IBM Corporation
2455 South Road
Poughkeepsie, NY 12601

June 07, 2011

Brocade Fabric Operating System (FOS) 6.4.0c and Data Center Fabric Manager (DCFM) 10.4.1 FICON Qualification Letter Includes M-EOSc 9.9.7, M-EOSn 9.9.7, and EFCM 9.7.4

International Business Machines Corporation (IBM) and Brocade Communications Systems, Inc. have successfully completed connectivity testing of switches and directors at FOS 6.4.0c and M-EOS 9.9.7 in ***Table 1*** with IBM System z servers listed in ***Table 2***.

Table 1) Brocade switches and directors supported on machines from Table 2

Brocade Name	Code Release	Graphical User Interface (GUI)	IBM Name	IBM Machine Type	Supported SFP Optics
48000	FOS 6.4.0c	DCFM 10.4.1	SAN256B	2109-M48	2, 4, 8, and 10 Gb/sec
DCX Backbone	FOS 6.4.0c	DCFM 10.4.1	SAN768B	2499-384	2, 4, 8, and 10 Gb/sec
DCX-4S	FOS 6.4.0c	DCFM 10.4.1	SAN384B	2499-192	2, 4, 8, and 10 Gb/sec
5100	FOS 6.4.0c	DCFM 10.4.1	SAN40B-4	2498-B40	8 Gb/sec
5300	FOS 6.4.0c	DCFM 10.4.1	SAN80B-4	2498-B80	8 Gb/sec
7500	FOS 6.4.0c	DCFM 10.4.1	SAN18B-R	2005-R18	4 Gb/sec
7500E	FOS 6.4.0c	DCFM 10.4.1	SAN04B-R	2005-R04	4 Gb/sec
7800	FOS 6.4.0c	DCFM 10.4.1	SAN06B-R	2498-R06	4 and 8 Gb/sec
M6140	M-EOSc 9.9.7	DCFM 10.4.1 See note 1	SAN140M	2027-140	2, 4, and 10 Gb/sec
Mi10K	M-EOSn 9.9.7	DCFM 10.4.1 See note 1	SAN256M	2027-256	2, 4, and 10 Gb/sec

Notes:
1. M-EOSx switches may use EFCM 9.7.4 as an alternative to DCFM for a GUI.

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 or 79F
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
Refer to ***Table 1*** for the SFP optics supported.
High Performance FICON for System z (zHPF)
All FICON / FCP data rates (2, 4, and 8 Gb/sec) supported on the switches and directors.
Fibre Channel Protocol (FCP) attached to System z machines that support FCP listed in ***Table 2*** running under Linux on System z • Novell SUSE SLES 9 and SLES 10 • Red Hat 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

Rick Leonard, PMP®, Vendor Services Lab Manager
System z® Hardware Development
International Business Machines Corporation

Sam Mercier, VSC Lab Sr. Engineer
System z® Hardware Development
International Business Machines Corporation

Table 4) Supported Input/Output (I/O) devices
TotalStorage Enterprise Storage Server (ESS) (2105-800)
IBM System Storage DS8000 series (242x)
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 Brocade 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
4 Gb/sec Extended Long WaveLength (ELWL) optics	30 km
8 Gb/sec ELWL optics	25 km
Note: Short wavelength (SX) optics are also 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 supported qualified DWDM extension products	Up to 300 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 in service releases 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 in service releases 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.

Rick Leonard, PMP®, Vendor Services Lab Manager
System z® Hardware Development
International Business Machines Corporation

Sam Mercier, VSC Lab Sr. Engineer
System z® Hardware Development
International Business Machines Corporation

Table 8) Supported FCIP configurations
(48000 or DCX or DCX-4S) ⇔ 7800 ⇔ 7800 ⇔ (48000 or DCX or DCX-4S)
(DCX or DCX-4S) ⇔ ICL ⇔ (DCX or DCX-4S) ⇔ 7800 ⇔ 7800 ⇔ (DCX or DCX-4S) ⇔ ICL ⇔ (DCX or DCX-4S)
Mi10K ⇔ 7800 ⇔ 7800 ⇔ Mi10K
M6140 ⇔ 7800 ⇔ 7800 ⇔ M6140
(* DCX or DCX-4S with FX8-24) ⇔ 7800 ⇔ (48000 or DCX or DCX-4S)
Note: The previous 5 configurations do not support I/O plugged into the 7800 switches.
(48000 or DCX or DCX-4S) ⇔ 7800 ⇔ 7800
(Mi10K or M6140) ⇔ 7800 ⇔ 7800
Note: The previous 2 configurations do not support I/O plugged into the middle 7800 switch. I/O can be plugged into end point 7800.
(* DCX or DCX-4S with FX8-24) ⇔ 7800
(* DCX or DCX-4S with FX8-24) ⇔ (* DCX or DCX-4S with FX8-24)
7800 ⇔ 7800
Note: The previous 3 configurations support I/O plugged into all switches and directors.
Notes: 1. 300 km of extension is supported for all supported FCIP configurations. 2. Performance characteristics can vary depending on environment. Professional assistance should be sought when implementing this technology. 3. A 7500 can be substituted for 7800 and a FR4-18i FCIP blade can be substituted for a FX8-24 FCIP blade in the above configurations as long as pairs are swapped together. A 7500 or a FR4-18i must be paired with a 7500 or a FR4-18i. A 7800 or FX8-24 must be paired with a 7800 or a FX8-24. 4. * In these configurations a 48000 can also be used with an FR4-18i FCIP blade. Note: The FX8-24 is not supported in a 48000. 5. A DCX-4S with FCIP blades can be substituted for 7500s or 7800s in the above configurations. 6. Contact Brocade for further extending FCIP links through use of the FICON Disk Emulation feature. 7. Contact Brocade for further extending FCIP links through use of the FICON Tape Pipelining feature.

Table 9) Supported InterChassis Link (ICL) configurations
DCX ⇔ DCX
DCX ⇔ DCX-4S
DCX-4S ⇔ DCX-4S

Table 10) Supported connections between b-type (interopmode 2) and m-type (McDATA Fabric Mode) fabric
(DCX or 5100 or 5300) ⇔ Mi10K
(DCX or 5100 or 5300) ⇔ M6140
Note: The DCX-4S is not supported for connection to m-type products.

Table 11) Supported blades in directors with FOS 6.4.0c

Director	FR4-18i	FA4-18	FC10-6		FX8-24	FC8-16	FC8-32	FC8-48	FC8-64	FS8-18	FCOE10-24
48000	Y		Y		N	Y	Y	N			
DCX	Y		Y		Y	Y	Y	Y1			
DCX-4S	Y		Y		Y	Y	Y	Y			

	not supported in the same physical director that has FICON traffic
1	only supported within a logical switch in a FICON environment
2	not supported in the same logical switch that has FICON in it, but supported in the same physical director

Note: If the card is not mentioned here, it is not supported in the same physical switch/director that is running FICON.

Rick Leonard, PMP®, Vendor Services Lab Manager
System z® Hardware Development
International Business Machines Corporation

Sam Mercier, VSC Lab Sr. Engineer
System z® Hardware Development
International Business Machines Corporation

Release Notes:

* Cascading of directors and switches is limited to one hop for a FICON environment with a few exceptions. For more details on this support see “Brocade Fabric OS v6.4.0c - Release Notes v2.0” (or the latest version) under the section “Appendix: Additional Considerations for FICON Environments”. This section contains other good to know information pertaining to FICON operation.
* DCFM can be used for direct support of M-EOS / m-type products at M-EOSx 9.9.6 and higher.
* Some of the setup for Interoperability fabric is through Command Line Interface (CLI) commands. Assistance from service support is highly recommended.
* For proper FICON configuration use the DCFM FICON configuration wizard.
* The ARBff fill word must be enabled with 8 Gb/sec platforms as soon as possible in System z environments. Additional information is available in “Brocade Fabric OS v6.4.0c - Release Notes v2.0” (or the latest version) under the section “Appendix: Additional Considerations for FICON Environments”.
* 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.
* The path from FOS 6.1.x to FOS 6.3..x must use FOS 6.2.0e_upgrade to minimize the possibility of encountering failures associated with Technical Service Bulletins (TSB) 2101-075-A and 2010-076-A. FOS 6.2.0e_upgrade is for upgrade path only; It should not be used for any period of time in a production environment.
* Port based routing should be used for all FICON environments. Exchange based routing is suspended until further notice.
* For interoperability between FOS levels refer to the “Brocade Fabric OS v6.4.0c - Release Notes v2.0” (or the latest version) under the section “Appendix: Additional Considerations for FICON Environments”.
* Consult Brocade for the recommended Graphical User Interface (GUI) for this switch or director.

This document and future qualification letters may be found on the IBM Resource Link Web site:

For the latest copy of this qualification letter go to the IBM Resource Link Web site.

Navigate to the following Web site
http://www.ibm.com/servers/resourcelink/
Hit the link for “Sign In”.
Sign in with valid user ID and password
On the left, click on the "Library" link
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”

IBM does not make any representations or warranties of any kind regarding the Brocades products and is not liable for such products or any claims made regarding such products. The fact that the listed Brocade products passed the enumerated IBM tests does not imply that the products will operate properly in any particular customer environment. Brocade retains sole responsibility for its products, the performance of such products and all claims relating to such products, including without limitation its products’ compliance to product specifications, safety requirements, regulatory agencies requirements and industry standards.

The terms IBM, eServer, DS6000, DS8000, TotalStorage, ESCON, FICON, System z, System z9, System z10, System Storage, SA OS/390, Resource Link, zEnterprise, z/OS, z/VM, z/VSE, z9, z10, and zSeries are trademarks or registered trademarks of International Business Machines Corporation.

Linux is a registered trade mark of Linus Torvalds in the United States, other countries, or both.

Other company, products, and service names may be trademarks or service marks of others.

Rick Leonard, PMP®, Vendor Services Lab Manager
System z® Hardware Development
International Business Machines Corporation

Sam Mercier, VSC Lab Sr. Engineer
System z® Hardware Development
International Business Machines Corporation