

Brocade Fabric OS v7.0.2a

Release Notes v1.0

October 11, 2012

Document History

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Overview

Fabric OS (FOS) v7.0.2a is a maintenance release based on FOS v7.0.2. All hardware platforms and features supported in FOS v7.0.2 are also supported in FOS v7.0.2a.

Resolution of Important Defects

- DEFECT000408553 - Kernel panic during upgrade to FOS v6.4.3 and v7.0.1b or later.
- DEFECT000420758 - Upgrade to FOS v6.4.3x/v7.0.2x/7.0.1a or later is resulting in errors on ports that have media validation issues.

Features

FOS v7.0.2a is a maintenance release that contains fixes for defects including those from FOS v7.0.2. In addition this release includes the following features and enhancements implemented in FOS v7.0.2:

- D_Port Enhancements
 - D_Port link saturation capability – ability to drive test traffic to saturate link utilization close to line rate as part of D_Port test
- Ability to assign individual ports of an optical ICL to logical switches
 - Prior to FOS v7.0.2, in Virtual Fabrics enabled environment, an entire ICL port (which includes four individual ports as part of a single QSFP) has to be associated with a single logical switch. Starting with FOS v7.0.2, the individual ports within an optical ICL can be assigned to different logical switches. This feature is applicable to the DCX8510 platforms.

Note: Please note that if any individual port of a QSFP is part of the Base Switch, the remaining ports of that QSFP cannot be assigned to any other logical switch.

- Bottleneck detection enhancements - Decoupling of latency and congestion alerts

In FOS v7.x releases prior to FOS v7.0.2, when users enabled bottleneck alerts, it would enable alerting for both congestion and latency bottleneck conditions. Starting with FOS v7.0.2 users can choose to enable alerts only for latency bottleneck while not enabling alerts for congestion bottleneck or vice versa. Users still have the option to enable alerts for both congestion and latency bottleneck conditions.

FOS v7.0.1 Feature Descriptions

New Hardware Support

- Brocade 6505 entry level 16G FC switch
- FC8-32E and FC8-48E Condor3 based 8G blades for DCX 8510-8 and DCX 8510-4

Enhanced Optical ICL Topology Support for DCX 8510

FOS v7.0.1 supports the following enhanced topologies using optical ICLs:

- Support for up to nine DCX 8510 chassis in full mesh configuration using optical ICLs
- Support for ICL connectivity with up to ten DCX 8510 chassis in core-edge topology

This increased support delivers massive scalability, significantly reduces cabling complexity, and also makes more ports available for device connectivity.

FOS v7.0.1 also adds support for Enterprise ICL license on DCX 8510 platforms. Description of this license can be found in the “Optionally Licensed Software” section of this document.

Support for Dynamic Fabric Provisioning: Fabric Assigned World Wide Name

In order to simplify and accelerate server deployment and improve operational efficiency, FOS v7.0.1 provides Fabric Assigned WWN or FA-PWWN capability. This feature allows users to create a virtual WWN for a server instead of using the server's physical port WWN (PWWN) to create zoning and LUN mapping/masking. When a FA-PWWN capable server is attached to the SAN, this feature allows the fabric to assign this virtual WWN to that server. This feature requires servers to be using Brocade HBAs/Adapters. Please consult Brocade HBA/Adapter driver documentation and Release Notes to confirm minimum requirements for this feature. For Brocade Network Advisor support, please consult Brocade Network Advisor documentation and Release Notes.

VCS/VDX6730 to FC SAN Connectivity

This feature enables connectivity between hosts (using FCoE) connected to VCS/VDX platforms and FC storage connected to FC SAN via FCR. An E-port on a VDX6730 platform running NOS v2.1.1 is connected to an EX_port on an FCR running FOS v7.0.1 to enable this functionality.

Note:

- Integrated Routing license is not required to share devices between VDX/VCS Ethernet fabric and FC SAN fabric.
- It is recommended to use 5300, DCX/DCX-4S, DCX 8510-8, DCX 8510-4 for FCR functionality for higher scalability.
- A new FCR EX_port mode 5 is used to connect VCS/VDX6730 to FCR

FCIP Enhancements

FOS v7.0.1 enables ESCON and Bus/Tag printer emulation support on FCIP platforms.

This feature provides near native performance for FICON Extended paths to remote ESCON or Bus and Tag printers. Enabling FICON Printer emulation requires the Advanced FICON Acceleration license. This feature is supported on 7800 and FX8-24.

D-port (Diagnostic Port) Support between Brocade 16G Fabric Adapter and Brocade 16G FC switch

D-port functionality is supported between a Brocade 16G Fabric Adapter with adapter firmware version 3.1 or later, and a Brocade 16G FC switch running FOS v7.0.1 or later. This feature requires usage of 16G SFP+ at

both the adapter and the switch. For additional information please consult the Brocade Adapter Release Notes for firmware version 3.1 or later, and the Brocade Adapter Administrator's Guide.

Optionally Licensed Software

Fabric OS v7.0.1 includes all basic switch and fabric support software, as well as optionally licensed software that is enabled via license keys.

Optionally licensed features supported in FOS v7.0.1 include:

Brocade Ports on Demand—Allows customers to instantly scale the fabric by provisioning additional ports via license key upgrade. (Applies to select models of switches).

Brocade Fabric or E_Port or Full Fabric— This license enables a switch to connect to a multi-switch fabric via E_Ports, forming ISL connections.

Note: This license is only required on select embedded switch models and Brocade 300, and does not apply to other fixed-port switches or chassis-based platforms.

Brocade Extended Fabrics—Provides greater than 10km of switched fabric connectivity at full bandwidth over long distances (depending on platform this can be up to 3000km)

Brocade ISL Trunking— Provides the ability to aggregate multiple physical links into one logical link for enhanced network performance and fault tolerance. Also includes Access Gateway ISL Trunking on those products that support Access Gateway deployment.

Brocade Advanced Performance Monitoring—Enables performance monitoring of networked storage resources. This license includes the Top Talkers feature.

Brocade Fabric Watch — Monitors mission-critical switch operations and provides notification if established limits or thresholds are exceeded. Fabric Watch includes Port Fencing capabilities.

High Performance Extension over FCIP/FC (formerly known as “FCIP Services”) (For the FR4-18i blade) — This license key also includes the FC-FastWrite feature and IPsec capabilities.

Note: The FC-FastWrite feature is not supported on FR4-18i in FOS v7.0 or later.

Brocade Accelerator for FICON – This license enables unique FICON emulation support for IBM’s Global Mirror (formerly XRC) application (including Hitachi Data Systems HXRC and EMC’s XRC) as well as Tape Pipelining for all FICON tape and virtual tape systems to significantly improve XRC and tape backup/recovery performance over virtually unlimited distance for FR4-18i.

FICON Management Server— Also known as “CUP” (Control Unit Port), enables host-control of switches in Mainframe environments.

Enhanced Group Management — This license enables full management of devices in a data center fabric with deeper element management functionality and greater management task aggregation throughout the environment. This license is used in conjunction with Brocade Network Advisor application software and is applicable to all FC platforms supported by FOS v7.0 or later.

Adaptive Networking with QoS—Adaptive Networking provides a rich framework of capability allowing a user to ensure high priority connections obtain the bandwidth necessary for optimum performance, even in congested environments. The QoS SID/DID Prioritization and Ingress Rate Limiting features are included in this license, and are fully available on all 8Gb and 16Gb platforms.

Server Application Optimization — When deployed with Brocade Server Adapters, this license optimizes overall application performance for physical servers and virtual machines by extending virtual channels to the server infrastructure. Application specific traffic flows can be configured, prioritized, and optimized throughout the entire data center infrastructure. This license is not supported on the Brocade 8000.

Integrated Routing— This license allows any port in a DCX 8510-8, DCX 8510-4, Brocade 6510, DCX-4S, DCX, 5300, 5100, 7800, or Brocade Encryption Switch to be configured as an EX_Port or VEX_Port (on some platforms) supporting Fibre Channel Routing. This eliminates the need to add a dedicated router to a fabric for FCR purposes.

Encryption Performance Upgrade — This license provides additional encryption processing power. For the Brocade Encryption Switch or a DCX/DCX-4S/DCX 8510-8/DCX 8510-4, the Encryption Performance License

can be installed to enable full encryption processing power on the BES or on all FS8-18 blades installed in a DCX/DCX-4S/DCX 8510-8/DCX 8510-4 chassis.

DataFort Compatibility — This license is required on the Brocade Encryption Switch or DCX/DCX-4S/DCX 8510-8/DCX 8510-4 with FS8-18 blade(s) to read and decrypt NetApp DataFort-encrypted disk and tape LUNs. DataFort Compatibility License is also required on the Brocade Encryption Switch or DCX/DCX-4S/DCX 8510-8/DCX 8510-4 Backbone with FS8-18 Encryption Blade(s) installed to write and encrypt the disk and tape LUNs in NetApp DataFort Mode (Metadata and Encryption Algorithm) so that DataFort can read and decrypt these LUNs. DataFort Mode tape encryption and compression is supported beginning with the FOS v6.2.0 release on DCX platforms. Availability of the DataFort Compatibility license is limited; contact your vendor for details.

Brocade 8000 FC Ports on Demand — This license enables all eight FC ports on the Brocade 8000.

Advanced Extension – This license enables two advanced extension features: FCIP Trunking and Adaptive Rate Limiting. The FCIP Trunking feature allows multiple IP source and destination address pairs (defined as FCIP Circuits) via multiple 1GbE or 10GbE interfaces to provide a high bandwidth FCIP tunnel and failover resiliency. In addition, each FCIP circuit supports four QoS classes (Class-F, High, Medium and Low Priority), each as a TCP connection. The Adaptive Rate Limiting feature provides a minimum bandwidth guarantee for each tunnel with full utilization of the available network bandwidth without impacting throughput performance under high traffic load. This license is available on the 7800 and the DCX/DCX-4S/DCX 8510-8/DCX 8510-4 for the FX8-24 on an individual slot basis.

10GbE FCIP/10G Fibre Channel – This license enables the two 10GbE ports on the FX8-24 or the 10G FC capability on FC16-xx blade ports. On the Brocade 6510, this license enables 10G FC ports. This license is available on the DCX/DCX-4S/DCX 8510-8/DCX 8510-4 on an individual slot basis.

- **FX8-24:** With this license assigned to a slot with an FX8-24 blade, two additional operating modes (in addition to 10 1GbE ports mode) can be selected; 10 1GbE ports and 1 10GbE port, or 2 10GbE ports
- **FC16-xx:** Enables 10G FC capability on an FC16-xx blade in a slot that has this license
- **Brocade 6510:** Enables 10G FC capability on the switch

Advanced FICON Acceleration – This licensed feature uses specialized data management techniques and automated intelligence to accelerate FICON tape read and write and IBM Global Mirror data replication operations over distance, while maintaining the integrity of command and acknowledgement sequences. This license is available on the 7800 and the DCX/DCX-4S/DCX 8510-8/DCX 8510-4 for the FX8-24 on an individual slot basis.

7800 Upgrade – This license allows a Brocade 7800 to enable 16 FC ports (instead of the base four ports) and six GbE ports (instead of the base two ports). This license is also required to enable additional FCIP tunnels and also for advanced capabilities like tape read/write pipelining.

ICL 16-link, or Inter Chassis Links – This license provides dedicated high-bandwidth links between two Brocade DCX chassis, without consuming valuable front-end 8Gb ports. Each chassis must have the 16-link ICL license installed in order to enable the full 16-link ICL connections. Available on the DCX only.

ICL 8-Link – This license activates all eight links on ICL ports on a DCX-4S chassis or half of the ICL bandwidth for each ICL port on the DCX platform by enabling only eight links out of the sixteen links available. This allows users to purchase half the bandwidth of DCX ICL ports initially and upgrade with an additional 8-link license to utilize the full ICL bandwidth at a later time. This license is also useful for environments that wish to create ICL connections between a DCX and a DCX-4S, the latter of which cannot support more than 8 links on an ICL port. Available on the DCX-4S and DCX platforms only.

ICL POD License – This license activates ICL ports on core blades of DCX 8510 platforms. An ICL 1st POD license only enables half of the ICL ports on CR16-8 core blades of DCX 8510-8 or all of the ICL ports on CR16-4 core blades on DCX 8510-4. An ICL 2nd POD license enables all ICL ports on CR16-8 core blades on a DCX 8510-8 platform. (The ICL 2nd POD license does not apply to the DCX 8510-4.)

Enterprise ICL (EICL) License – The EICL license is required on a Brocade DCX 8510 chassis when that chassis is participating in a group of five or more Brocade DCX 8510 chassis connected via ICLs.

Note that this license requirement does not depend upon the total number of DCX 8510 chassis that exist in a fabric, but only on how many chassis are interconnected via ICLs. This license is only recognized/displayed when operating with FOS v7.0.1 and later.

Temporary License Support

The following licenses are available in FOS v7.0.1 as Universal Temporary or regular temporary licenses:

- Fabric (E_Port) license
- Extended Fabric license
- Trunking license
- High Performance Extension license
- Advanced Performance Monitoring license
- Adaptive Networking license
- Fabric Watch license
- Integrated Routing license
- Server Application Optimization license
- Advanced Extension license
- Advanced FICON Acceleration license
- 10GbE FCIP/10G Fibre Channel license
- FICON Management Server (CUP) license
- Enterprise ICL license

Note: Temporary Licenses for features available on a per slot basis enable the feature for any and all slots in the chassis.

Temporary and Universal Temporary licenses have durations and expiration dates established in the licenses themselves. FOS will accept up to two temporary licenses and a single Universal license on a unit. Universal Temporary license keys can only be installed once on a particular switch, but can be applied to as many switches as desired. Temporary use duration (the length of time the feature will be enabled on a switch) is provided with the license key. All Universal Temporary license keys have an expiration date upon which the license can no longer be installed on any unit.

Supported Switches

Fabric OS v7.0.1 supports the Brocade 300, 5410/5424/5450/5460/5470/5480/NC-5480, 5100, 5300, VA-40FC, Brocade Encryption Switch (BES), DCX/DCX-4S, 8000, 7800, 6505, 6510, DCX 8510-8 and DCX 8510-4.

Access Gateway mode is also supported by Fabric OS v7.0.1, and is supported on the following switches: the Brocade 300, 5100, VA-40FC, 8000, 5450, 5460, 5470, 5480, NC-5480, M5424, 6510, 6505.

Standards Compliance

This software conforms to the Fibre Channel Standards in a manner consistent with accepted engineering practices and procedures. In certain cases, Brocade might add proprietary supplemental functions to those specified in the standards. For a list of FC standards conformance, visit the following Brocade Web site: <http://www.brocade.com/sanstandards>

The Brocade 8000 and FCOE10-24 blade conform to the following Ethernet standards:

- IEEE 802.1D Spanning Tree Protocol
- IEEE 802.1s Multiple Spanning Tree
- IEEE 802.1w Rapid reconfiguration of Spanning Tree Protocol

- IEEE 802.3ad Link Aggregation with LACP
- IEEE 802.3ae 10G Ethernet
- IEEE 802.1Q VLAN Tagging
- IEEE 802.1p Class of Service Prioritization and Tagging
- IEEE 802.1v VLAN Classification by Protocol and Port
- IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
- IEEE 802.3x Flow Control (Pause Frames)

The following draft versions of the Converged Enhanced Ethernet (CEE) and Fibre Channel over Ethernet (FCoE) Standards are also supported on the Brocade 8000 and FCOE10-24 blade:

- IEEE 802.1Qbb Priority-based Flow Control
- IEEE 802.1Qaz Enhanced Transmission Selection
- IEEE 802.1 DCB Capability Exchange Protocol (Proposed under the DCB Task Group of IEEE 802.1 Working Group)
- FC-BB-5 FCoE (Rev 2.0)

Technical Support

Contact your switch supplier for hardware, firmware, and software support, including product repairs and part ordering. To expedite your call, have the following information immediately available:

1. General Information

- Technical Support contract number, if applicable
- Switch model
- Switch operating system version
- Error numbers and messages received
- **supportSave** command output and associated files
 - For dual CP platforms running FOS v6.2 and above, the supportsave command gathers information from both CPs and any AP blades installed in the chassis
- Detailed description of the problem, including the switch or fabric behavior immediately following the problem, and specific questions
- Description of any troubleshooting steps already performed and the results
- Serial console and Telnet session logs
- Syslog message logs

2. Switch Serial Number

The switch serial number is provided on the serial number label, examples of which are shown here:



The serial number label is located as follows:

- Brocade Encryption Switch, VA-40FC, 300, 5100, 5300, 6510, 6505 — On the switch ID pull-out tab located on the bottom of the port side of the switch

- Brocade 7800 — On the pull-out tab on the front left side of the chassis underneath the serial console and Ethernet connection and on the bottom of the switch in a well on the left side underneath (looking from front)
- Brocade 8000 — On the switch ID pullout tab located inside the chassis on the port side on the left and also on the bottom of the chassis
- Brocade DCX, DCX 8510-8 — Bottom right of the port side
- Brocade DCX-4S, DCX 8510-4 — Back, upper left under the power supply

3. World Wide Name (WWN)

When the Virtual Fabric feature is enabled on a switch, each logical switch has a unique switch WWN. Use the **wwn** command to display the switch WWN.

If you cannot use the **wwn** command because the switch is inoperable, you can get the primary WWN from the same place as the serial number, except for the Brocade DCX/DCX-4S and DCX 8510-8/DCX 8510-4. For the Brocade DCX/DCX-4S and DCX 8510-8/DCX 8510-4 access the numbers on the WWN cards by removing the Brocade logo plate at the top of the non-port side. The WWN is printed on the LED side of both cards.

1. License Identifier (License ID)

There is only one License Identifier associated with a physical switch or director/backbone chassis. This License Identifier is required as part of the ordering process for new FOS licenses.

Use the **licenseid** command to display the License Identifier.

FOS Migration Considerations

This section contains important details to consider before migrating to or from this FOS release.

TSBs - Critical Issues to Consider Prior to Installing This FOS Release

Technical Support Bulletins (TSBs) are produced to provide detailed information about high priority defects or issues present in FOS releases. The following sections specify all current TSBs that have been identified as being a risk to or resolved with this specific version of Fabric OS. Please review carefully and refer to the complete TSB for relevant issues prior to migrating to this version of code. TSBs can be found at <http://my.brocade.com> under the “Technical Documentation” section of the “documentation” tab.

TSB Issues Outstanding in FOS v7.0.2a

Issues in the following list of TSBs are known to be potential risks to using FOS v7.0.2a and should be considered carefully prior to using this release of code:

TSB	Summary
None	

TSB Issues Resolved in FOS v7.0.2a

Issues in the following list of TSBs are known FOS v7.0.2 risks that are not exposures in FOS v7.0.2a. Note that the issues addressed in this list of TSBs may also be resolved in other FOS releases. Refer to the specific Release Notes for each release to verify resolution details.

TSB	Summary
None	

Recommended Migration Paths to FOS v7.0.1

Migrating from FOS v7.0

Any 8G or 16G platforms running any FOS v7.0.0x release can be non-disruptively upgraded to FOS v7.0.1.

Migrating from FOS v6.4.x

DCX/DCX-4S units running any FOS v6.4.x release can be non-disruptively upgraded to FOS v7.0.1.

Any 8G platforms (other than DCX/DCX-4S) that are currently operating at lower than FOS v6.4.1a must be upgraded to FOS v6.4.1a or later before non-disruptively upgrading to FOS v7.0.1. Upgrading these platforms from any FOS v6.4.x release **lower than FOS v6.4.1a to FOS v7.0.1 will cause disruption to FC traffic.**

Upgrading any 8G platform operating at FOS v6.4.1a or later to FOS v7.0.1 is non-disruptive to FC traffic.

Migrating from FOS v6.4.1_fcoe1

The upgrade from FOS v6.4.1_fcoe1 to FOS v7.0.1 is non-disruptive to both FC and FCoE traffic on DCX and DCX-4S.

Note: Upgrading from FOS v6.4.1_fcoe or FOS v6.4.x releases other than v6.4.1_fcoe1 to FOS v7.0.1 will be disruptive to FCoE traffic going through FCOE10-24 blades in DCX/DCX-4S. When loading FOS v7.0.1 with Brocade Network Advisor v11.1.1/11.1.1a, there is no warning flagging this FCoE traffic disruption.

Migrating from FOS v6.3.x

To non-disruptively migrate from FOS v6.3.x to v7.0.1, units should first load FOS v6.4.1a or later (v6.4.1b should be used for encryption platforms, units operating in Access Gateway mode, or units with ports configured as EX or VEX for FCR), and then migrate to FOS v7.0.1.

FOS Upgrade and Downgrade Special Considerations

The DCX/DCX-4S units running any FOS v6.4.x can be non-disruptively upgraded to FOS v7.0.1. This upgrade is non-disruptive to FC traffic only. When loading FOS v7.0.1 to a DCX chassis with FCOE10-24 blades with Brocade Network Advisor v11.1.1/11.1.1a, there is no warning flagging FCoE traffic disruption.

The DCX/DCX-4S units running FOS v6.4.1_fcoe1 can be non-disruptively upgraded to FOS v7.0.1. This upgrade is non-disruptive to both FCoE traffic through FCOE10-24 blades and FC traffic.

Non-disruptive upgrade to FOS v7.0.1 on 8G switches is allowed from **FOSv6.4.1a** or later.

Disruptive upgrades to Fabric OS 7.0.1 are allowed and supported from FOS 6.3 (up to a two-level migration) using the optional “-s” parameter with the *firmwaredownload* command.

If there are multiple node EGs (encryption groups) in a fabric, please complete firmwaredownload on one node at a time before downloading on another node.

The Brocade 8000 does not support non-disruptive hot code loads (HCL). Upgrading the Brocade 8000 to FOS v7.0.1 will be disruptive to the I/O through the switch.

FC FastWrite , EX_Ports, and TCP byte streaming on FR4-18i must be disabled prior to upgrading to FOS v7.0.1. Failure to do so will cause the upgrade to be blocked.

Upgrading a switch currently operating in interopmode 2 or 3 to FOS v7.0.1 is disruptive. The interopmode must be changed to 0 prior to upgrading to FOS v7.0.1, as interopmodes 2 and 3 are not supported on FOS v7.0.1. Changing the interopmode is an offline operation.

Important Notes

This section contains information that you should consider before you use this Fabric OS release.

Brocade Network Advisor Compatibility

Brocade® Network Advisor provides the industry's first unified network management solution for data, storage, and converged networks. It supports Fibre Channel Storage Area Networks (SANs), Fibre Channel over Ethernet (FCoE) networks, Layer 2/3 IP switching and routing networks, wireless networks, application delivery networks, and Multiprotocol Label Switching (MPLS) networks. In addition, Brocade Network Advisor supports comprehensive lifecycle management capabilities across different networks through a seamless and unified user experience. It is the next-generation successor product to legacy Brocade management products (Brocade Data Center Fabric Manager (DCFM), Brocade Fabric Manager (FM) and Brocade Enterprise Fabric Connectivity Manager (EFCM)).

Brocade Network Advisor is available with flexible packaging and licensing options for a wide range of network deployments and for future network expansion. Brocade Network Advisor 11.1.0 is available in

- SAN-only edition
- IP-only edition
- SAN+IP edition.

For SAN Management, Network Advisor 11.1 is available in three editions:

- **Network Advisor Professional:** a fabric management application that is ideally suited for small-size businesses that need a lightweight management product to manage their smaller fabrics. It manages one FOS fabric at a time and up to 1,000 switch ports. It provides support for Brocade FC switches, Brocade HBAs / CNAs, and Fibre Channel over Ethernet (FCoE) switches.
- **Network Advisor Professional Plus:** a SAN management application designed for medium-size businesses or departmental SANs for managing up to four physical or virtual fabrics (FOS, M-EOS and Mixed fabrics) and up to 2,560 switch ports. It supports Brocade backbone and director products (DCX 8510-4/DCX-4S, 48Ks, etc.), FC switches, Fibre Channel Over IP (FCIP) switches, Fibre Channel Routing (FCR) switches/ Integrated Routing (IR) capabilities, Fibre Channel over Ethernet (FCoE) / DCB switches, and Brocade HBAs / CNAs.
- **Network Advisor Enterprise:** a management application designed for enterprise-class SANs for managing up to 24 physical or virtual fabrics and up to 9,000 switch ports. Network Advisor SAN Enterprise supports all the hardware platforms and features that Network Advisor Professional Plus supports, and adds support for the Brocade DCX Backbone (DCX 8510-8/DCX) and Fiber Connectivity (FICON) capabilities.

More details about Network Advisor's new enhancements can be found in the Network Advisor 11.1 Release Notes, Network Advisor 11.1 User Guide, and Network Advisor 11.1 Installation, Migration, & Transition Guides.

Note:

Brocade Network Advisor 11.0 and DCFM 10.4 cannot manage switches running FOS v7.0 or later.

Brocade Network Advisor 11.1.3 is required to manage Brocade 6505 platform.

DCFM Compatibility

DCFM is not qualified or support the management of switches operating with FOS v7.0 and later firmware versions. **You must first upgrade DCFM to Network Advisor 11.1 or later if you are planning to upgrade devices to FOS v7.0 or you risk losing management connectivity.**

WebTools Compatibility

FOS v7.0.1 is qualified and supported only with Oracle JRE 1.6.0 update 24.

SMI Compatibility

- It is important to note that host SMI-S agents cannot be used to manage switches running FOS v7.0.1
- If users want to manage a switch running FOS v7.0.1 using SMI-S interface, they must use Brocade Network Advisor's integrated SMI agent.

Fabric OS Compatibility

The following table lists the earliest versions of Brocade software supported in this release, that is, the *earliest* supported software versions that interoperate. Brocade recommends using the *latest* software versions to get the greatest benefit from the SAN.

To ensure that a configuration is fully supported, always check the appropriate SAN, storage or blade server product support page to verify support of specific code levels on specific switch platforms prior to installing on your switch. Use only FOS versions that are supported by the provider.

For a list of the effective end-of-life dates for all versions of Fabric OS, visit the following Brocade Web site:

http://www.brocade.com/support/end_of_life.jsp

Supported Products and FOS Interoperability	
Brocade 2000-series switches	Not supported, end of support (December 2007)
Brocade 3200, 3800	Direct E-port connections are not supported – must use FCR
Brocade 3000	Direct E-port connections are not supported – must use FCR v3.2.1c ³
Silkworm 3016, 3250, 3850, 3900, 24000	Direct E-port connections are not supported – must use FCR
4100, 4900, 7500, 7500e, 5000, 200E, 48K Brocade 4012, 4016, 4018, 4020, 4024, 4424	v6.2.2 or later ⁶
Silkworm 12000	v5.0.x ³ (Direct E_Port connections are not supported – must use FCR)
Brocade 5410, 5480, 5424, 5450, 5460, 5470, NC-5480	v6.2.0 or later ⁶
Brocade DCX, 300, 5100, 5300	v6.1.0e and later ^{2 6}
VA-40FC	v6.2.1_vfc ⁶ , v6.2.2 or later ⁶
Brocade DCX-4S	v6.2.0 or later ⁶
Brocade DCX with FS8-18 blade(s), Brocade Encryption Switch	v6.1.1_enc or later ⁶
Brocade 7800, DCX and DCX-4S with FCOE10-24 or FX8-24 blades	V6.3.0 or later
Brocade 8000	V6.1.2_CEE1 or later
Brocade DCX/DCX-4S with FA4-18 blade(s)	DCX requires v6.0.x or later ⁶ , DCX-4S requires 6.2.x or later ^{5 6}
Brocade DCX 8510-8/DCX 8510-4	FOS v7.0 or later
Brocade 6510	FOS v7.0 or later
Brocade 6505	FOS v7.0.1 or later
48000 with FA4-18 blade(s), Brocade 7600	V6.2.2 or later ⁶

Supported Products and FOS Interoperability	
Secure Fabric OS (on any model)	Not Supported
Mi10k, M6140, ED-6064, ES-3232, ES-4300, ES-4400, ES-4500, ES-4700 (McDATA Fabric Mode and Open Fabric Mode) ¹	Direct E_Port connections are not supported – must use FCR. M-EOS v9.9.5 or later
McDATA ED-5000 32-port FC director	Not Supported

Multi-Protocol Router Interoperability	
Brocade 7420	Not supported
Brocade 7500 and FR4-18i blade	V6.2.2 and higher ^{4 6}
McDATA SANRouters 1620 and 2640	Not Supported

NOS (VDX Platform) Interoperability	
Brocade VDX6710, VDX6720, VDX6730	NOS v2.1.1 or later ⁷

Table Notes:

- ¹ When routing to an M-EOS edge fabric using frame redirection, the M-EOS fabric must have a FOS-based product in order to configure the frame redirection zone information in the edge fabric.
- ² When directly attached to a Host or Target that is part of an encryption flow.
- ³ These platforms may not be directly attached to hosts or targets for encryption flows.
- ⁴ McDATA 1620 and 2640 SANRouters should not be used with FOS-based routing (FCR) for connections to the same edge fabric.
- ⁵ FA4-18 is not supported in a DCX/DCX-4S that is running FOS v7.0 or later
- ⁶ If operating with **FOS v6.2.2e or earlier**, Adaptive Networking QoS must be disabled when connecting to 16G FC platform. Otherwise, ISL will segment.
- ⁷ Connectivity to FC SAN is established via VDX6730 connected to FCR running FOS v7.0.1 or later. FCR platforms supported include 5100, VA-40FC, 5300, 7800, DCX, DCX-4S, DCX 8510-8, DCX 8510-4, 6510. For higher FCR backbone scalability (refer to separate “Brocade SAN Scalability Guidelines” documentation for details), please use 5300, DCX, DCX-4S, DCX 8510-8, DCX 8510-4.

Zoning Compatibility Note:

Users are recommended to upgrade to the following versions of firmware when interoperating with a switch running FOS v7.0 or later in the same layer 2 fabric to overcome some of the zoning operations restrictions that otherwise exist:

Main code level	Patch code levels with full zoning compatibility
FOS v6.2	FOS v6.2.2d or later
FOS v6.3	FOS v6.3.2a or later
FOS v6.4	FOS v6.4.1 or later

If there are switches running FOS versions lower than the above listed patch levels in the same fabric as a switch with FOS v7.0 or later, then cfsave and cfsenable operations **initiated** from these switches will fail if the zoning database is greater than 128KB. In such scenarios zoning operations such as cfsave/cfsenable can still be performed successfully if initiated from a switch running FOS v7.0 or later.

Blade Support

Fabric OS v7.0.1 software is fully qualified and supports the blades for the DCX/DCX-4S noted in the following table:

DCX/DCX-4S Blade Support Matrix	
16-, 32-, 48- and 64-port 8Gbit port blades (FC8-16, FC8-32, FC8-48, FC8-64) and the 6-port 10G FC blade (FC10-6)	Supported with FOS v6.0 and above (FC8-64 requires FOS v6.4) with any mix and up to 8/4 of each. No restrictions around intermix.
Intelligent blade	Up to a total of 8/4 intelligent blades. See below for maximum supported limits of each blade.
FCIP/FC Router blade (FR4-18i)	Up to a maximum of 4 blades of this type. This can be extended under special circumstances, but must be approved by Brocade's Product Team. Up to 8 FR4-18i blades can be installed in a DCX if they are used only for FCIP without routing. Note: FR4-18i cannot coexist with FX8-24 in FOS v7.0 or later FR4-18i does not support EX-ports, FC FastWrite and WAN optimization features in FOS v7.0 or later FR4-18i supports VEX ports on FOS v7.0 or later
Virtualization/Application Blade (FA4-18)	Not supported on FOS v7.0 or later
Encryption Blade (FS8-18)	Up to a maximum of 4 blades of this type.
Next Generation Distance Extension Blade (FX8-24)	Up to a max of 4 blades of this type. Note: FR4-18i cannot coexist with FX8-24 in FOS v7.0 or later
FCoE/L2 CEE blade FCOE10-24	Up to a max of 4 blades of this type. Not supported in the same chassis with other intelligent blades or the FC8-64 port blade.
FC16-32, FC16-48	Not supported

Table 1 Blade Support Matrix for DCX and DCX-4S with FOS v7.0.1

Note: The iSCSI FC4-16IP blade is not qualified for the DCX/DCX-4S.

Fabric OS v7.0.1 software is fully qualified and supports the blades for the DCX 8510-8 and DCX 8510-4 noted in the table below.

DCX 8510-8/DCX 8510-4 Blade Support Matrix	
FC16-32, FC16-48 16G FC blades	Supported starting with FOS v7.0
FC8-64 64 port 8Gbit port blade	With any mix and up to 8/4 of each. No restrictions around intermix. Note: FC8-16, FC8-32, FC8-48 blades are not supported on DCX 8510 platforms
FC8-32E, FC8-48E Condor3 based 8G blades	Supported starting with FOS v7.0.1 ¹
FC10-6	Not supported.
Intelligent blade	Up to a total of 8/4 intelligent blades. See below for maximum supported limits of each blade.
FCIP/FC Router blade (FR4-18i)	Not supported.
Virtualization/Application Blade (FA4-18)	Not supported
Encryption Blade (FS8-18)	Up to a maximum of 4 blades of this type.
Next Generation Distance Extension Blade (FX8-24)	Up to a maximum of 4 blades of this type.
FCoE/L2 CEE blade FCOE10-24	Not supported

Table 2 Blade Support Matrix for DCX 8510-8 and DCX 8510-4 with FOS v7.0.1

Note: The iSCSI FC4-16IP blade is not qualified for the DCX 8510-8/DCX 8510-4.

1. Note that 16G SFP+ is not supported in FC8-32E and FC8-48E blades

Power Supply Requirements for Blades in DCX/DCX-4S				
Blades	Type of Blade	DCX/DCX-4S @110 VAC (Redundant configurations)	DCX/DCX-4S @200-240 VAC (Redundant configurations)	Comments
FC10-6, FC8-16, FC8-32, FC 8-48, FC8-64	Port Blade	2 Power Supplies	2 Power Supplies	Distribute the Power Supplies evenly to 2 different AC connections for redundancy.
FR4-18i	Intelligent Blade	Not Supported	2 Power Supplies	
FS8-18, FX8-24, FCOE10-24	Intelligent Blade	Not Supported	DCX: 2 or 4 Power Supplies DCX-4S: 2 Power Supplies	- For DCX with three or more FS8-18 Blades, (2+2) 220VAC Power Supplies are required for redundancy. - For DCX with one or two FS8-18 Blades, (2) 220VAC Power Supplies are required for redundancy. - For DCX-4S, (2) 220VAC Power Supplies provide redundant configuration with any supported number of FS8-18 Blades. - For both DCX and DCX-4S with FX8-24 blades, (1+1) 220VAC Power Supplies are required for redundancy.

Table 3 Power Supply Requirements for DCX and DCX-4S

Typical Power Supply Requirements Guidelines for Blades in DCX 8510-8 (For specific calculation of power draw with different blade combinations, please refer to Appendix A: Power Specifications in the 8510-8 Backbone Hardware Reference Manual)					
Configured Number of Ports	Blades	Type of Blade	DCX 8510-8 @110 VAC (Redundant configurations)	DCX 8510-8 @200-240 VAC (Redundant configurations)	Comments
Any combination of 8Gb or 16Gb ports with QSFP ICLs	FC8-64, FC16-32, FC8-32E	Port Blade	4 Power Supplies	2 Power Supplies	200-240VAC: 1+1 Power Supplies 110VAC: 2+2 ¹ Power Supplies
256 16Gb ports + QSFP ICLs	FC16-32, FC16-48 (Maximum of fully populated FC16-32 blades)	Port Blade	4 Power Supplies	2 Power Supplies	200-240VAC: 1+1 Power Supplies 110VAC: 2+2 ¹ Power Supplies Max 8 FC16-32 port blades
256 8Gb ports + QSFP ICLs	FC8-32E, FC8-48E (Maximum of fully populated FC8-32E blades)	Port Blade	4 Power Supplies	2 Power Supplies	200-240VAC: 1+1 Power Supplies 110VAC: 2+2 ¹ Power Supplies Max 8 FC8-32E port blades
192 16Gb Ports & max 2 intelligent blades (FX8-24 /FS8-18/combination) with QSFP ICLs	FC16-32, FC16-48, FX8-24, FS8-18	Port / Intelligent Blade	4 Power Supplies	2 Power Supplies	200-240VAC: 1+1 Power Supplies 110VAC: 2+2 ¹ Power Supplies Max four FC16-48 port blades and max 2 Intelligent blades
192 8Gb Ports & max 2 intelligent blades (FX8-24 /FS8-18/combination) with QSFP ICLs	FC8-32E, FC8-48E, FX8-24, FS8-18	Port / Intelligent Blade	4 Power Supplies	2 Power Supplies	200-240VAC: 1+1 Power Supplies 110VAC: 2+2 ¹ Power Supplies Max four FC8-48E port blades and max 2 Intelligent blades
336 16Gb ports + QSFP ICLs	FC16-48 (Maximum of seven FC16-48 blades, with one empty port blade slot)	Port Blade	4 Power Supplies	2 Power Supplies	200-240VAC: 1+1 Power Supplies 110VAC: 2+2 ¹ Power Supplies Max 7 FC16-48 port blades

Typical Power Supply Requirements Guidelines for Blades in DCX 8510-8 (For specific calculation of power draw with different blade combinations, please refer to Appendix A: Power Specifications in the 8510-8 Backbone Hardware Reference Manual)					
Configured Number of Ports	Blades	Type of Blade	DCX 8510-8 @110 VAC (Redundant configurations)	DCX 8510-8 @200-240 VAC (Redundant configurations)	Comments
336 8Gb ports + QSFP ICLs	FC8-48E (Maximum of seven FC8-48E blades, with one empty port blade slot)	Port Blade	4 Power Supplies	2 Power Supplies	200-240VAC: 1+1 Power Supplies 110VAC: 2+2 ¹ Power Supplies Max 7 FC8-48E port blades
384 16Gb ports + QSFP ICLs	FC16-32, FC16-48	Port Blade	Not Supported	4 Power Supplies	200-240VAC: For DCX 8510-8, four (2+2) ¹ 220V AC Power Supplies are required
384 8Gb ports + QSFP ICLs	FC8-32E, FC8-48E	Port Blade	Not Supported	4 Power Supplies	200-240VAC: For DCX 8510-8, four (2+2) ¹ 220V AC Power Supplies are required
Any combination of 8Gb or 16Gb ports and intelligent blades with QSFP ICLs	FC16-32, FC16-48, FC8-64, FC8-32E, FC8-48E, FS8-18, FX8-24	Intelligent Blade /Combination	Not Supported	4 Power Supplies	For DCX 8510-8, four (2+2) ¹ 220V AC Power Supplies are required when any special purpose blade are installed

Table 4 Power Supply Requirements for DCX 8510-8

Notes:

1. When 2+2 power supply combination is used, the users are advised to configure the Fabric Watch setting for switch marginal state to be two power supplies. Users can use the CLI `switchstatuspolicyset` to configure this value if the current value is set to zero. In FOS v7.0.x, the default setting for the marginal state due to missing power supplies is incorrectly set to zero (Defect 000349586), which will prevent Fabric Watch from generating notifications when the switch enters the marginal state due to missing power supplies

Typical Power Supply Requirements Guidelines for Blades in DCX 8510-4 (For specific calculation of power draw with different blade combinations, please refer to Appendix A: Power Specifications in the 8510-4 Backbone Hardware Reference Manual)					
Configured Number of Ports	Blades	Type of Blade	DCX 8510-4 @110 VAC (Redundant configurations)	DCX 8510-4 @200-240 VAC (Redundant configurations)	Comments
96 ports max with QSFP ICLs	FC16-32, FC8-32E	Port Blade	2 Power Supplies	2 Power Supplies	1+1 redundancy with 110 or 200-240 VAC power supplies
Any combination of 8Gb or 16 Gb ports and intelligent blades with QSFP ICLs	FC16-32, FC16-48, FC8-32E, FC8-48E, FC8-64, FS8-18, FX8-24	Intelligent Blade /Combination	Not Supported	2 Power Supplies	200-240VAC: 1+1 Power Supplies

Table 5 Power Supply Requirements for DCX 8510-4

Scalability

All scalability limits are subject to change. Limits may be increased once further testing has been completed, even after the release of Fabric OS. For current scalability limits for Fabric OS, refer to the *Brocade Scalability Guidelines* document, available under the *Technology and Architecture Resources* section at <http://www.brocade.com/compatibility>

Other Important Notes and Recommendations

Adaptive Networking/Flow-Based QoS Prioritization

- Any 8G or 4G FC platform running FOS v6.2.2e or lower version of firmware cannot form an E-port with a 16G FC platform when Adaptive Networking QoS is enabled at both ends of the ISL. Users must disable QoS at either end of the ISL in order to successfully form an E-port under this condition.

Users can disable QoS via `portcfgQos -disable` command. Please consult Fabric OS Command Reference manual for details related to `portcfgQos` command.

- When using QoS in a fabric with 4G ports or switches, FOS v6.2.2 or later must be installed on all products in order to pass QoS info. E_Ports from the DCX to other switches must come up AFTER 6.2.2 is running on those switches.

Access Gateway

- AG cascading is not supported on Brocade 6510, Brocade 6505 in FOS v7.0.1.
- Users who want to utilize Access Gateway's Device-based mapping feature in the ESX environments are encouraged to refer to the SAN TechNote GA-TN-276-00 for best implementation practices. Please follow these instructions to access this technote:
 - Log in to <http://my.brocade.com>
 - Go to Documentation > Tech Notes.

- Look for the Tech Note on Access Gateway Device-Based Mapping in VMware ESX Server.

Brocade HBA/Adapter Compatibility

- Brocade HBA/Adapter should be using driver version 2.3.0.2 or later when attached to 16G ports on Brocade switches.

D-Port

- FOS v7.0.0a and later support the execution of D-Port tests concurrently on up to eight ports on the switch.
- Support of D-Port is extended to R_RDY flow control mode. The R_RDY mode is useful for active DWDM links that do not work in VC_RDY or EXT_VC_RDY flow control modes.
- A new sub-option “-dwdm” is added to “portcfgdport --enable” CLI to configure D-Port over **active** DWDM links. The “-dwdm” option will not execute the optical loopback test while performing D-Port tests as the **active** DWDM links do not provide necessary support to run optical loopback tests.

Encryption Behavior for the Brocade Encryption Switch (BES) and FS8-18

- SafeNet's KeySecure hosting NetApp's LKM (SSKM) is supported for data encryption operations with FOS v7.0.1
 - Use of SSKM with the Brocade encryption solution is only supported for SSKM operating in PVM mode. Please see SSKM documentation for operating in PVM mode for details. Operation in HVM mode is not supported.
 - It is recommended to use Tight VNC connection to access the management console for SSKM and LKM key vaults instead of remote desktop. If remote desktop is used, customer may encounter the following errors related to smart card reader:
 - Error communicating with smart card reader.
 - Card reader already in use by default key.
 - Unable to complete TEP/TAP process as window for selecting card and entering password does not appear.
 - Please refer to SafeNet Keysecure install documentation for setting up and initially configuring the SSKM key vaults. There are some changes between setting up the SSKMs and the LKMs. Please refer SafeNet or NetApp documentation for any LKM to SSKM migration procedures. This migration is not tested/supported with FOS v7.0.1 or later.
 - The following is tested and supported with FOS v7.0.1
 - Platform Serial Number: 27CJNQ1
 - Platform FW Version: SSKM-1.0-03
 - Platform Firmware Build ID: 0.5_secure
 - DB version: 166
 - SEP FW ID: SEPLuna TDB
 - SEP HW ID: Luna K6 TBD
 - SEP SW ID: 6.2.0 TBD
 - System Card FW ID: 200.5
 - Management console version: 1.0 build 18.
- For crypto tape operations, please ensure to use Emulex FC HBA firmware/drivers 2.82A4/7.2.50.007 or higher. Use of lower level firmware/drivers may result in hosts not being able to access their tape LUNs through a crypto target container.
- If the migration to FOS v7.0 or later does not occur from 6.4.1a, 6.4.1b, or 6.4.2, the following will result
 - BES will reboot if auto reboot is enabled otherwise it needs to be rebooted manually for recovery2010/11/08-04:54:35:485488, [FSS-1009], 4424/886, CHASSIS, ERROR, MACE, FSS Error: fcsw0-vs: MISMATCH: component., svc.c, line: 2462, comp:FSSK_TH, ltime:2010/11/08-04:54:35:485484

- Adding of 3PAR Session/Enclosure LUNs to CTCs is now supported. Session/Enclosure LUNs (LUN 0xFE) used by 3PAR InServ arrays must be added to CryptoTarget (CTC) containers with LUN state set to “cleartext”, encryption policy set to “cleartext”. BES/FS8-18 will not perform any explicit enforcement of this requirement.
- The “*cryptocfg -manual_rekey -all*” command should not be used in environments with multiple encryption engines (FS8-18 blades) installed in a DCX/DCX-4S/DCX 8510 chassis with more than one encryption engine has access to the same LUN. In such situations, use the “*cryptocfg -manual_rekey <CTC> <LUN Num> <Initiator PWWN>*” command to manually rekey these LUNs.
- When host clusters are deployed in an Encryption environment, please note the following recommendations:
 - If two EEs (encryption engines) are part of a HAC (High Availability Cluster), configure the host/target pair such that they form a multipath from both EEs. Avoid connecting both the host/target pairs to the same EE. This connectivity does not give full redundancy in the case of EE failure resulting in HAC failover.
 - Since quorum disk plays a vital role in keeping the cluster in sync, please configure the quorum disk to be outside of the encryption environment.
- The “-key_lifespan” option has no effect for “*cryptocfg -add -LUN*”, and only has an effect for “*cryptocfg -create -tapepool*” for tape pools declared “-encryption_format native”. For all other encryption cases, a new key is generated each time a medium is rewound and block zero is written or overwritten. For the same reason, the “Key Life” field in the output of “*cryptocfg -show -container -all -stat*” should always be ignored, and the “Key life” field in “*cryptocfg -show -tapepool -cfg*” is only significant for native-encrypted pools.
- The Quorum Authentication feature requires a compatible DCFM or Brocade Network Advisor release (DCFM 10.3 or later for pre-FOS v7.0 and Network Advisor 11.1 or later for FOS v7.0 or later) that supports this feature. Note, all nodes in the EG must be running FOS v6.3.0 or later for quorum authentication to be properly supported.
- The System Card feature requires a compatible DCFM or Brocade Network Advisor release (DCFM 10.3 or later for pre-FOS v7.0 and Network Advisor 11.1 or later for FOS v7.0 or later) that supports this feature. Note, all nodes in the EG must be running FOS v6.3.0 or later for system verification to be properly supported.
- The Brocade Encryption switch and FS8-18 blade do not support QoS. When using encryption or Frame Redirection, participating flows should not be included in QoS Zones.
- HP SKM & ESKM are supported with Multiple Nodes and Dual SKM/ESKM Key Vaults. Two-way certificate exchange is supported. Please refer to the Encryption Admin Guide for configuration information. If using dual SKMs or ESKMs on BES/FS8-18 Encryption Group, then these SKM / ESKM Appliances must be clustered. Failure to cluster will result in key creation failure. Otherwise, register only one SKM / ESKM on the BES/FS8-18 Encryption Group.
- The RSA RKM Appliance A1.6, SW v2.7.1.1 is supported. The procedure for setting up the RKM Appliance with BES or a DCX/DCX-4S/DCX 8510 with FS8-18 blades is located in the [Encryption Admin Guide](#).
- Support for registering a 2nd RKM Appliance on BES/FS8-18 is blocked. If the RKM Appliances are clustered, then the virtual IP address hosted by a 3rd party IP load balancer for the RKM Cluster must be registered on BES/FS8-18 in the primary slot for Key Vault IP.
- With Windows and Veritas Volume Manager/Veritas Dynamic Multipathing, when LUN sizes less than 400MB are presented to BES for encryption, a host panic may occur and this configuration is not supported in the FOS v6.3.1 or later release.
- Hot Code Load from FOS v6.4.1a to FOS v7.0 or later is supported. Cryptographic operations and I/O will be disrupted but other layer 2 FC traffic will not be disrupted.

- When disk and tape CTCs are hosted on the same encryption engine, re-keying cannot be done while tape backup or restore operations are running. Re-keying operations must be scheduled at a time that does not conflict with normal tape I/O operations. The LUNs should not be configured with auto rekey option when single EE has disk and tape CTCs.
- Gatekeeper LUNs used by SYMAPI on the host for configuring SRDF/TF using in-band management must be added to their containers with LUN state as “cleartext”, encryption policy as “cleartext” and without “-newLUN” option.
- For new features added to encryption in FOS v6.4.0, such as, disk device decommissioning, combined disk-tape encryption support on the same encryption engine, and redundant key ID metadata option for replication environments, all the nodes in the encryption group must be running FOS v6.4.0 or higher versions of FOS. Firmware downgrade will be prevented from FOS v6.4.0 to a lower version if one or more of these features are in use.
- Special Notes for HP Data Protector backup/restore application
 - Tape Pool encryption policy specification:
 - On Windows Systems, HP Data Protector can be used with tape pool encryption specification only if the following pool label options are used:
 - Pick from Barcode
 - User Supplied – Only 9 characters or less
 - For other options, behavior defaults to Tape LUN encryption policy.
 - On HP-UX systems, HP Data Protector cannot be used with tape pool encryption specification for any of the pool options. The behavior defaults to Tape LUN Encryption Policy.
 - Tape LUN encryption policy specification:
 - No restrictions, tape LUN encryption policy specification can be used with HP Data Protector on HP-UX and Windows systems.
- BES/FS8-18 will reject the SCSI commands WRITE SAME and EXTENDED COPY, which are related to VAAI (vStorage APIs for Array Integration) hardware acceleration in vSphere 4.1. This will result in non-VAAI methods of data transfer for the underlying arrays, and may affect the performance of VM related operations.

FCIP (FR4-18i, Brocade 7800 and FX8-24)

- Any firmware activation will disrupt I/O traffic on FCIP links.
- Latency measurements supported on FCIP Tunnels:
 - 1GbE & 10GbE - 200ms round trip time and 1% loss.
- After inserting a 4G SFP in GE ports of an FX8-24 blade or 7800 switch, sometimes “sfps show” output might display “Cannot read serial data!” . Removing and re-inserting the SFP should resolve this issue. It is recommended that users perform sfps show immediately after inserting the SFP and ensure SFP is seated properly before connecting the cables.
- When running FOS v7.0.0 or later, if any of the following features are enabled in the FCIP configuration, a downgrade operation to pre-FOS v7.0.0 will be blocked until the features are removed from the FCIP configuration:
 - InBand Management
 - Multigigabit Circuit
 - Shared GE among Logical Switches
 - Auto-mode compression option

- VE as XISL
- 10GigE lossless failover
- Modified QoS percentages
- 10GigE ARL
- IP Configuration where multiple GigEs have same subnet values
- For a tunnel configuration on 1GE ports that has more than 4 circuits
- Teradata emulation enabled
- Circuits configured explicitly to be listeners or an initiators

FCoE/DCB/CEE (Brocade 8000 and FCOE10-24)

- When upgrading a Brocade 8000 or DCX/DCX-4S with one or more FCOE10-24 blades from FOS v6.x to FOS v7.0.0 or later, the user should carefully review Chapter 5 of the FOS v7.0.0 Converged Enhanced Ethernet Administrator's Guide.
- FOS v7.0 or later supports a new optimized model for provisioning FCoE with fewer configuration steps to enable FCoE on DCB ports. These changes do not allow the Brocade 8000 to retain FCoE configuration information following an upgrade to FOS v7.0 or later. After the upgrade to FOS v7.0 or later, all FCoE edge ports will need to be provisioned with the new model before any FIP FLOGIs will take place
- Although including Brocade 8000 in the path of TI (Traffic Isolation) and ETI (Enhanced Traffic Isolation) Zones is not prohibited, it is not supported. Configuring Brocade 8000 in the TI/ETI Zone path is not recommended and will result in undefined behavior.
- Ethernet L2 traffic with xSTP Hello timer set to less than or equal to 3 seconds may experience momentary traffic disruption during HA failover.
- The Brocade 8000 balances the FCoE bandwidth across all six port groups (each port group contains four ports). To get optimum performance for FCoE traffic it is recommended that the user distribute server CNA connections across these six port groups.
- Hot plugging a CP with firmware level less than FOS v6.3.0 into a DCX or DCX-4S with an active FCOE10-24 blade will result in the new standby CP not coming up.
- When operating in Converged Mode, tagged traffic on the native VLAN of the switch interface is processed normally. The host should be configured not to send VLAN tagged traffic on the switch's native VLAN.
- When operating in Converged Mode, tagged frames coming with a VLAN tag equal to the configured native VLAN are dropped.
- The Converged Network Adapter (CNA) may lose connectivity to the Brocade 8000/FCOE10-24 if the CNA interface is toggled repeatedly over time. This issue is related to the CNA and rebooting the CNA restores connectivity.
- The Brocade 8000 and FCOE10-24 support only one CEE map on all interfaces connected to CNAs. Additionally, CEE map is not recommended for use with non-FCoE traffic. QoS commands are recommended for interfaces carrying non-FCoE traffic.
- Before upgrading to FOS v6.4.1_fcoe/v6.4.1_fcoe1/v7.0.0 or later, if the CEE map "default" value already exists, the same "default" value is preserved after upgrading to FOS v6.4.1_fcoe/v6.4.1_fcoe1/v7.0.0 or later. However, if the CEE map "default" is not configured before upgrading to FOS v6.4.1_fcoe/v6.4.1_fcoe1/v7.0.0 or later, then after upgrading to FOS v6.4.1_fcoe/v6.4.1_fcoe1/v7.0.0 or later, the following CEE map "default" will be created automatically:

cee-map default

priority-group-table 1 weight 40 pfc

priority-group-table 2 weight 60

priority-table 2 2 2 1 2 2 2 2

- When upgrading from FOS v6.3.x or v6.4.x to FOS v6.4.1_fcoe/v6.4.1_fcoe1/v7.0.0 or later, the CEE start up configuration dcf.conf file will be incompatible with the FCoE provisioning changes implemented in v6.4.1_fcoe and later releases. Users can save the dcf.conf file as a backup and apply it once the firmware upgrade is completed to get the DCX/DCX-4S to the same startup configuration as in the older release.
- It is recommended that Spanning Tree Protocol and its variants be disabled on CEE interfaces that are connected to an FCoE device.
- The Fabric Provided MAC Address (FPMA) and the Fibre Channel Identifier (FCID) assigned to a VN_Port cannot be associated with any single front-end CEE port on which the FLOGI was received.
- LLDP neighbor information may be released before the timer expires when DCBX is enabled on a CEE interface. This occurs only when the CEE interface state changes from active to any other state. When the DCBX is not enabled, the neighbor information is not released until the timer expires, irrespective of the interface state.
- The FCoE login group name should be unique in a fabric-wide FCoE login management configuration. If there is a login group name conflict, the merge logic would rename the login group by including the last three bytes of the switch WWN in the login group name. As long as the OUI of the switch WWNs are identical this merge logic guarantees uniqueness in any modified login group name (switches with the same OUI will have unique last 3 bytes in WWN). However, if the participating switches have different OUIs but identical last three bytes in the switch WWNs, then the merge logic will fail to guarantee uniqueness of login group names. This will result in one of the login groups being dropped from the configuration. This means, no device can login to the login group that is dropped as a result of this name conflict. Users must create a new login group with a non-conflicting name to allow device logins.
- Ethernet switch services must be explicitly enabled using the command “*fosconfig -enable ethsw*” before powering on an FCOE10-24 blade. Failure to do so will cause the blade to be faulted (fault 9). Users can enable ethsw after upgrading firmware without FC traffic interruption.
- The Brocade 8000 does not support non-disruptive hot code loads (HCL). Upgrading the Brocade 8000 to FOS v7.0.1 or downgrading from v7.0.1 is disruptive to the IO through the switch.
- Upgrading firmware on a DCX or DCX-4S with one or more FCOE10-24 blades from FOS v6.4.1_fcoe1 to FOS v7.0 or later will be non-disruptive to FCoE traffic through FCOE10-24 blades and FC traffic.
- Upgrading firmware on a DCX or DCX-4S with one or more FCOE10-24 blades from FOS v6.3.x, v6.4.x, and v6.4.1_fcoe to FOS v7.0 or later will be disruptive to any traffic through the FCOE10-24 blades.
- Connecting Brocade 8000 to an FCR-capable switch with fcrbcast config enabled will cause a storm of broadcast traffic resulting in termination of iswitchd.
- When rebooting a DCX or DCX-4S with an FCOE10-24 blade, Qlogic CNA and LSan zoning, the switch will become very unresponsive for a period of time. This is due to the CNA sending excessive MS queries to the switch.
- The Brocade 8000 and FCOE10-24 can handle 169 small FCoE frames in bursts. If you are using the Brocade 8000 or FCOE10-24, and you delete a large number of v-ports with HCM, some of the v-ports may not appear to be deleted. To correct this, disable and re-enable FCoE with the following CLI commands:

switch:admin>**fcoe -disable slot/port**

switch:admin>**fcoe -enable slot/port**

- When a FCOE10-24 blade is powered off during configuration replay, the interface specific configuration won't get applied. Later when FCOE10-24 blade is powered on, all physical interfaces will come up with default configurations. User can execute "copy startup-config running-config" command to apply the new configuration after powering on the FCOE10-24 blade.
- When IGMP Snooping is disabled on a VLAN, all configured IGMP groups are removed from that VLAN. User has to reconfigure the IGMP groups after enabling the IGMP snooping on that VLAN.

FCR and Integrated Routing

- With routing and dual backbone fabrics, the backbone fabric ID must be changed to keep the IDs unique.
- When using FC Routing in a backbone to edge configuration with an Mi10K in the edge fabric, users may experience slow throughput for hosts attached to the Mi10K. Users may encounter this following a bounced IFL connection between the backbone and edge fabric. This slowdown can be resolved by disabling/enabling the Mi10K ports for the hosts that are impacted.
- Mi10K Directors operating with firmware prior to M-EOSn v9.9.5 may experience repeated system faults when attached as an FCR edge switch to a Brocade 7800 EX Port. To avoid this, ensure that the Mi10K is operating with M-EOSn v9.9.5 or later when in an edge fabric that will be attached to a Brocade 7800 FCR Backbone.
- VEX edge to VEX edge device sharing will not be supported.
- To allow Hot Code Load on Brocade 5100 when using Integrated Routing, the edge switch connected to the 5100 must be running Fabric OS v6.1 or later code.

Forward Error Correction (FEC)

- Though FEC capability is generally supported on Condor3 (16G capable FC) ports when operating at either 10G or 16G speed, it is not supported when using active DWDM links. Hence FEC must be disabled on Condor3 ports when using active DWDM links by using portCfgFec command. Failure to disable FEC on active DWDM links may result in link failure during port bring up.

FICON

- For FICON qualified releases, please refer to the *Appendix: Additional Considerations for FICON Environments* section for details and notes on deployment in FICON environments. (This appendix is only included for releases that have completed FICON qualification).

FL_Port (Loop) Support

- FL_Port is not supported on FC16-32, FC16-48, FC8-32E, FC8-48E, Brocade 6510, and Brocade 6505.
- The FC8-48 and FC8-64 blade support attachment of loop devices.
 - Virtual Fabrics must be enabled on the chassis and loop devices may only be attached to ports on a 48-port or 64-port blade assigned to a non-Default Logical Switch operating with the default 10-bit addressing mode (they may not be in the default Logical Switch).
- A maximum of 144 ports may be used for connectivity to loop devices in a single Logical Switch within a chassis in 10-bit dynamic area mode on DCX-4S.
- A maximum of 112 ports may be used for connectivity to loop devices in a single Logical Switch within a chassis in 10-bit dynamic area mode on DCX.
- Loop devices continue to be supported when attached to ports on the FC8-16, FC8-32 with no new restrictions.

ICLs on DCX/DCX-4S

- If a DCX with an 8-link ICL license is connected to a DCX with a 16-link license, the DCX with the 16-link license will report enc_out errors. The errors are harmless, but will continue to increment. These errors will not be reported if a DCX with a 16-link license is connected to a DCX-4S with only 8-link ICL ports.
- If ICL ports are disabled on only one side of an ICL link, the enabled side may see enc_out errors.

Native Connectivity (M-EOS interoperability)

- A switch running FOS v7.0 or later cannot form E-port connectivity with any M-EOS platform. A switch running FOS v7.0 or later can only operate in Brocade native mode (interopmode 0). Connectivity between M-EOS platforms and a switch running FOS v7.0 or later is supported via FCR.

Port Mirroring

- On the Brocade 5300, the port mirroring feature has a limitation where all port mirror resources must stay within the same ASIC port group. The resources are the configured mirror port, Source Device, and Destination Device or ISL, if the Destination Device is located on another switch. The ASIC port groups are 0-15, 16-31, 32-47, 48-63, and 64-79. The routes will be broken if the port mirror resources are spread across multiple port groups.
- Port Mirroring is not supported on the Brocade 7800.

Port Statistics

- On Condor3-based (16G FC) ports, the enc_in (number of encoding errors inside of frames) and enc_out (number of encoding errors outside of frames) counters will not be updated when a port is *operating* at either 10G or 16G speed. This is due to the different encoding scheme used at 10G and 16G speeds when compared to 8G/4G/2G speeds. Because of this, Fabric Watch alerts and Port Fencing based on ITW (Invalid Transmission Word) thresholds will not function as these enc_in and enc_out counters will not be incremented when operating at either 10G or 16G (ITW is computed based on enc_in and enc_out counters). Also any CLI or GUI that displays enc_in and enc_out counters will show no incrementing of these counters when a port is operating at either 10G or 16G.

Both enc_in and enc_out counters contain valid information when a Condor3-based port is operating at speeds **other than** 10G and 16G.

SNMP

- Though below OIDs are present in Brocade MIBs, they are not functional in FOS v7.0.2a. Below are the OIDs that are not functional in FOS v7.0.2a:
 - swDeviceStatusTrap
 - swConnUnitPCSErrorCounter in swConnUnitPortStatExtensionTable
 - swDeviceStatus in swSystemTable.
 - Addition of swConnUnitPortCapableSpeeds

Virtual Fabrics

- When creating Logical Fabrics that include switches that are not Virtual Fabrics capable, it is possible to have two Logical Switches with different FIDs in the same fabric connected via a VF incapable switch. Extra caution should be used to verify the FIDs match for all switches in the same Logical Fabric.
- A switch with Virtual Fabrics enabled may not participate in a fabric that is using Password Database distribution or Administrative Domains. The Virtual Fabrics feature must be disabled prior to deploying in a fabric using these features.

Zoning

- The maximum zone database size supported in FOS v7.x is limited to 1MB, even though the cfgsize CLI on some platforms (DCX, DCX-4S, DCX 8510-8, DCX 8510-4) show the maximum zone database capacity to be 2MB. Users should not exceed the 1MB zone database capacity to operate within the supported limits. Please note that there is no enforcement by FOS 7.0.x to restrict users to operate within 1MB zone database limit - it is the responsibility of the user to not exceed this limit.
- There are limitations to zoning operations that can be performed from a FOS v6.x switch that is in the same fabric as a FOS v7.0 or later switch if the FOS v6.x switch is not running the recommended firmware version. Please see Fabric OS Interoperability section for details.

Beginning with the FOS v6.2.0 release, all WWNs containing upper-case characters are automatically converted to lower-case when associated with a zone alias and stored as part of a saved configuration on a switch. For example, a WWN entered as either "AA.BB.CC.DD.EE.FF.GG.HH" or "aa.bb.cc.dd.ee.ff.gg.hh" when associated with a zone alias will be stored as "aa.bb.cc.dd.ee.ff.gg.hh" on a switch operating with FOS v6.2.0 or later.

This behavioral change in saved zone alias WWN members will not impact most environments. However, in a scenario where a switch with a zone alias WWN member with upper case characters (saved on the switch with pre-FOS v6.2.0 code) is merged with a switch with the same alias member WWN in lower case characters, the merge will fail, since the switches do not recognize these zoning configurations as being the same.

For additional details and workaround solutions, please refer to the latest FOS Admin Guide updates or contact Brocade Customer Support.

Miscellaneous

- Using a Windows anonymous FTP server for supportsave collection

When using anonymous ftp, to avoid long delays or failure of simultaneous supportsave collections when AP blades are present in a director chassis, the number of unlimited anonymous users for a Windows FTP server should be configured as follows:

$$\text{Number of anonymous FTP connections} = (\text{Number of director chassis}) + (\text{Number of installed Application Blades} \times 3)$$
- RASlog message AN-1010 may be seen occasionally indicating "Severe latency bottleneck detected". Even though it is a "Warning" message, it is likely to be a false alarm and can be ignored.
- POST diagnostics for the Brocade 5100 have been modified beginning with FOS v6.3.1b and v6.4.0 to eliminate an "INIT NOT DONE" error at the end of an ASIC diagnostic port loopback test. This modification addresses BL-1020 Initialization errors encountered during the POST portloopbacktest. (Defect 263200)
- It is important to note that the outputs of slotshow -p and chassisshow commands also display the maximum allowed power consumption per slot. These are absolute maximum values and should not be confused with the real-time power consumption on 16G blades. The chassisshow command has a "Power Usage (Watts):" field that shows the actual power consumed in real-time on 16G blades.
- Class 3 frames that have been trapped to CPU will be discarded in the following scenarios on DCX/DCX-4S/DCX 8510 during the following conditions:
 - HA failover on DCX/DCX-4S/DCX 8510 platforms while running FOS v7.0 or later firmware
 - Firmware upgrade from v7.0 to a later release on Brocade 300, 5100, VA-40FC, 5300, 6510
 - Firmware upgrade from v7.0.1 to a later release on Brocade 6505

- The QSFP information in the sfpshow output will indicate the ID field as all zeros. This is as designed.

```

ras080:FID128:root> sfpshow 5/32
QSFP No: 8 Channel No:0
Identifier: 13 QSFP+
Connector: 12 MPO Parallel Optic
Transceiver: 0000000000000000 16_Gbps id

```
- It is recommended that for directors with more than 300 E_Ports, the switch be disabled prior to executing the “switchCfgTrunk” command (used to disable or enable trunking on the switch).
- During non-disruptive firmware upgrades, E_Ports in R-RDY mode may cause some frame drops on the E-port links.
- For the configure command, in FOS v6.4, or later the default value that displays for Maximum Logins per switch is different than the value that displays in FOS v6.3.x. The default value has not changed; it was displayed incorrectly in FOS v6.3.x, and is now corrected.

Defects

Closed with Code Change in Fabric OS v7.0.2a

This section lists the defects with Critical, High and Medium Technical Severity closed with a code change as of October 11, 2012 in Fabric OS v7.0.2a

Defect ID: DEFECT000383577	Technical Severity: High
Summary: CRC with good EOF detected on ICL ports	
Symptom: Observed CRC with good EOF on multiple ICL ports between a DCX and DCX-4S.	
Probability: Low	
Feature: FOS Software	Function: ASIC Driver
Reported In Release: FOS6.4.2	Service Request ID: 693593,693593

Defect ID: DEFECT000388607	Technical Severity: Medium
Summary: Unexpected NTP behavior starting at FOS v6.3.x	
Symptom: TS-1002 RASLOG messages when changing NTP source using tsclockserver command are not as expected.	
Probability: Medium	
Feature: FOS Software	Function: RAS Logging / Tracing
Reported In Release: FOS6.3.0	Service Request ID: 699177

Defect ID: DEFECT000399649	Technical Severity: Medium
Summary: fmmonitor --clear does not clear the Count value properly	
Symptom: fmmonitor --clear does not clear counts sometimes.	
Probability: Low	
Feature: FOS Software	Function: ASIC Driver
Reported In Release: FOS7.0.1	Service Request ID: 730829

Defect ID: DEFECT000407000	Technical Severity: High
Summary: Loop port comes up "In_Sync" after port bounce	
Symptom: 3rd party storage was unable to connect to Brocade switch with In_Sync after user executed switchenable/switchdisable for configuration change	
Probability: Low	
Feature: FOS Software	Function: Fabric Services
Reported In Release: FOS6.4.2	Service Request ID: 744343

Defect ID: DEFECT000407005	Technical Severity: High
Summary: BR5470 cannot negotiate to 8Gb with an OEM specific chassis mid-plane.	
Symptom: BR5470 will only negotiate to 4Gb.	
Probability: High	
Feature: 8G Platform Services	Function: Other
Reported In Release: FOS6.4.2	

Defect ID: DEFECT000408553	Technical Severity: Medium
Summary: Kernel panic during upgrade to FOS v6.4.3 and v7.0.1b or later.	
Symptom: With more than 2 VE ports configured on a FX8-24 blade, switch could panic during HAfailover if there are ELS frames coming in. This only applies to FOS v6.4.3, v7.0.1b and later.	
Workaround: Try to avoid any discovery frame during HA/firmware-download	
Probability: Medium	
Feature: 8G ASIC Driver	Function: C2 ASIC driver
Reported In Release: FOS6.4.2	Service Request ID: 748441

Defect ID: DEFECT000409878	Technical Severity: Medium
Summary: HTTPD (Apache server 1.3.31-10) goes to defunct state.	
Symptom: Customer loses manageability via BNA.	
Workaround: Restart httpd or HAfailover	
Probability: High	
Feature: Mgmt Embedded - CAL	Function: Other
Reported In Release: FOS7.0.0	Service Request ID: 750519,750057,103192

Defect ID: DEFECT000411481	Technical Severity: Medium
Summary: Switch drops ADISC requests from a third party HBA.	
Symptom: With session based zoning, customer is unable to configure storage properly on servers with a third party HBA.	
Probability: Low	
Feature: FOS Software	Function: ASIC Driver
Reported In Release: FOS6.4.2	Service Request ID: 753595

Defect ID: DEFECT000411841	Technical Severity: Critical
Summary: Rolling reboots occur when faulty FX8-24 blade detected.	
Symptom: Rolling reboots happens during CP reset BP and BP cannot be properly initialized due to hardware failure.	
Workaround: None. However relocating the FX8-24 blade to a different slot may alleviate the underlying hardware fault.	
Probability: Low	
Feature: FOS Software	Function: Firmware Download
Reported In Release: FOS7.0.0	Service Request ID: 755867

Defect ID: DEFECT000413752	Technical Severity: High
Summary: Brocade 10G FC ports unable to interoperate with a third party DWD 10G FC ports	
Symptom: Brocade 10G FC ports are unable to sync with third party 10G FC ports on DWDM equipment.	
Probability: Medium	
Feature: 16G ASIC Driver	Function: 16Bbps/10Gbps Port
Reported In Release: FOS7.0.0	

Defect ID: DEFECT000414491	Technical Severity: High
Summary: Switch panic during hafailover with Failed expression: (area == sw->sw_pt[port]->full_fmt_area	
Symptom: After user had performed port address binding in the past, a HAfailover caused a panic on new active CP during taking over and triggered disruption	
Probability: Medium	
Feature: FOS Software	Function: Panic / OOM
Reported In Release: FOS6.4.2	Service Request ID: 759663

Defect ID: DEFECT000414936	Technical Severity: High
Summary: Offline port FCID is not synced to standby CP.	
Symptom: Move offline ports from default switch to logical switch, HAfailover, the newly moved ports FCID change. This happens running in either address mode 1 or address mode 2	
Probability: High	
Feature: FOS Software	Function: FC Layer 2 Routing
Reported In Release: FOS7.0.0	Service Request ID: 736579

Defect ID: DEFECT000414944	Technical Severity: Medium
Summary: CRC errors on port with LWL SFP running at 8Gbit/sec	
Symptom: Spinfab fails and CRC errors are observed on an 8Gbit/sec link with a specific LWL optics.	
Probability: High	
Feature: FOS Software	Function: Diagnostics
Reported In Release: FOS7.0.1	Service Request ID: 759819

Defect ID: DEFECT000414993	Technical Severity: Medium
Summary: Diag code optimization	
Symptom: Provide more information in case of portloopbacktest failure.	
Probability: Low	
Feature: Diagnostics	Function: Other
Reported In Release: FOS7.0.2	

Defect ID: DEFECT000415047	Technical Severity: Medium
Summary: Busy buffer stuck caused blades to be faulted	
Symptom: While diag is running on port blade, toggle slider on core blade can trigger busy buff stuck with traffic issue on blade or blade fault.	
Probability: Low	
Feature: FOS Software	Function: ASIC Driver
Reported In Release: FOS6.4.2	Service Request ID: 761781

Defect ID: DEFECT000415165	Technical Severity: Medium
Summary: A fast FLOGI frame comes in before the port state has changed to AC (Active online) caused various switch problems.	
Symptom: In a mainframe setup, many Nport are bounced at the same time and some hosts cannot see storage.	
Workaround: Bounce the Fport using portdisable and then portenable to recover.	
Probability: Low	
Feature: FOS Software	Function: Fabric Services
Reported In Release: FOS6.4.2	Service Request ID: SR 763577

Defect ID: DEFECT000415731	Technical Severity: High
Summary: Detected termination of process cnmd panic when executing security scans against directors	
Symptom: Switch panics when being aggressively scanned by security software	
Probability: High	
Feature: Data Security	Function: Encryption Group
Reported In Release: FOS7.1.0	

Defect ID: DEFECT000415797	Technical Severity: High
Summary: Portperfshow shows 8.4g of traffic on a 8G F-port that have no traffic on it.	
Symptom: portppperfshow displays one F-Port showing 8.5g of traffic but portstatshow and slotstatshow do not and the total field for the slot does not match actual total.	
Probability: Low	
Feature: Port Statistics	Function: Other
Reported In Release: FOS7.1.0	

Defect ID: DEFECT000420758	Technical Severity: High
Summary: Upgrade to FOS v6.4.3x/v7.0.2x/7.0.1a or later is resulting in errors on ports that have media validation issues	
Symptom: After upgrade, ENC, CRC and other errors occurred on some ports. ISL ports were affected to the point of causing fabric interruption. No errors were noted prior to the upgrade.	
Workaround: User will have to run sfpslow -f <port#> and then portdisable/portenable to recover.	
Probability: Low	
Feature: System Controls/EM	Function: PCI/I2C
Reported In Release: FOS6.4.3	Service Request ID: 1032635