



IBM Corporation
2455 South Road
Poughkeepsie, NY 12601



Broadcom Inc.
1320 Ridder Park Drive
San Jose, CA 95131

January 19, 2023

IBM Z® and Brocade Qualification support for FOS 9.0.1b

International Business Machines Corporation and Broadcom Inc. have successfully completed qualification testing of zHPF® (High Performance FICON), FICON® and FCP protocols, using the switches and directors in **Table 1** running FOS 9.0.1b, using the optics in **Table 2**, and in the configurations in **Table 3**, for the following IBM Z family hardware platforms: IBM z16™ Model A01 (z16 A01), IBM z15™ models T01 (z15 T01) and T02 (z15 T02), IBM z14® (z14) and IBM z14 Model ZR1 (z14 ZR1), IBM z13® (z13) and IBM z13s® (z13s), and for the following IBM LinuxONE™ platforms: IBM LinuxONE III models LT1 and LT2, IBM LinuxONE Emperor™ II, IBM LinuxONE Rockhopper™ II, IBM LinuxONE Emperor™, and IBM LinuxONE Rockhopper™.

SANnav Management Portal and SANnav Global View was used as the management tool during the qualification testing. Please refer to the SANnav 2.1.1 Release Notes v1.0 (or the latest available version) for more information regarding the supported FOS releases.

Supported Directors and Switches

Table 1 – Supported directors and switches

| Brocade Name | IBM Name | IBM Machine Type | Max. Logical Switches | Max. CUP Instances | FICON Base Switch Support (XISL) | Supported Blades |
|--------------|-----------|--|-----------------------|--------------------|----------------------------------|---|
| X7-8 | SAN512B-7 | 8961-F78 | 16 | 8 | Yes | FC64-48 FC32-X7-48 FC32-48 FC32-64 ^a SX6 |
| X7-4 | SAN256B-7 | 8961-F74 | 16 | 8 | Yes | |
| G720 | SAN64B-7 | 8960-R64 8960-P64 | 4 | 2 | Yes | N/A |
| X6-8 | SAN512B-6 | 8961-F08 | 16 | 8 | Yes | FC32-48 FC32-64 ^a SX6 |
| X6-4 | SAN256B-6 | 8961-F04 | 16 | 8 | Yes | |
| G620 | SAN64B-6 | 8960-F64 8960-N64 8960-F65 8960-N65 | 4 | 2 | Yes | N/A |

a. The FC32-64 is supported for FCP use only, and is not supported in the same logical switch as FICON traffic.

Additional details on support for Brocade directors and switches connected to FICON protocol-attached IBM Z released after z14 and z14 ZR1 can be found on the Brocade Product End of Life. Please contact your sales representative for additional details:

<https://www.broadcom.com/support/fibre-channel-networking/eol>.

Supported Optics

Table 2 – Supported Optics

| Supported SFP/SFP+ Optics | Products and Blades | | Notes |
|---|---|------------------------|--|
| | Gen7 | Gen6 | |
| 64GFC SW SFP | G720 FC64-48 | | Links running at 64GFC tested over ISLs and ICLs between Brocade Gen7 Directors and switches. Direct connections between IBM Z FICON adapters and Brocade 64GFC optics tested only at 32GFC and 16GFC speeds. |
| 32GFC SW/LWL SFP 32GFC ELWL 25km SFP 32GFC SmartOptics 40km DWDM SFP+ | G720 FC64-48 FC32-X7-48 FC32-48 SX6 | G620 FC32-48 SX6 | The SmartOptics DWDM SFP+ can be used in conjunction with a SmartOptics multiplexer. ^a |
| 16GFC SW/LWL SFP 16GFC ELWL 25km SFP 16GFC SmartOptics 40km DWDM SFP+ | FC32-X7-48 FC32-48 SX6 | G620 FC32-48 SX6 | The SmartOptics DWDM SFP+ can be used in conjunction with a SmartOptics multiplexer. ^a |
| 10GFC SW/LWL SFP | G720 FC64-48 FC32-X7-48 FC32-48 SX6 | G620 FC32-48 SX6 | |
| 8GFC SmartOptics 80km DWDM SFP+ | | G620 FC32-48 SX6 | The SmartOptics DWDM SFP+ can be used in conjunction with a SmartOptics multiplexer. ^a |
| Supported QSFP Optics | Products and Blades | | Notes |
| | Gen7 | Gen6 | |
| 32GFC QSFP 16GFC QSFP | | G620 FC32-64 | Both the 50m and 100m 16GFC QSFPs are supported. QSFPs in the G620 switches are only supported for QSFP connections to other G620 QSFPs, they cannot be used for ICL connections to Gen6 or Gen7 chassis. |
| Supported ICL QSFP Optics | Products and Blades | | Notes |
| | Gen7 | Gen6 | |
| Brocade Gen7 capable ICL QSFP | X7-8 X7-4 | | Brocade Gen7 capable ICL QSFPs can only connect to other Brocade Gen7 capable ICL QSFPs. |
| 32GFC ICL QSFP 32GFC 2km ICL QSFP | X7-8 X7-4 | X6-8 X6-4 | 32GFC ICL QSFPs can only connect to other 32GFC ICL QSFPs. |

a. Use of SmartOptics may require users to make changes to their MAPs policies. For details on the SmartOptics implementation, please refer to the Brocade Fabric OS v9.0.1b Release Notes v1.0 (or the latest available version).

Additional details on supported optics can be found on the Brocade Supported Transceivers Matrix. Please contact your sales representative for additional details: <https://www.broadcom.com/products/fibre-channel-networking/transceiver-modules>.

Supported Topologies

Table 3 - Supported cascaded configurations

| |
|---|
| Switch(A) <ISL> Switch(A) |
| Extension(A) <IP> Extension (A) |
| Switch(A) <ISL> Extension (B) <IP> Extension (A) |
| Switch(A) <ISL> Extension (B) <IP> Extension (B) <ISL> Switch(A) |
| Switch(B) <ICL> Switch(B) <ISL> Extension (B) <IP> Extension (A) |
| Switch(B) <ICL> Switch(B) <ISL> Extension (B) <IP> Extension (B) <ISL> Switch(A) |
| Switch(B) <ICL> Switch(B) <ISL> Extension (B) <IP> Extension (B) <ISL> Switch(B) <ICL> Switch(B) |
| Switch(B) <ICL> Switch(B) <ISL> Switch(A) |
| Switch(B) <ICL> Switch(B) <ISL> Switch(B) <ICL> Switch(B) |
| Switch(B) <ICL> Switch(B) <ICL> Switch(B) ^a |
| FICON Multi-hop Configurations for Gen6 and Gen7 Switches and Directors (see Note below) |
| Restrictions and Switch Descriptions: Extension(A): <ul style="list-style-type: none"> • Extension switch 7840^b or extension blade SX6. • Extension switch 7840^b must only be connected to another 7840^b or an SX6 extension blade for IP extension. Extension(B): <ul style="list-style-type: none"> • Extension switch 7840^b or extension blade SX6. • Extension switch 7840^b must only be connected to another 7840^b or an SX6 extension blade for IP extension. • Switch & IP connections only. No device or channel connections. Switch(A): <ul style="list-style-type: none"> • May be any switch in Table 1. Switch(B): <ul style="list-style-type: none"> • May be X7-8 or X7-4 • May be X6-8 or X6-4 |

a. This configuration is also supported as a triangle configuration with Gen6/Gen7.

b. Extension switch 7840 is supported with FOS 8.2.2c or higher for connection to Gen6 and Gen7 switches and directors running FOS 9.0.1b.

Note: For more information regarding use of FICON multihop, requirements and supported configurations, please refer to “FICON Multihop: Requirements and Configurations (WP102704)” whitepaper: <https://www-03.ibm.com/support/techdocs/atmsastr.nsf/WebIndex/WP102704>.

FICON Release Notes

Please refer to the Brocade Fabric OS v9.0.1b Release Notes v1.0 (or the latest available version) for additional requirements, restrictions, and recommendations.

The new supported hardware features in this release are:

- 64GFC SW SFPs
- X7-8 and X7-4 chassis
- G720 Switch
- FC64-48 blade
- FC32-X7-48 blade
- FC32-48 blade in Gen7 chassis
- FC32-64 blade in Gen7 chassis
- SX6 blade in Gen7 chassis
- 32G SFPs
- 32G QSFP for ICLs
- 32G 2km QSFP for ICLs
- 32G 25KM Extended Long Wavelength (ELWL) optic
- Brocade Gen7 capable QSFP for ICLs
- SmartOptics support for Gen6 and Gen7 Directors
- SmartOptics 8G 80km DWDM SFP+ optic

The new supported features and functions in this release are:

- Fibre Channel Endpoint Security
- FICON Logical Switch
- Remote FICON CUP access from a CUP disabled switch

The supported routing modes for FICON are:

- Port Based Routing (PBR)
- Device Base Routing (DBR)
- Exchanged Base Routing (EBR) with FICON Dynamic Routing
 - For more information regarding host and control unit requirements for use of FICON Dynamic Routing, please refer to “FICON Dynamic Routing (FIDR): Technology and Performance Implications (WP102651)” whitepaper: <http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP102651>.

Notes and Recommendations:

1. **Upgrade Path:** The IBM Z and IBM LinuxONE supported FOS upgrade path to 9.0.1b for Gen7 is from 9.0.1a, 9.0.0b and for Gen6 is from 9.0.1a, 9.0.0b, 8.2.3a, 8.2.3, 8.2.2c, 8.2.2a, or 8.2.0a.
2. **FICON Operation:** The High Integrity Fabric feature is required for proper operation with FICON channels attached to FICON switches and directors running pre-FOS 9.0.0b. The FICON Logical Switch feature is required for proper operation with FICON channels attached to FICON switches and directors running FOS 9.0.0b and higher. Therefore, it is recommended that customers verify HIF is enabled for pre-FOS 9.0.0b and verify that FICON Logical Switch is enabled for FOS 9.0.0b or higher. If HIF or FICON LS is not enabled, FICON channels will go into an Invalid Attach state after a channel or port event occurs that requires the channels to log in.
3. **Extended Distance RPQ:** Although the distances for the protocols supported for these switches (FICON, FCP, FCIP, and ISLs) have been successfully tested to a distance of 300km, IBM requires an Extended Distance RPQ for IBM Z and for LinuxONE to assure applications greater than 100km adhere to the bounds of the qualification.
4. **I/O Insight and Analytics Monitoring Platform:** Brocade I/O Insight and Analytics Monitoring Platform (AMP) are supported in a Linux on IBM Z environment. These analytics capabilities are limited to FCP solutions only. Brocade AMP connectivity to an IBM Z FICON SAN Fabric is supported for FCP solutions such as Linux for IBM Z or IBM Metro Mirror.
5. **Cabling Best Practices:** For more information regarding cabling and other best practices please visit IBM’s “Cabling Considerations in Storage Area Networks” support document: <http://www-01.ibm.com/support/docview.wss?uid=ssg1S1004299>.

Qualification testing is performed to ensure connectivity and interoperability of Fibre Connection (FICON) and Fibre Channel Protocol (FCP) switches and directors with IBM Z, as well as to ensure adherence to the FICON architecture and FCP architecture. Testing is also performed to ensure the products support High Performance FICON for IBM Z (zHPF), intermix of FICON and FCP in the same switch/director, and cascading of switches/directors. All qualification testing is completed according to Brocade and IBM guidelines, and the methodologies and results are reviewed and audited by both organizations. This procedure integrates a variety of fabric switches, storage devices, and processor channels to accomplish the comprehensive qualification process for FICON directors and switches.

Results achieved were in a test environment under laboratory conditions. IBM does not make any representations or warranties regarding Broadcom Inc. products. Broadcom retains sole responsibility for its products, the performance of such products and all claims relating to such products, including without limitation its products’ compliance with product specifications, industry standards and safety and other regulatory requirements.

If a device supports attachment to the IBM Z platform, then IBM anticipates it will operate properly with the qualified products in this letter. For a list of IBM supported devices, please visit IBM System Storage Interoperation Center (SSIC): <http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>. For third party devices please check with the OEM device vendor for support statements regarding attachment to IBM Z.

The terms zHPF, FICON, IBM, IBM Z, z16, z15, z14, z Systems, z13, z13s, LinuxONE, LinuxONE Emperor and LinuxONE Rockhopper are trademarks or registered trademarks of International Business Machines Corporation.

Qualification Letter Version History

- 07/12/2021: Initial version.
- 04/05/2022: Added support for z16 Model A01.
- 01/19/2023: Updated 64GFC and 32GFC optics support notes.