z990) and zSeries 890 (z890) at driver 55K
zSeries 900 (z900) and zSeries 800 (z800) at driver 3GF
Note: Check with IBM service personnel to ensure all required Machine Change Levels (MCLs) have been applied to System z machines.

Table 3) Supported System z functions/features and environments
High Performance FICON for System z (zHPF)
All FICON / FCP data rates (1, 2, 4, and 8 Gb/sec) are supported on the switches and directors in Table 1 .
Fibre Channel Protocol (FCP) attached to System z machines that support FCP listed in Table 2 running under Linux on System z <ul style="list-style-type: none"> • Novell SUSE SLES 9 and SLES 10 • Red Hat RHEL 3, RHEL 4, and RHEL 5)
Note: FCP is also supported by z/VM and z/VSE.
FCP N-Port ID Virtualization (NPIV) on System z machines listed in Table 2 .
Intermix of FICON and FCP traffic within the same fabric

Table 4) Supported Input/Output (I/O) devices
TotalStorage Enterprise Storage Server (ESS) (2105-800)
IBM System Storage DS8000 series
IBM System Storage DS6000 (1750)
System Storage Virtualization Engine TS-7700 (3957)
IBM TotalStorage Virtual Tape Server (3494)
IBM TotalStorage Enterprise Tape Controller model J70 (3592-J70)
IBM System Storage TS1120 Tape Controller model C06 (3592-C06)
Optica PRIZM for FICON to ESCON conversion
Note: It is anticipated that the Cisco switches and directors could attach to any System z FICON / FCP supported device and other FICON / FCP devices that adhere to the FICON / FCP architecture.

Table 5) Supported distance for non-repeated and non-amplified switch/director optics	
Small Form Factor (SFP) optic	Distance Supported
2 Gb/sec LX, 10 km optics	10 km
4 Gb/sec LX, 10 km optics	10 km
4 Gb/sec LX, 4 km optics	4 km
8 Gb/sec LX, 10 km optics	10 km
10 Gb/sec LX, 10 km optics	10 km
10 Gb/sec Extended Reach (ER) optics	40 km
Note: Short wavelength (SX) optics are supported. The preferred method of connection for 8 Gb/sec short wavelength (SX) small form factor pluggable optics (SFPs) is through 50 micron multimode fiber optic cabling rated at 2000 MHz-km (OM3 fiber). Other 50 micron and 62.5 micron multimode fiber may be used as an alternative, but distance limitations exist.	

Table 6) Supported distance extension	
Feature	Supported Distance
IBM System Storage Metro Mirror (formerly PPRC) using Fibre Channel Protocol (FCP)	Synchronous mirroring is supported to up to 300 km
z/OS Global Mirror (formerly XRC) environments using FICON channels	Asynchronous mirroring is supported to up to 300 km
Fibre Channel over IP (FCIP) Note: See Table 8 for supported configurations.	Up to 300 km
Optical 2, 4, and 10 Gb/sec InterSwitch Links (ISLs) extended through qualified DWDM extension products	Up to 300 km
Optical 2 Gb/sec ISLs extended through Cisco 2 Gb/sec CWDM optics	Up to 100 km
Optical 4 Gb/sec ISLs extended through Cisco 4 Gb/sec CWDM optics	Up to 40 km
Optical 10 Gb/sec ISLs extended through Cisco Extended Reach optics	Up to 40 km
DWDM optics installed in MDS series switches and directors may be used for 2 Gb/sec links	Up to 300 km
DWDM optics installed in 9200/9500 series switches and directors may be used for 10 Gb/sec links	Up to 100 km
Note: 8 Gb/sec ISLs were not tested at extended distance through CWDM or DWDM due to no availability of extension equipment with an 8 Gb/sec interface – When equipment is available this will be tested.	

Table 7) Supported Software
It is anticipated that the tested switches and directors will operate with supported versions of System z operating systems - z/OS, z/VM, z/VSE, z/TPF, and Linux on System z that support FICON.
It is anticipated that the tested switches and directors will operate with supported versions of System z operating systems - z/VM, z/VSE, and Linux on System z that support FCP.
System Automation for OS/390 (SA OS/390) is supported for in band management.

Table 8) Supported FCIP Configurations		
9216i ⇔ 9216i	9216i ⇔ 14+2	14+2 ⇔ 14+2
9222i ⇔ 9222i	9222i ⇔ 18+4	18+4 ⇔ 18+4
Notes:		
<ol style="list-style-type: none"> 1. FCIP distance support is for up to 300 km. Testing was performed with both emulated distance and with real fiber over DWDM. 2. Performance characteristics can vary depending on environment. Professional assistance should be sought when implementing this technology. 3. The 14+2 and the 18+4 port cards can be plugged into the MDS-9500 directors. 4. Contact Cisco for further extending FCIP links through use of the FICON XRC Acceleration (XRCA) feature. 5. Contact Cisco for further extending FCIP links through use of the FICON Tape Acceleration (FTA) for tape writes feature. 		

Release Notes:

- * Cascading of directors and switches is limited to one hop for a FICON environment.
- * There is limited risk that Interface Control Checks (IFCCs) may be seen on the FC/IP 14+2 blade when using encryption and port channels with both IP ports. This problem appears to be seen when only small packets are used under high stress conditions. This was not seen under z/OS.
- * When a zone with more than 250 members is created, there is a rare chance that all ports in a switch can fail to log in during a System z processor Power On Reset (POR) in an FCP environment. This problem has not been seen in FICON environments. To work around this issue, customers can bring ports up after the POR in smaller groups or use smaller zones per Cisco's recommended best-practices for zoning.
- * Concurrent code downgrade from 4.x to 3.x is not supported.
- * On the MDS 9513 (only), new fabric switch modules (DS-13SLT-FAB2) are required when using the 24-port 8G FC/FICON module (DS-X9224-96K9) or the 48-port 8G FC/FICON module (DS-X9248-96K9).
- * Encryption on ISLs is supported on 8 Gb/sec line cards only and can not be used in Port Channel configurations.
- * With many CHPIDs plugged into a switch, there is a limited risk of taking a few IFCCs on the CUP during CEC IML.s.
- * 8 Gb/sec optics should not be attached directly to 1 Gb/sec optics. Auto-negotiation is from 8 Gb/sec to 2 or 4 Gb/sec or from 4 Gb/sec to 1 or 2 Gb/sec.

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 Locate the listing of "Hardware products for servers" around the middle of the Web page
 Click on the link "Switches and directors qualified for IBM System z FICON and FCP channels"

Table 9) All of Cisco's supported FICON switches and directors for attachment to System z		
Cisco Name	IBM Machine Type	Supported SFP Optics
MDS-9506	2062-D04 or 2054-E04	2, 4, 8, and 10 Gb/sec
MDS-9509	2062-D07 or 2054-E07	2, 4, 8, and 10 Gb/sec
MDS-9513	2062-E11 or 2054-E11	2, 4, 8, and 10 Gb/sec
9222i	2054-E01	2, 4, 8, and 10 Gb/sec
9134	2053-434	4 and 10 Gb/sec
9216i	2062-D1H or 2054-D1H	2, 4, and 10 Gb/sec
9216 (see note 1 and 2)	2062-D01	2 Gb/sec
9216a (see note 1 and 2)	2062-D1A or 2054-D1A	2, 4, and 10 Gb/sec
Notes:		
<ol style="list-style-type: none"> 1. Support for these products remains at Cisco SAN-OS 3.3(1c). 2. This product can be used at its supported FM level in a fabric with other switches and directors at the current NX-OS level. 		

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