Fabric OS

MIB Reference Manual

Supporting Fabric OS v3.1.x, v3.2.x, v4.1.x, v4.2.x, v4.4.x

Supporting SilkWorm 3016, 3200, 3250, 3800, 3850, 3900, 4100, 12000, 24000

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Document History

The following table lists all versions of the *Fabric OS MIB Reference Manual*.

Document Title	Publication Number	Summary of Changes	Publication Date
Brocade MIB Reference Manual v2.3	53-0000069-02		December 2000
Brocade MIB Reference Manual v3.0	53-0000134-03		July 2001
Brocade MIB Reference Manual v3.0, 4.0	53-0000184-02		March 2002
Brocade MIB Reference Manual (v4.1, v4.0.x, v3.1, v3.0.x, v2.6.x)	53-0000521-02	Added Brocade-specific Entity and HA-MIBs.	April 2003
Brocade MIB Reference Manual (v4.1.2, v4.1, v4.0.x, v3.1, v3.0.x, v2.6.x)	53-0000521-03	Added FICON information.	May 2003
Brocade MIB Reference Manual (v4.1.2, v4.1, v4.0.x, v3.1, v3.0.x, v2.6.x)	53-0000521-04	Revised FICON information.	October 2003
Brocade MIB Reference Manual (v4.2.0, v4.1.2, v4.1, v4.0.x, v3.1, v3.0.x, v2.6.x)	53-0000521-06	Update to support the SilkWorm 3250, 3850, and 24000 switches.	December 2003
Brocade Fabric OS MIB Reference Manual	53-0000521-08	Updated to support the SilkWorm 4100.	September 2004

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About This Document

This document is a reference manual written for SNMP administrators to help configure and administer the SNMP interface to manage a fabric. “About This Document” contains the following sections:

- “How This Document Is Organized,” next
- “Supported Hardware and Software” on page xii
- “What’s New in This Document” on page xii
- “Document Conventions” on page xiii
- “Additional Information” on page xiv
- “Getting Technical Help” on page xv
- “Document Feedback” on page xvi

How This Document Is Organized

This document is organized to help you find the particular information that you want as quickly and easily as possible.

The document contains the following components:

- Chapter 1, “Understanding Brocade SNMP” provides an introduction to Brocade SNMP and MIBs.
- Chapter 2, “MIB-II (RFC1213-MIB)” provides information for MIB-II.
- Chapter 3, “FE MIB Objects” provides information for FE MIB object types.
- Chapter 4, “Entity MIB Objects” provides information for Entity MIB object types.
- Chapter 5, “SW-MIB Objects” provides information for FC Switch MIB (SW-MIB) object types.
- Chapter 6, “High-Availability MIB Objects” provides information for High-Availability MIB object types.
- Chapter 7, “FICON MIB Objects” provides information for FICON MIB (LINK-INCIDENT-MIB) object types.
- Chapter 8, “FibreAlliance MIB Objects” provides information for FibreAlliance MIB (FCMGMT-MIB) object types.
- Appendix A, “MIB Object Groupings” is a function-based listing of MIB objects.
- Appendix B, “MIB OIDs and Their Matching Object Names” provides a listing of the MIB object names and the corresponding MIB Object ID (OID) associated with each.
- The glossary defines both terms specific to Brocade technology and common industry terms with uses specific to Brocade technology.
- The index points you to the exact pages on which specific information is located.

Supported Hardware and Software

This document supports Brocade Fabric OS versions Fabric OS v3.1.x, v3.2.x, v4.1.x, v4.2.x, and v4.4.0 and all switches supporting these Fabric OS versions, including:

- Brocade SilkWorm 3016 switch
- Brocade SilkWorm 3200 switch
- Brocade SilkWorm 3250 switch
- Brocade SilkWorm 3800 switch
- Brocade SilkWorm 3850 switch
- Brocade SilkWorm 3900 switch
- Brocade SilkWorm 4100 switch
- Brocade SilkWorm 12000 director
- Brocade SilkWorm 24000 director

Although many different software and hardware configurations are tested and supported by Brocade Communications Systems, Inc. for the Fabric OS v4.4.0 release, documenting all possible configurations and scenarios is beyond the scope of this document. This document supports only the Fabric OS versions and switches listed above.

What's New in This Document

The following changes have been made since this document was last released:

- Information that was changed:
  - Port-related tables have been modified to support 4 Gbit/sec traffic.
  - FRU and Sensor Tables have been modified to support the SilkWorm 4100.
  - Performance Monitor sections have been modified to support the SilkWorm 4100 and its new ASIC. The primary change is the support for 12 monitors per port and 256 end-to-end monitors per ASIC on the SilkWorm 4100.
  - Trunking sections have been modified to support the SilkWorm 4100 and its new ASIC. The primary change is the support for 8 ports per trunk and dynamic trunk master (masterless trunking).
  - Changes to support the new RASLog feature, which has changed the format of error messages on the system.

Document Conventions

This section describes text formatting conventions and important notices formats.

Text Formatting

The narrative-text formatting conventions that are used in this document are as follows:

bold text	Identifies command names Identifies GUI elements Identifies keywords and operands Identifies text to enter at the GUI or CLI
italic text	Provides emphasis Identifies variables Identifies paths and Internet addresses Identifies document titles
`code` text	Identifies CLI output Identifies syntax examples

For readability, command names in the narrative portions of this guide are presented in mixed lettercase: for example, **switchShow**. In actual examples, command lettercase is often all lowercase. Otherwise, this manual specifically notes those cases in which a command is case sensitive.

Notes, Cautions, and Warnings

The following notices appear in this document.

Note
A note provides a tip, emphasizes important information, or provides a reference to related information.

Caution
A caution alerts you to potential damage to hardware, firmware, software, or data.

Warning
A warning alerts you to potential danger to personnel.

Special Term Uses

For definitions of SAN-specific terms, visit the Storage Networking Industry Association online dictionary at *http://www.snia.org/education/dictionary.*

Additional Information

This section lists additional Brocade and industry-specific documentation that you might find helpful.

Brocade Resources

The following related documentation is provided on the Brocade Documentation CD-ROM and on the Brocade Web site, through Brocade Connect.

Note

Go to *http://www.brocade.com* and click **Brocade Connect** to register at no cost for a user ID and password.

Fabric OS

- *Brocade Fabric OS Features Guide*
- *Brocade Fabric OS Procedures Guide*
- *Brocade Fabric OS Command Reference Manual*
- *Brocade Fabric OS System Error Message Reference Manual*

Fabric OS Optional Features

- *Brocade Advanced Web Tools Administrator's Guide*
- *Brocade Fabric Watch User's Guide*
- *Brocade Secure Fabric OS User's Guide*
- *Brocade Secure Fabric OS QuickStart Guide*

For practical discussions about SAN design, implementation, and maintenance, you can obtain *Building SANs with Brocade Fabric Switches* through:

http://www.amazon.com

For additional Brocade documentation, visit the Brocade SAN Info Center and click the Resource Library location:

http://www.brocade.com

Release notes are available on the Brocade Connect Web site and are also bundled with the Fabric OS firmware.

Other Industry Resources

For additional resource information, visit the Technical Committee T11 Web site. This Web site provides interface standards for high-performance and mass storage applications for Fibre Channel, storage management, as well as other applications:

http://www.t11.org

For information about the Fibre Channel industry, visit the Fibre Channel Industry Association Web site:

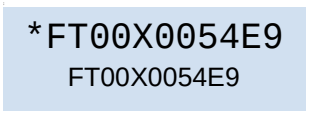
http://www.fibrechannel.org

Getting Technical Help

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

1. **General Information**
   - Technical Support contract number, if applicable
   - Switch model
   - Switch operating system version
   - Error numbers and messages received
   - **supportSave** command output
   - Detailed description of the problem and specific questions
   - Description of any troubleshooting steps already performed and results
2. **Switch Serial Number**

   The switch serial number and corresponding bar code are provided on the serial number label, as shown here:

   The serial number label is located as follows:

   - *SilkWorm 3016 switch:* Side of chassis.
   - *SilkWorm 3200 and 3800 switches:* Back of chassis.
   - *SilkWorm 3250, 3850, and 3900 switches*: Bottom of chassis.
   - *SilkWorm 4100 switches:* On the switch ID pull-out tab located on the port side and on the inside of the chassis, near power supply 1 (on the right when looking at the nonport side).
   - *SilkWorm 12000 and 24000 directors:* Inside the front of the chassis, on the wall to the left of the ports.

3. **World Wide Name (WWN)**

   - *SilkWorm 3016, 3250, 3850, 3900, and 4100 switches and SilkWorm 12000 and 24000 directors:* Provide the license ID. Use the **licenseIDShow** command to display the license ID.
   - *All other SilkWorm switches:* Provide the switch WWN. Use the **wwn** command to display the switch WWN.

Document Feedback

Because quality is our first concern at Brocade, we have made every effort to ensure the accuracy and completeness of this document. However, if you find an error or an omission, or you think that a topic needs further development, we want to hear from you. Forward your feedback to *documentation@brocade.com*. Provide the title and version number and as much detail as possible about your issue, including the topic heading and page number and your suggestions for improvement.

Understanding Brocade SNMP

Chapter 1

The Simple Network Management Protocol (SNMP) is an industry standard method for monitoring and managing network devices. This protocol promotes interoperability, as SNMP-capable systems must adhere to a common set of framework and language rules. Understanding the components of SNMP make it possible to use third-party tools to view, browse, and manipulate Brocade switch variables (MIBs) remotely as well as set up an enterprise-level management process. Every Brocade switch supports SNMP.

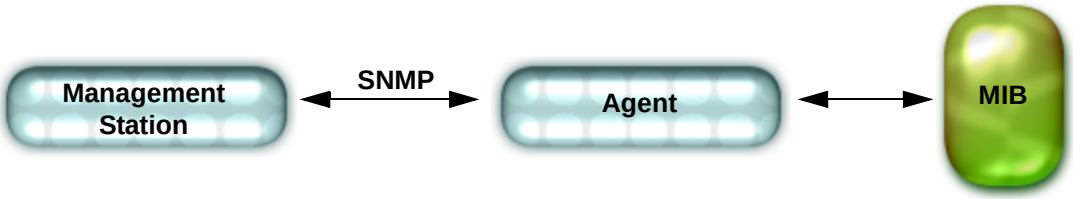
This chapter discusses the following:

- "Understanding SNMP Basics," next
- "Loading Brocade MIBs" on page 1-4

Understanding SNMP Basics

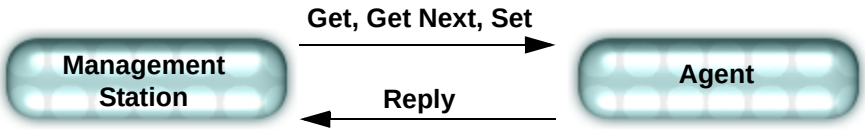
Every Brocade SilkWorm switch carries an *agent* and management information base (MIB), as illustrated in Figure 1-1. The agent accesses information about a device and makes it available to a network management station.

Figure 1-1 SNMP Structure



When active, the management station can **get** information or **set** information when it queries an agent. The **get**, **getnext**, and **set** commands are sent from the management station, and the agent replies once the value is obtained or modified (see Figure 1-2). Agents use variables to report such data as the number of bytes and packets in and out of the device, or the number of broadcast messages sent and received. These variables are also known as *managed objects*. All managed objects are contained in the MIB.

Figure 1-2 SNMP Query

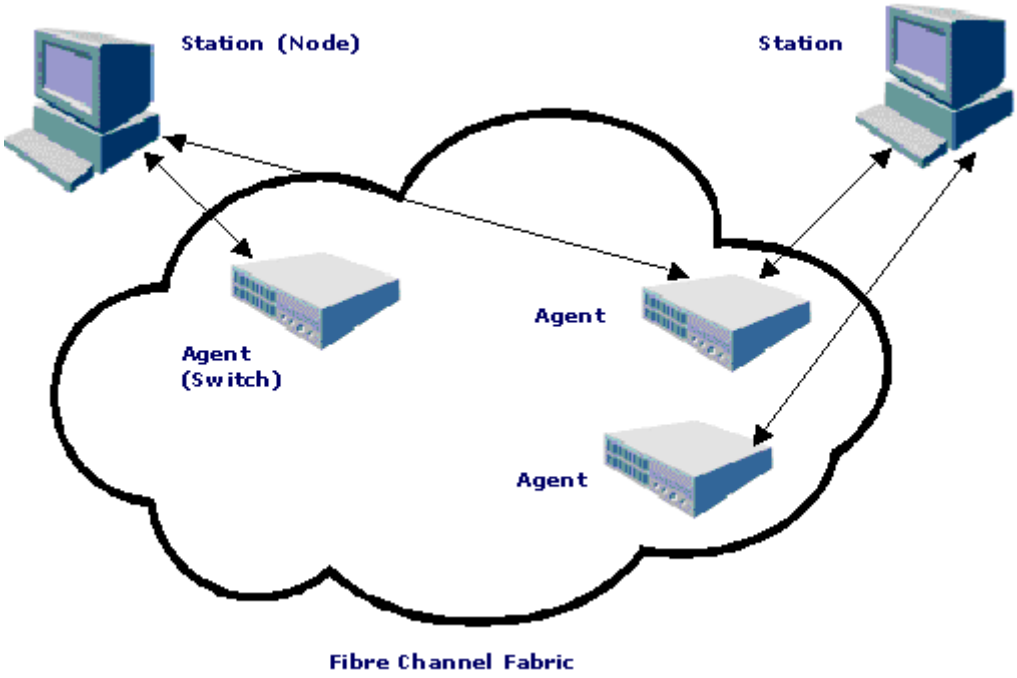


When passive, the management station receives an unsolicited message (trap) from the switch agent if an unusual event occurs. Refer to *Traps* on page 1-4 for more information.

Figure 1-3 SNMP Trap

The agent can receive queries from one or more management stations and can send traps to up to *six* management stations.

Figure 1-4 Fibre Channel SAN

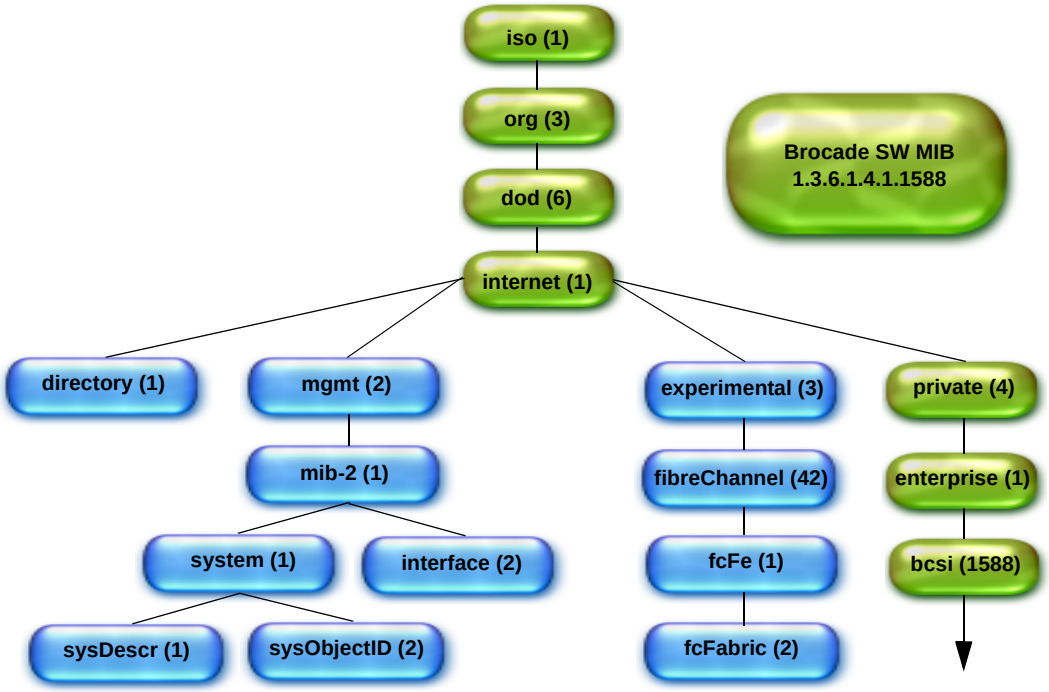


Understanding MIBs

The MIB structure can be represented by a tree hierarchy. The root splits into three main *branches*: International Organization for Standardization (ISO), Consultative Committee for International Telegraph and Telephone (CCITT), and joint ISO/CCITT. These branches and their *leaves* have short text strings and integers to identify them. Text strings describe *object names*, while integers allow software to create compact, encoded representations of the names.

Each MIB variable is assigned an *object identifier* (OID). The OID is the sequence of numeric labels on the nodes along a path from the root to the object. For example, as shown in Figure 1-5, the Brocade SW.MIB OID is *1.3.6.1.4.1.1588*, the corresponding name is *iso.org.dod.internet.private.enterprise.bsci*. The other branches are part of the standard MIBs, and the portions relevant to configuring SNMP on a Brocade switch are referenced in the remainder of this manual.

Figure 1-5 Brocade MIB Tree Location



Use a MIB browser to access the MIB variables; all MIB browsers perform queries and load MIBs.

Since different vendors vary the information in their private enterprise MIBs, it is necessary to verify their information. The Fibre Channel MIB standards dictate certain information be included in all MIBs, it is the vendors responsibility to follow the standards. The standards are:

- *FibreAlliance* (FA) MIB: Brocade supports version 3.0.
- *Fabric Element* (FE) MIB: accepted by the Internet Engineering Task Force (IETF).

  Brocade supports FE_RCF2837.mib under the MIB-II branch in Fabric OS v4.x, 3.2.0, and v3.1.x and the experimental version, FE_EXP.mib, in Fabric OS v2.6.x and 3.0.x. This latest version of the FE MIB references the FRAMEWORK.MIB and, based on the MIB browser, it is necessary to load this MIB before the FE.MIB. Refer to *Loading Brocade MIBs* on page 1-4 for more information.

Once loaded, the MAX-ACCESS provides access levels between the agent and management station. The access levels are as follows:

- not-accessible
  You cannot read or write to this variable.
- read-create
  Specifies a tabular object that can be read, modified, or created as a new row in a table.
- read-only - *Public*
  You can only monitor information.
- read-write - *Private*
  You can read or modify this variable.

Traps

An unsolicited message that comes to the management station from the SNMP agent on the device is called a *trap*. Brocade switches send traps out on UDP port 162 only.

For more information on Brocade MIB Traps refer to "sw Traps" on page 5-9.

Loading Brocade MIBs

The Brocade MIB is a set of variables that are private extensions to the Internet standard MIB-II. The MIB-II standard is documented in Request for Comment (RFC) 1213, *Management Information Base for Network Management of TCP/IP-based Internets: MIB-II*. The Brocade agents support many other Internet-standard MIBs. These standard MIBs are defined in RFC publications. To find specific MIB information, examine the Brocade propriety MIB structure and the standard RFC MIBs supported by Brocade.

This section describes the requirements and dependencies when loading MIBs. Sections include:

- "Before Loading MIBs," next
- "MIB Loading Order" on page 1-4

Before Loading MIBs

Before loading Brocade MIB files, ensure you have the correct version of SNMP for your Fabric OS version (refer to Table 1-1).

Table 1-1 Fabric OS Supported SNMP Versions

Fabric OS	SNMPv1	SNMPv2	SNMPv3
v2.6.2 and previous	Yes	Yes[1]	No
v3.2.0 and previous	Yes	Yes[1]	No
v4.2.0 and previous	Yes	No	No
v4.4.0	Yes	Yes[1]	Yes[2]

Note

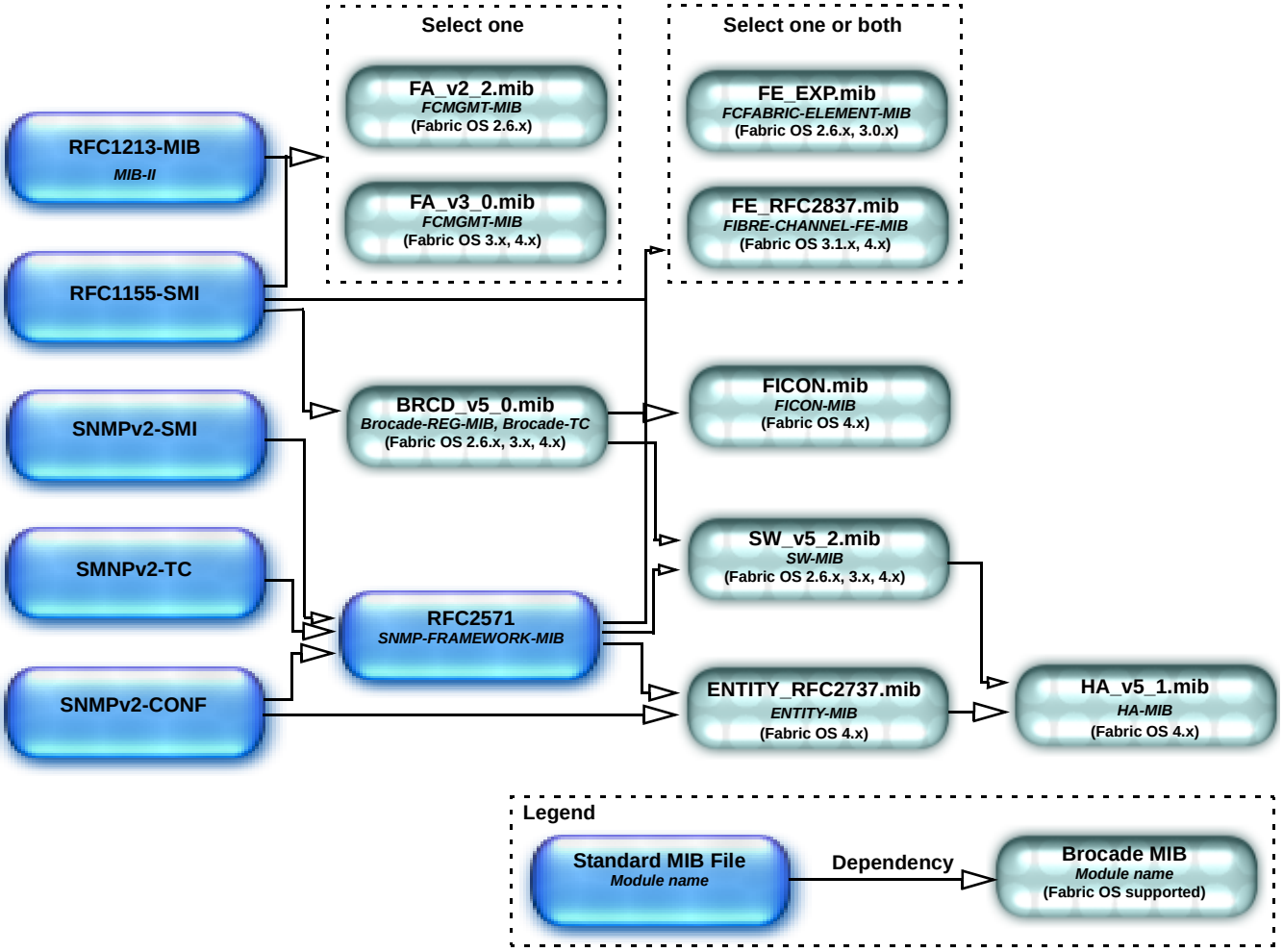
[1] The corresponding Fabric OS has SNMPv2 capabilities, but it is not officially supported by Brocade.

[2] Fabric OS v4.4.0 supports SNMPv3-USM (snmpUsmMIB) MIB, which is available as RFC3414.

MIB Loading Order

Many MIBs use definitions that are defined in other MIBs. These definitions are listed in the IMPORTS sections near the top of the MIB. When loading the Brocade MIBs, see Figure 1-6 to ensure any MIB dependencies are loading in the correct order.

Figure 1-6 Brocade SNMP MIB Dependencies and Advised Installation Order



Note: The FA_v3_0.mib obsoletes the use of the connUnitPortStatFabricTable used in the FA_v2_2.mib. It now uses the connUnitPortStatTable for port statistics. The FA_v3_0.mib and the FA_v2_2.mib cannot be loaded concurrently on the same SNMP management system.

The FE_RFC2837.mib and the FE_EXP.mib can be loaded concurrently on the same SNMP management system. The FE_EXP.mib was listed in the experimental OID section. The FE_RFC2837.mib has subsequently been ratified by the standards organizations.

All Fabric OSs support SNMPv1. Fabric v2.6.x and v3.2.x partially support SNMPv2, but not v4.x. Fabric OS v4.4.0 supports SNMPv3-USM (snmpUsmMIB) MIB.

Brocade MIB Files

The following Brocade MIBs can be found in a "mibs" subdirectory after uncompressing the v4.4.0 firmware file.

- BRCD_v5_0.mib
- SW_v5_2.mib
- HA_v5_1.mib
- FICON_v5_0.mib
- FA_v3_0.mib
- ENTITY_RFC2737.mib
- FE_RFC2837.mib

Unsupported SilkWorm 4100 Features in the MIB

The current version of the MIB does not support the following SilkWorm 4100 features:

- Routing policy management
- Buffer credit management, including degraded ports and enable/disable of buffer-credit sharing
- Ports on Demand license

Fabric OS Commands for Configuring SNMP

Use the following commands to configure MIBs in the Fabric OS. Refer to the *Fabric OS Procedures Guide* for on procedures on configuring SNMP on the SilkWorm switches.

Table 1-2 Commands for Configuring SNMP

Command	Description
snmpConfig	Introduced in Fabric OS v4.4, this command has all the features of existing the agtcfg* commands and in addition it has SNMPv3 configuration parameters.
snmpMibCapSet	Enhanced in Fabric OS v4.4 to provide a filter facility at the trap level (previously the filter facility was at MIB level for traps).
snmpMibCapShow	Displays the settings in the **snmpMibCapSet** command.
agtcfgDefault	Resets the traps to the default values. This command is retained for legacy reasons, but is replaced functionally by the **snmpConfig** command.
agtcfgSet	Used to set the trap values for SNMP. This command is retained for legacy reasons, but is replaced functionally by the **snmpMibCapSet** command.
agtcfgShow	Used to display the configuration of the SNMP values. This command is retained for legacy reasons, but is replaced functionally by the **snmpMibCapShow** command.

MIB-II (RFC1213-MIB)

Chapter 2

This chapter provides descriptions and other information specific to MIB-II, including the following sections:

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MIB II Overview

The descriptions of each of the MIB variables in this chapter come directly from the MIB-II itself. The notes that follow the descriptions typically pertain to Brocade-specific information and are provided by Brocade.

The objects in MIB-II are organized into the following groups:

- *System Group*
- *Interfaces Group*
- *Address Translation Group*
- *IP Group*
- *ICMP Group*
- *TCP Group*
- *UDP Group*
- *EGP Group*
- *Transmission Group*
- *SNMP Group*

MIB-II Object Hierarchy

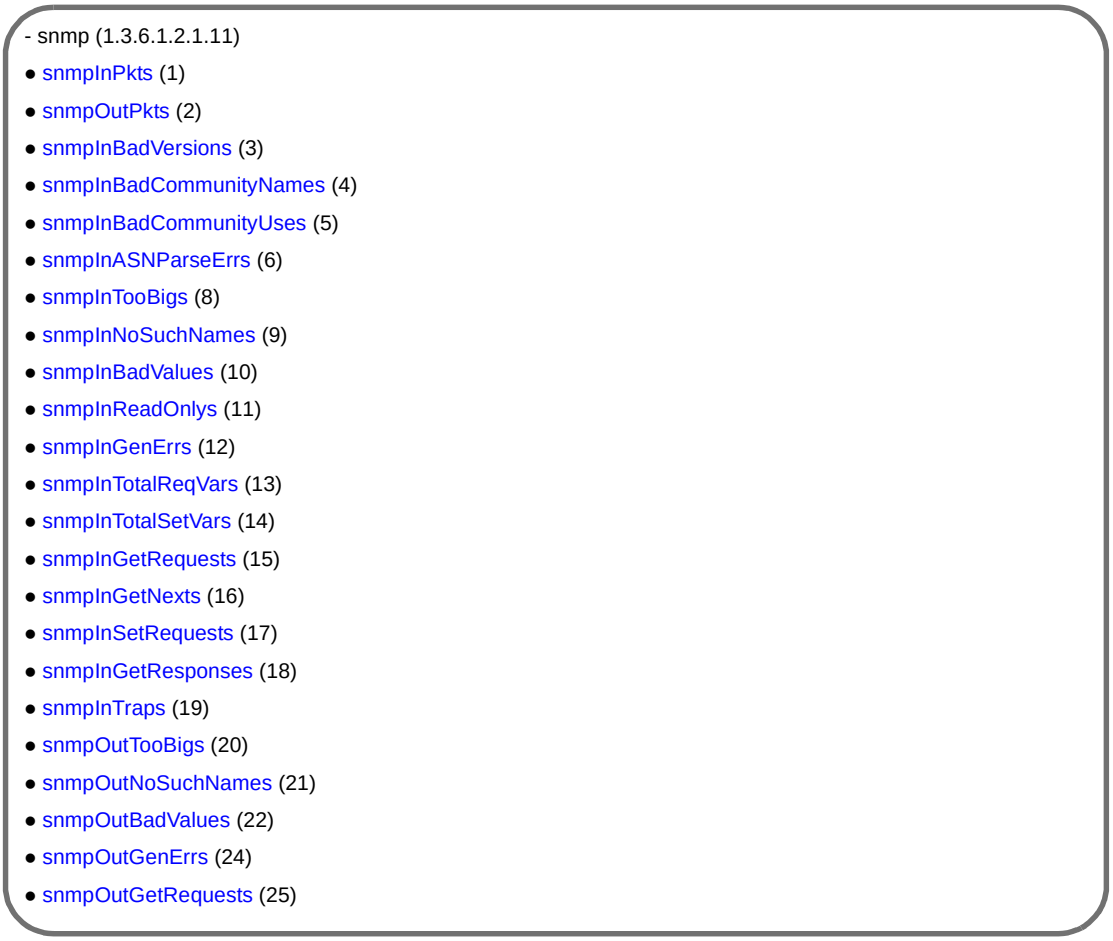
Figure 2-1 through Figure 2-4 depict the organization and structure of MIB-II.

Figure 2-1 MIB-II Overall Tree Structure

Figure 2-2 Tree Structure for MIB-II System, Interfaces, AT, and IP Groups

Figure 2-3 Tree Structure for MIB-II ICMP, TCP, UDP, and EGP Groups

Figure 2-4 Tree Structure for MIB-II SNMP Group



Textual Conventions

Table 2-1 lists the textual conventions used for MIB-II.

Table 2-1 MIB-II Textual Conventions

Type Definition	Value
DisplayString	Octet String of size 0 to 255
PhysAddress	Octet String

Objects and Types Imported

The following objects and types are imported from RFC1155-SMI:

- mgmt
- NetworkAddress

- IpAddress
- Counter
- Gauge
- TimeTicks

System Group

All systems must implement the System Group. If an agent is not configured to have a value for any of the System Group variables, a string of length 0 is returned.

sysDescr

OID	1.3.6.1.2.1.1.1
Description	A textual description of the entity.
Note	This value should include the full name and version identification of the hardware type, software operating system, and networking software. This must contain only printable ASCII characters. Default Value = Fibre Channel Switch. Set this value using the **agtCfgSet** telnet command.

sysObjectID

OID	1.3.6.1.2.1.1.2
Description	The vendor’s authoritative identification of the network management subsystem contained in the entity.
Note	This value is allocated within the SMI enterprises subtree (1.3.6.1.4.1) and provides an easy and unambiguous means for determining what kind of device is being managed. For example, if a vendor “NetYarn, Inc.” was assigned the subtree 1.3.6.1.4.1.4242, it could assign the identifier 1.3.6.1.4.1.4242.1.1 to its “Knit Router”. Default value = iso.org.dod.internet.private.enterprises.bcsi.commDev.fibrechannel.fcSwitch.sw

sysUpTime

OID	1.3.6.1.2.1.1.3
Description	The time (in hundredths of a second) since the network management portion of the system was last reinitialized.

sysContact

OID	1.3.6.1.2.1.1.4

Description The textual identification of the contact person for this managed node, together with information on how to contact this person.

Note Default value = Field Support. Set this value using the **agtCfgSet** telnet command.

sysName

OID 1.3.6.1.2.1.1.5

Description An administratively assigned name for this managed node. By convention, this is the node's fully qualified domain name.

Note Default value = *preassigned name of the switch.*

sysLocation

OID 1.3.6.1.2.1.1.6

Description The physical location of this node (for example, telephone closet, 3rd floor).

Note Default value = End User Premise. Set this value using the **agtCfgSet** telnet command.

sysServices

OID 1.3.6.1.2.1.1.7

Description A value that indicates the set of services that this entity primarily offers.

The value is a sum. This sum initially takes the value 0. Then, for each layer, L, in the range 1 through 7, for which this node performs transactions, 2 raised to (L - 1) is added to the sum. For example, a node that primarily performs routing functions has a value of 4 (2^{3-1}). In contrast, a node that is a host and offers application services has a value of 72 ($2^{4-1} + 2^{7-1}$). Note that in the context of the Internet suite of protocols, values should be calculated accordingly:

Layer functionality
1 = physical (for example, repeaters)
2 = datalink/subnetwork (for example, bridges)
3 = internet (for example, IP gateways)
4 = end-to-end (for example, IP hosts)
7 = applications (for example, mail relays)

Note For systems including OSI protocols, layers 5 and 6 also can be counted. The return value is always 79.

Interfaces Group

Implementation of the Interfaces group is mandatory for all systems.

ifNumber

OID 1.3.6.1.2.1.2.1

Description	The number of network interfaces (regardless of their current state) present on this system.
Note	The return value is 5 for the SilkWorm 24000 (single domain), 7 for SilkWorm 12000 or the SilkWorm 240000 (dual-domain). All non-bladed systems will have a value of 3.

Interfaces Table

The Interfaces table contains information on the entity's interfaces. Each interface is thought of as being attached to a subnetwork. Note that this term should not be confused with *subnet*, which refers to an addressing partitioning scheme used in the Internet suite of protocols.

ifTable

OID	1.3.6.1.2.1.2.2
Description	A list of interface entries. The number of entries is given by the value of ifNumber.

ifEntry

OID	1.3.6.1.2.1.2.2.1
Description	An interface entry containing objects at the subnetwork layer and below, for a particular interface.
Index	ifIndex

ifIndex

OID	1.3.6.1.2.1.2.2.1.1
Description	A unique value for each interface.
Note	The values range between 1 and the value of ifNumber. The value for each interface must remain constant, at least from one reinitialization of the entity's network management system to the next reinitialization. For example, the number of entries inside the SilkWorm 12000 and 24000 switches is 1 to 3 for FCIP; otherwise, the value is 1 or 2.

ifDescr

OID	1.3.6.1.2.1.2.2.1.2
Description	A textual string containing information about the interface.
Note	The ifDescr for non-bladed switches includes: lo, eth0, and fc0. The ifDescr for SilkWorm 12000 and 24000 switches includes: lo, eth0, and fc0, as well as fc1, eth0:1, and eth0:2.

ifType

OID	1.3.6.1.2.1.2.2.1.3
Description	The type of interface, designated by the physical/link protocol(s) immediately below the network layer in the protocol stack.
Note	eth0 maps to 6 (Ethernet-csmacd). lo0 maps to 24 (softwareLoopback). fc0 maps to 56.

ifMtu

OID	1.3.6.1.2.1.2.2.1.4
Description	The size of the largest datagram that can be sent/received on the interface, specified in octets.
Note	For interfaces that are used to transmit network datagrams, the value is the size of the largest network datagram that can be sent on the interface (these values are different for Fabric OS v4.x). fei0 returns 1500. lo0 returns 3904. fc0 returns 2024.

ifSpeed

OID	1.3.6.1.2.1.2.2.1.5
Description	An estimate (in bits per second) of the interface's current bandwidth.
Note	For interfaces that do not vary in bandwidth or interfaces for which no accurate estimation can be made, this object should contain the nominal bandwidth. For Fabric OS v4.x, 2 Gbit/sec returns. fei0 returns 10^7. lo0 returns 0. fc0 returns 10^9.

ifPhysAddress

OID	1.3.6.1.2.1.2.2.1.6
Description	The interface's address at the protocol layer immediately below the network layer in the protocol stack.
Note	For interfaces that do not have such an address (for example, a serial line), this object should contain an octet string of zero length. fei0 returns MAC address of the Ethernet. lo0 returns null. fc0 returns MAC address of the Fibre Channel.

ifAdminStatus

OID 1.3.6.1.2.1.2.2.1.7

Description The desired state of the interface.

Note The 3 state (testing) indicates that no operational packets can be passed. This object is read-only in Fabric OS v4.x.

ifOperStatus

OID 1.3.6.1.2.1.2.2.1.8

Description The current operational state of the interface.

Note The 3 state (testing) indicates that no operational packets can be passed.

ifLastChange

OID 1.3.6.1.2.1.2.2.1.9

Description The value of sysUpTime at the time the interface entered its current operational state. If the current state was entered prior to the last re-initialization of the local network management subsystem, then this object contains a zero value.

ifInOctets

OID 1.3.6.1.2.1.2.2.1.10

Description The total number of octets received on the interface, including framing characters.

ifInUcastPkts

OID 1.3.6.1.2.1.2.2.1.11

Description The number of subnetwork-unicast packets delivered to a higher-layer protocol.

ifInNUcastPkts

OID 1.3.6.1.2.1.2.2.1.12

Description The number of nonunicast packets (for example, subnetwork-broadcast or subnetwork-multicast) delivered to a higher-layer protocol.

ifInDiscards

OID 1.3.6.1.2.1.2.2.1.13

Description The number of inbound packets that were chosen to be discarded (even though no errors had been detected) to prevent their being deliverable to a higher-layer protocol.

Note One possible reason for discarding such a packet could be to free buffer space.

ifInErrors

OID 1.3.6.1.2.1.2.2.1.14

Description The number of inbound packets that contained errors, which thereby prevented them from being deliverable to a higher-layer protocol.

ifInUnknownProtos

OID 1.3.6.1.2.1.2.2.1.15

Description The number of packets received by way of the interface that were discarded because of an unknown or unsupported protocol.

ifOutOctets

OID 1.3.6.1.2.1.2.2.1.16

Description The total number of octets transmitted out of the interface, including framing characters.

ifOutUcastPkts

OID 1.3.6.1.2.1.2.2.1.17

Description The total number of packets that were requested, by higher-level protocols, to be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.

ifOutNUcastPkts

OID 1.3.6.1.2.1.2.2.1.18

Description The total number of packets that were requested, by higher-level protocols, to be transmitted to a nonunicast address (for example, a subnetwork-broadcast or subnetwork-multicast), including those that were discarded or not sent.

ifOutDiscards

OID 1.3.6.1.2.1.2.2.1.19

Description The number of outbound packets that were chosen to be discarded (even though no errors had been detected) to prevent their being transmitted. One possible reason for discarding such a packet could be to free buffer space.

ifOutErrors

OID 1.3.6.1.2.1.2.2.1.20

Description The number of outbound packets that could not be transmitted because of errors.

ifOutQLen

OID 1.3.6.1.2.1.2.2.1.21

Description The length of the output packet queue (in packets).

ifSpecific

OID 1.3.6.1.2.1.2.2.1.22

Description A reference to MIB definitions specific to the particular media being used to realize the interface.

For example, if the interface is realized by an Ethernet, then the value of this object refers to a document defining objects specific to Ethernet. If this information is not present, its value should be set to the Object Identifier 0 0, which is a syntactically valid object identifier, and any conferment implementation of ASN.1 and BER must be able to generate and recognize this value.

Note fei0 returns null OID.

lo0 returns null OID.

fc0 returns null OID.

Address Translation Group

Implementation of the Address Translation group is mandatory for all systems. Note, however, that this group is deprecated by MIB-II. From MIB-II onward, each network protocol group contains its own address translation tables.

Address Translation Table

The Address Translation group contains one table, which is the union across all interfaces of the translation tables for converting a network address (for example, an IP address) into a subnetwork-specific address. For lack of a better term, this document refers to such a subnetwork-specific address as a *physical address*.

For example, for broadcast media, where ARP is in use, the translation table is equivalent to the ARP cache; on an X.25 network, where nonalgorithmic translation to X.121 addresses is required, the translation table contains the network address to X.121 address equivalences.

atTable

OID 1.3.6.1.2.1.3.1

Description The Address Translation tables contain the network address to physical address equivalences. Some interfaces do not use translation tables for determining address equivalences (for example, DDN-X.25 has an algorithmic method); if all interfaces are of this type, then the Address Translation table is empty.

atEntry

OID 1.3.6.1.2.1.3.1.1

Description Each entry contains one network address to physical address equivalence.

Index atIfIndex, atNetAddress

atIfIndex

OID 1.3.6.1.2.1.3.1.1.1

Description The interface on which this entry's equivalence is effective. The interface identified by a particular value of this index is the same interface as identified by the same value of ifIndex.

atPhysAddress

OID 1.3.6.1.2.1.3.1.1.2

Description The media-dependent physical address.

atNetAddress

OID 1.3.6.1.2.1.3.1.1.3

Description The network address (for example, the IP address) corresponding to the media-dependent physical address.

IP Group

Implementation of the IP group is mandatory for all systems.

ipForwarding

OID 1.3.6.1.2.1.4.1

Description The indication of whether this entity is acting as an IP gateway in respect to the forwarding of datagrams received by, but not addressed to, this entity. IP gateways forward datagrams; IP hosts do not (except those source-routed through the host).

ipDefaultTTL

OID 1.3.6.1.2.1.4.2

Description The default value inserted into the time-to-live field of the IP header of datagrams originated at this entity, whenever a TTL value is not supplied by the transport layer protocol.

ipInReceives

OID 1.3.6.1.2.1.4.3

Description The total number of input datagrams received from interfaces, including those received in error.

ipInHdrErrors

OID 1.3.6.1.2.1.4.4

Description The number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, and so on.

ipInAddrErrors

OID 1.3.6.1.2.1.4.5

Description The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity. This count includes invalid addresses (for example, 0.0.0.0) and addresses of unsupported classes (for example, Class E). For entities that are not IP gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.

ipForwDatagrams

OID 1.3.6.1.2.1.4.6

Description The number of input datagrams for which this entity was not final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities that do not act as IP gateways, this counter includes only those packets that were source-routed through this entity, and the Source-Route option processing was successful.

ipInUnknownProtos

OID 1.3.6.1.2.1.4.7

Description The number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.

ipInDiscards

OID 1.3.6.1.2.1.4.8

Description The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (for example, for lack of buffer space).

Note This counter does not include any datagrams discarded while awaiting reassembly.

ipInDelivers

OID 1.3.6.1.2.1.4.9

Description The total number of input datagrams successfully delivered to IP user protocols (including ICMP).

ipOutRequests

OID 1.3.6.1.2.1.4.10

Description The total number of IP datagrams that local IP user protocols (including ICMP) supplied to IP in requests for transmission. Note that this counter does not include any datagrams counted in ipForwDatagrams.

ipOutDiscards

OID 1.3.6.1.2.1.4.11

Description The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (for example, for lack of buffer space).

Note This counter would include datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion.

ipOutNoRoutes

OID 1.3.6.1.2.1.4.12

Description The number of IP datagrams discarded because no route could be found to transmit them to their destination.

Note This counter includes any packets counted in ipForwDatagrams that meet this “no-route” criterion. Note that this includes any datagrams that a host cannot route because all of its default gateways are down.

ipReasmTimeout

OID 1.3.6.1.2.1.4.13

Description The maximum number of seconds that received fragments are held while they are awaiting reassembly at this entity.

ipReasmReqds

OID 1.3.6.1.2.1.4.14

Description The number of IP fragments received that needed to be reassembled at this entity.

ipReasmOKs

OID 1.3.6.1.2.1.4.15

Description The number of IP datagrams successfully reassembled.

ipReasmFails

OID 1.3.6.1.2.1.4.16

Description The number of failures detected by the IP reassembly algorithm (for whatever reason: timed out, errors, and so on).

Note This is not necessarily a count of discarded IP fragments, because some algorithms (notably the algorithm in RFC 815) can lose track of the number of fragments by combining them as they are received.

ipFragOKs

OID 1.3.6.1.2.1.4.17

Description The number of IP datagrams that have been successfully fragmented at this entity.

ipFragFails

OID 1.3.6.1.2.1.4.18

Description The number of IP datagrams that have been discarded because they needed to be fragmented at this entity but could not be (for example, because their Don't Fragment flag was set).

ipFragCreates

OID 1.3.6.1.2.1.4.19

Description The number of IP datagram fragments that have been generated as a result of fragmentation at this entity.

IP Address Table

The IP address table contains this entity’s IP addressing information.

ipAddrTable

OID 1.3.6.1.2.1.4.20

Description The table of addressing information relevant to this entity's IP addresses.

ipAddrEntry

OID 1.3.6.1.2.1.4.20.1

Description The addressing information for one of this entity's IP addresses.

Index ipAdEntAddr

ipAdEntAddr

OID 1.3.6.1.2.1.4.20.1.1

Description The IP address to which this entry's addressing information pertains.

ipAdEntIfIndex

OID 1.3.6.1.2.1.4.20.1.2

Description The index value which uniquely identifies the interface to which this entry is applicable. The interface identified by a particular value of this index is the same interface as identified by the same value of ifIndex.

ipAdEntNetMask

OID 1.3.6.1.2.1.4.20.1.3

Description The subnet mask associated with the IP address of this entry. The value of the mask is an IP address with all the network bits set to 1 and all the host bits set to 0.

ipAdEntBcastAddr

OID 1.3.6.1.2.1.4.20.1.4

Description The value of the least-significant bit in the IP broadcast address used for sending datagrams on the (logical) interface associated with the IP address of this entry. For example, when the Internet standard all-ones broadcast address is used, the value will be 1. This value applies to both the subnet and network broadcasts addresses used by the entity on this (logical) interface.

ipAdEntReasmMaxSize

OID 1.3.6.1.2.1.4.20.1.5

Description The size of the largest IP datagram that this entity can reassemble from incoming IP fragmented datagrams received on this interface.

IP Routing Table

The IP routing table contains an entry for each route currently known to this entity.

ipRouteTable

OID 1.3.6.1.2.1.4.21

Description This entity’s IP routing table.

ipRouteEntry

OID 1.3.6.1.2.1.4.21.1

Description	A route to a particular destination.
Index	ipRouteDest

ipRouteDest

OID	1.3.6.1.2.1.4.21.1.1
Description	The destination IP address of this route.
Note	An entry with a value of 0.0.0.0 is considered a default route. Multiple routes to a single destination can appear in the table, but access to such multiple entries is dependent on the table-access mechanisms defined by the network management protocol in use.

ipRouteIfIndex

OID	1.3.6.1.2.1.4.21.1.2
Description	The index value that uniquely identifies the local interface through which the next hop of this route should be reached.
Note	The interface identified by a particular value of this index is the same interface identified by the same value of ifIndex.

ipRouteMetric1

OID	1.3.6.1.2.1.4.21.1.3
Description	The primary routing metric for this route.
Note	The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1.

ipRouteMetric2

OID	1.3.6.1.2.1.4.21.1.4
Description	An alternate routing metric for this route.
Note	The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1.

ipRouteMetric3

OID	1.3.6.1.2.1.4.21.1.5
Description	An alternate routing metric for this route.
Note	The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1.

ipRouteMetric4

OID	1.3.6.1.2.1.4.21.1.6

Description An alternate routing metric for this route.

Note The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1.

ipRouteNextHop

OID 1.3.6.1.2.1.4.21.1.7

Description The IP address of the next hop of this route. (In the case of a route bound to an interface that is realized via a broadcast media, the value of this field is the agent's IP address on that interface.)

ipRouteType

OID 1.3.6.1.2.1.4.21.1.8

Description The type of route. Valid values are:

other (1)	None of the following
invalid (2)	An invalidated route—route to directly
direct (3)	Connected (sub)network—route to a non-local
indirect (4)	Host/network/subnetwork

Setting this object to 2 (invalid) has the effect of invalidating the corresponding entry in the ipRouteTable object. That is, it effectively dissasociates the destination identified with said entry from the route identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive tabular information from agents that corresponds to entries not currently in use. Proper interpretation of such entries requires examination of the relevant ipRouteType object.

Note The values direct (3) and indirect (4) refer to the notion of direct and indirect routing in the IP architecture.

ipRouteProto

OID 1.3.6.1.2.1.4.21.1.9

Description The routing mechanism via which this route was learned.

Note Inclusion of values for gateway routing protocols is not intended to imply that hosts should support those protocols.

ipRouteAge

OID 1.3.6.1.2.1.4.21.1.10

Description The number of seconds since this route was last updated or otherwise determined to be correct.

Note Older semantics cannot be implied except through knowledge of the routing protocol by which the route was learned.

ipRouteMask

OID 1.3.6.1.2.1.4.21.1.11

Description The mask to be logical-ANDed with the destination address before being compared to the value in the ipRouteDest field. For those systems that do not support arbitrary subnet masks, an agent constructs the value of the ipRouteMask by determining whether the value of the correspondent ipRouteDest field belong to a class-A, B, or C network, and then using one of the following:

mask	network
255.0.0.0	class-A
255.255.0.0	class-B
255.255.255.0	class-C

If the value of the ipRouteDest is 0.0.0.0 (default route), then the mask value is also 0.0.0.0.

Note All IP routing subsystems implicitly use this mechanism.

ipRouteMetric5

OID 1.3.6.1.2.1.4.21.1.12

Description An alternate routing metric for this route.

Note The semantics of this metric are determined by the routing protocol specified in the route's ipRouteProto value. If this metric is not used, its value should be set to -1.

ipRouteInfo

OID 1.3.6.1.2.1.4.21.1.13

Description A reference to MIB definitions specific to the particular routing protocol that is responsible for this route, as determined by the value specified in the route's ipRouteProto value. If this information is not present, its value should be set to the Object Identifier { 0 0 }, which is a syntactically valid object identifier; any conferment implementation of ASN.1 and BER must be able to generate and recognize this value.

IP Address Translation Table

The IP address translation table contains the IpAddress to physical address equivalences. Some interfaces do not use translation tables for determining address equivalences.

Example:

DDN-X.25 has an algorithmic method; if all interfaces are of this type, then the Address Translation table is empty.

ipNetToMediaTable

OID 1.3.6.1.2.1.4.22

Description The IP Address Translation table used for mapping from IP addresses to physical addresses.

ipNetToMediaEntry

OID 1.3.6.1.2.1.4.22.1

Description Each entry contains one IpAddress to physical address equivalence.

Index ipNetToMediaIfIndex, ipNetToMediaNetAddress

ipNetToMediaIfIndex

OID 1.3.6.1.2.1.4.22.1.1

Description The interface on which this entry's equivalence is effective.

Note The interface identified by a particular value of this index is the same interface identified by the same value of ifIndex.

ipNetToMediaPhysAddress

OID 1.3.6.1.2.1.4.22.1.2

Description The media-dependent physical address.

ipNetToMediaNetAddress

OID 1.3.6.1.2.1.4.22.1.3

Description The IpAddress corresponding to the media-dependent physical address.

ipNetToMediaType

OID 1.3.6.1.2.1.4.22.1.4

Description The type of mapping.

Additional IP Objects

ipRoutingDiscards

OID 1.3.6.1.2.1.4.23

Description The number of routing entries discarded even though they are valid. One possible reason for discarding such an entry could be to free buffer space for other routing entries.

ICMP Group

Implementation of the ICMP group is mandatory for all systems.

icmpInMsgs

OID 1.3.6.1.2.1.5.1

Description The total number of ICMP messages that the entity received.

Note This counter includes all ICMP messages counted by icmpInErrors.

icmpInErrors

OID 1.3.6.1.2.1.5.2

Description The number of ICMP messages that the entity received but determined to have ICMP-specific errors (bad ICMP checksums, bad length, and so on).

icmpInDestUnreachs

OID 1.3.6.1.2.1.5.3

Description The number of ICMP Destination Unreachable messages received.

icmpInTimeExcds

OID 1.3.6.1.2.1.5.4

Description The number of ICMP Time Exceeded messages received.

icmpInParmProbs

OID 1.3.6.1.2.1.5.5

Description The number of ICMP Parameter Problem messages received.

icmpInSrcQuenchs

OID 1.3.6.1.2.1.5.6

Description The number of ICMP Source Quench messages received.

icmpInRedirects

OID 1.3.6.1.2.1.5.7

Description The number of ICMP Redirect messages received.

icmpInEchos

OID 1.3.6.1.2.1.5.8

Description The number of ICMP Echo (request) messages received.

icmpInEchoReps

OID 1.3.6.1.2.1.5.9

Description The number of ICMP Echo Reply messages received.

icmpInTimestamps

OID 1.3.6.1.2.1.5.10

Description The number of ICMP Timestamp (request) messages received.

icmpInTimestampReps

OID 1.3.6.1.2.1.5.11

Description The number of ICMP Timestamp Reply messages received.

icmpInAddrMasks

OID 1.3.6.1.2.1.5.12

Description The number of ICMP Address Mask Request messages received.

icmpInAddrMaskReps

OID 1.3.6.1.2.1.5.13

Description The number of ICMP Address Mask Reply messages received.

icmpOutMsgs

OID 1.3.6.1.2.1.5.14

Description The total number of ICMP messages that this entity attempted to send.

Note This counter includes all those counted by icmpOutErrors.

icmpOutErrors

OID 1.3.6.1.2.1.5.15

Description The number of ICMP messages that this entity did not send due to problems discovered within ICMP such as a lack of buffers. This value should not include errors discovered outside the ICMP layer such as the inability of IP to route the resultant datagram. In some implementations there might be no types of error that contribute to this counter's value.

icmpOutDestUnreachs

OID 1.3.6.1.2.1.5.16

Description The number of ICMP Destination Unreachable messages sent.

icmpOutTimeExcds

OID 1.3.6.1.2.1.5.17

Description The number of ICMP Time Exceeded messages sent.

icmpOutParmProbs

OID 1.3.6.1.2.1.5.18

Description The number of ICMP Parameter Problem messages sent.

icmpOutSrcQuenchs

OID 1.3.6.1.2.1.5.19

Description The number of ICMP Source Quench messages sent.

icmpOutRedirects

OID 1.3.6.1.2.1.5.20

Description The number of ICMP Redirect messages sent. For a host, this object is always 0, since hosts do not send redirects.

icmpOutEchos

OID 1.3.6.1.2.1.5.21

Description The number of ICMP Echo (request) messages sent.

icmpOutEchoReps

OID 1.3.6.1.2.1.5.22

Description The number of ICMP Echo Reply messages sent.

icmpOutTimestamps

OID 1.3.6.1.2.1.5.23

Description The number of ICMP Timestamp (request) messages sent.

icmpOutTimestampReps

OID 1.3.6.1.2.1.5.24

Description The number of ICMP Timestamp Reply messages sent.

icmpOutAddrMasks

OID 1.3.6.1.2.1.5.25

Description The number of ICMP Address Mask Request messages sent.

icmpOutAddrMaskReps

OID 1.3.6.1.2.1.5.26

Description The number of ICMP Address Mask Reply messages sent.

TCP Group

Implementation of the TCP group is mandatory for all systems that implement the TCP.

Instances of object types that represent information about a particular TCP connection are transient; they persist only as long as the connection in question.

tcpRtoAlgorithm

OID 1.3.6.1.2.1.6.1

Description The algorithm used to determine the time-out value used for retransmitting unacknowledged octets.

tcpRtoMin

OID 1.3.6.1.2.1.6.2

Description The minimum value permitted by a TCP implementation for the retransmission time-out, measured in milliseconds.

Note More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission time-out. In particular, when the time-out algorithm is 3 (rsre), an object of this type has the semantics of the LBOUND quantity described in RFC 793.

tcpRtoMax

OID 1.3.6.1.2.1.6.3

Description The maximum value permitted by a TCP implementation for the retransmission time-out, measured in milliseconds.

Note More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission time-out. In particular, when the time-out algorithm is 3 (rsre), an object of this type has the semantics of the UBOUND quantity described in RFC 793.

tcpMaxConn

OID 1.3.6.1.2.1.6.4

Description The limit on the total number of TCP connections the entity can support. In entities where the maximum number of connections is dynamic, this object should contain the value -1.

tcpActiveOpens

OID 1.3.6.1.2.1.6.5

Description The number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.

tcpPassiveOpens

OID 1.3.6.1.2.1.6.6

Description The number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.

tcpAttemptFails

OID 1.3.6.1.2.1.6.7

Description The number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state.

tcpEstabResets

OID 1.3.6.1.2.1.6.8

Description The number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE-WAIT state.

tcpCurrEstab

OID 1.3.6.1.2.1.6.9

Description The number of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT.

tcpInSegs

OID 1.3.6.1.2.1.6.10

Description The total number of segments received, including those received in error. This count includes segments received on currently established connections.

tcpOutSegs

OID 1.3.6.1.2.1.6.11

Description The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.

tcpRetransSegs

OID 1.3.6.1.2.1.6.12

Description The total number of segments retransmitted; that is, the number of TCP segments transmitted containing one or more previously transmitted octets.

TCP Connection Table

The TCP connection table contains information about this entity's existing TCP connections.

tcpConnTable

OID 1.3.6.1.2.1.6.13

Description A table containing TCP connection-specific information.

tcpConnEntry

OID 1.3.6.1.2.1.6.13.1

Description Information about a particular current TCP connection. An object of this type is transient, in that it ceases to exist when (or soon after) the connection makes the transition to the CLOSED state.

Index tcpConnLocalAddress, tcpConnLocalPort, tcpConnRemAddress, tcpConnRemPort

tcpConnState

OID 1.3.6.1.2.1.6.13.1.1

Description The state of this TCP connection.

The only value that might be set by a management station is deleteTCB (12). Accordingly, it is appropriate for an agent to return a badValue response if a management station attempts to set this object to any other value.

If a management station sets this object to the value delete12 (TCB), then this has the effect of deleting the TCB (as defined in RFC 793) of the corresponding connection on the managed node, resulting in immediate termination of the connection.

As an implementation-specific option, a RST segment might be sent from the managed node to the other TCP endpoint (note, however, that RST segments are not sent reliably).

Possible values are:

closed (1)
listen (2)
synSent (3)
synReceived (4)
established (5)
finWait1 (6)
finWait2 (7)
closeWait (8)
lastAck (9)
closing (10)
timeWait (11)
deleteTCB (12)

Note Fabric OS v3.1.x and v4.x do not allow the SET operation on this variable.

tcpConnLocalAddress

OID 1.3.6.1.2.1.6.13.1.2

Description The local IP address for this TCP connection. In the case of a connection in the listen state that is willing to accept connections for any IP interface associated with the node, the value 0.0.0.0 is used.

tcpConnLocalPort

OID 1.3.6.1.2.1.6.13.1.3

Description The local port number for this TCP connection.

tcpConnRemAddress

OID 1.3.6.1.2.1.6.13.1.4

Description The remote IP address for this TCP connection.

tcpConnRemPort

OID 1.3.6.1.2.1.6.13.1.5

Description The remote port number for this TCP connection.

Additional TCP Objects

tcpInErrs

OID 1.3.6.1.2.1.6.14

Description The total number of segments received in error (for example, bad TCP checksums).

tcpOutRsts

OID 1.3.6.1.2.1.6.15

Description The number of TCP segments sent containing the RST flag.

UDP Group

Implementation of the UDP group is mandatory for all systems that implement the UDP.

udpInDatagrams

OID 1.3.6.1.2.1.7.1

Description The total number of UDP datagrams delivered to UDP users.

udpNoPorts

OID 1.3.6.1.2.1.7.2

Description The total number of received UDP datagrams for which there was no application at the destination port.

udpInErrors

OID 1.3.6.1.2.1.7.3

Description The number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.

udpOutDatagrams

OID 1.3.6.1.2.1.7.4

Description The total number of UDP datagrams sent from this entity.

UDP Listener Table

The UDP listener table contains information about this entity's UDP end-points on which a local application is currently accepting datagrams.

udpTable

OID 1.3.6.1.2.1.7.5

Description A table containing UDP listener information.

udpEntry

OID 1.3.6.1.2.1.7.5.1

Description Information about a particular current UDP listener.

Index udpLocalAddress, udpLocalPort

udpLocalAddress

OID 1.3.6.1.2.1.7.5.1.1

Description The local IP address for this UDP listener. In the case of a UDP listener that is willing to accept datagrams for any IP interface associated with the node, the value 0.0.0.0 is used.

udpLocalPort

OID 1.3.6.1.2.1.7.5.1.2

Description The local port number for this UDP listener.

EGP Group

Implementation of the EGP group is mandatory for all systems that implement the EGP.

Note

Brocade does not support the EGP Group. This section is not applicable. Refer to the RFC1213 for complete information regarding the EGP Group.

Transmission Group

Based on the transmission media underlying each interface on a system, the corresponding portion of the Transmission group is mandatory for that system.

When Internet-standard definitions for managing transmission media are defined, the transmission group is used to provide a prefix for the names of those objects.

Typically, such definitions reside in the experimental portion of the MIB until they are proven; then, as a part of the Internet standardization process, the definitions are accordingly elevated and a new object identifier under the transmission group is defined. By convention, the name assigned is

```
type Object Identifier ::= { transmission number }
```

type is the symbolic value used for the media in the ifType column of the ifTable object, and *number* is the actual integer value corresponding to the symbol.

SNMP Group

Implementation of the SNMP group is mandatory for all systems that support an SNMP protocol entity. Some of the objects defined next are zero-valued in those SNMP implementations that are optimized to support only those functions specific to either a management agent or a management station. All of the objects that follow refer to an SNMP entity, and there might be several SNMP entities residing on a managed node (for example, if the node is acting as a management station).

snmpInPkts

OID 1.3.6.1.2.1.11.1

Description The total number of messages delivered to the SNMP entity from the transport service.

snmpOutPkts

OID 1.3.6.1.2.1.11.2

Description The total number of SNMP messages that were passed from the SNMP protocol entity to the transport service.

snmpInBadVersions

OID 1.3.6.1.2.1.11.3

Description The total number of SNMP messages that were delivered to the SNMP protocol entity and were for an unsupported SNMP version.

snmpInBadCommunityNames

OID 1.3.6.1.2.1.11.4

Description The total number of SNMP messages delivered to the SNMP protocol entity that used a SNMP community name not known to said entity.

snmpInBadCommunityUses

OID 1.3.6.1.2.1.11.5

Description The total number of SNMP messages delivered to the SNMP protocol entity that represented an SNMP operation that was not allowed by the SNMP community named in the message.

snmpInASNParseErrs

OID 1.3.6.1.2.1.11.6

Description The total number of ASN.1 or BER errors encountered by the SNMP protocol entity when decoding received SNMP messages.

Note
1.3.6.1.2.1.11.7 is not used.

snmpInTooBigs

OID 1.3.6.1.2.1.11.8

Description The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is “tooBig.”

snmpInNoSuchNames

OID 1.3.6.1.2.1.11.9

Description The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is “noSuchName.”

snmpInBadValues

OID 1.3.6.1.2.1.11.10

Description The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is “badValue.”

snmpInReadOnlys

OID 1.3.6.1.2.1.11.11

Description The total number valid SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is “readOnly.”

Note It is a protocol error to generate an SNMP PDU that contains the value “readOnly” in the error-status field; as such, this object is provided as a means of detecting incorrect implementations of the SNMP.

snmpInGenErrs

OID 1.3.6.1.2.1.11.12

Description The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is “genErr.”

snmpInTotalReqVars

OID 1.3.6.1.2.1.11.13

Description The total number of MIB objects that have been retrieved successfully by the SNMP protocol entity as the result of receiving valid SNMP Get-Request and Get-Next PDUs.

snmpInTotalSetVars

OID 1.3.6.1.2.1.11.14

Description The total number of MIB objects that have been altered successfully by the SNMP protocol entity as the result of receiving valid SNMP Set-Request PDUs.

snmpInGetRequests

OID 1.3.6.1.2.1.11.15

Status Mandatory

Description The total number of SNMP Get-Request PDUs that have been accepted and processed by the SNMP protocol entity.

snmpInGetNexts

OID 1.3.6.1.2.1.11.16

Description The total number of SNMP Get-Next PDUs that have been accepted and processed by the SNMP protocol entity.

snmpInSetRequests

OID 1.3.6.1.2.1.11.17

Description The total number of SNMP Set-Request PDUs that have been accepted and processed by the SNMP protocol entity.

snmpInGetResponses

OID 1.3.6.1.2.1.11.18

Description The total number of SNMP Get-Response PDUs that have been accepted and processed by the SNMP protocol entity.

snmpInTraps

OID 1.3.6.1.2.1.11.19

Description The total number of SNMP Trap PDUs that have been accepted and processed by the SNMP protocol entity.

snmpOutTooBigs

OID 1.3.6.1.2.1.11.20

Description The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is too large.

snmpOutNoSuchNames

OID 1.3.6.1.2.1.11.21

Description The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is “noSuchName.”

snmpOutBadValues

OID 1.3.6.1.2.1.11.22

Description The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is “badValue.”

Note

1.3.6.1.2.1.11.23 is not used.

snmpOutGenErrs

OID 1.3.6.1.2.1.11.24

Description The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is “genErr.”

snmpOutGetRequests

OID 1.3.6.1.2.1.11.25

Description The total number of SNMP Get-Request PDUs that have been generated by the SNMP protocol entity.

snmpOutGetNexts

OID 1.3.6.1.2.1.11.26

Description The total number of SNMP Get-Next PDUs that have been generated by the SNMP protocol entity.

snmpOutSetRequests

OID 1.3.6.1.2.1.11.27

Description The total number of SNMP Set-Request PDUs that have been generated by the SNMP protocol entity.

snmpOutGetResponses

OID 1.3.6.1.2.1.11.28

Description The total number of SNMP Get-Response PDUs that have been generated by the SNMP protocol entity.

snmpOutTraps

OID 1.3.6.1.2.1.11.29

Description The total number of SNMP Trap PDUs that have been generated by the SNMP protocol entity.

snmpEnableAuthenTraps

OID 1.3.6.1.2.1.11.30

Description Indicates whether the SNMP agent process is permitted to generate authentication-failure traps. The value of this object overrides any configuration information; as such, it provides a means whereby all authentication-failure traps might be disabled. Possible values are enabled (1) or disabled (2).

Note This object is stored in nonvolatile memory so that it remains constant between reinitializations of the switch. This value can be changed with the **agtCfgSet** command.

FE MIB Objects

Chapter 3

This chapter provides descriptions and other information specific to FE MIB object types and includes the following information:

- "FE MIB Overview" next
- "FIBRE-CHANNEL-FE-MIB (MIB-II branch)" on page 3-1
- "FCFABRIC-ELEMENT-MIB (Experimental Branch)" on page 3-26

FE MIB Overview

Brocade supports two versions of the FE MIB:

- **FIBRE-CHANNEL-FE-MIB (RFC2837)** in the **MIB-II** branch.
- **FCFABRIC-ELEMENT-MIB** in the **experimental** branch.

The version of the FE MIB supported depends on the version of the Fabric OS. Table 3-1 lists which FE MIB is supported in which Fabric OS version.

Table 3-1 FE MIBs and supported Fabric OS versions

MIB	v4.x	v3.1.x	v3.0.x	v2.6.x
FIBRE-CHANNEL-FE-MIB (MIB-II branch)	Yes	Yes	Yes	No
FCFABRIC-ELEMENT-MIB (experimental branch)	No	No	Yes	Yes

FIBRE-CHANNEL-FE-MIB (MIB-II branch)

This section contains descriptions and other information specific to FIBRE-CHANNEL-FE-MIB (*in the MIB-II branch*), including:

- "FIBRE-CHANNEL-FE-MIB Organization" on page 3-2
- "Definitions for FIBRE-CHANNEL-FE-MIB" on page 3-4
- "Configuration Group" on page 3-7
- "Status Group" on page 3-12
- "Error Group" on page 3-17
- "Accounting Group" on page 3-19

- "Capability Group" on page 3-23

The descriptions of each of the MIB variables in this chapter come directly from the FIBRE-CHANNEL-FE-MIB itself. The notes that follows the descriptions typically pertain to Brocade-specific information and are provided by Brocade.

Note

Brocade does not support the settable "Write" function for any of the Fibre Channel FE MIB objects except fcFxPortPhyAdminStatus.

The object types in FIBRE-CHANNEL-FE-MIB are organized into the following groupings:

- Configuration
- Operational
- Error
- Accounting
- Capability

FIBRE-CHANNEL-FE-MIB Organization

Figure 3-1, Figure 3-2, and Figure 3-3 depict the organization and structure of FIBRE-CHANNEL-FE-MIB.

Figure 3-1 FIBRE-CHANNEL-FE-MIB Overall Tree Structure

- iso (1)
- org (3)
- dod (6)
- internet (1)
- mgmt (2)
- mib-2 (1)
- **fcFeMIB** (75)
- fcFeMIBObjects (1)
- fcFeConfig (1)
- fcFeStatus (2)
- fcFeError (3)
- fcFeAccounting (4)
- fcFeCapabilities (5)

Figure 3-2 Tree Structure for fcFeConfig, fcFeStatus, fcFeError, and fcFeCapabilities Tables

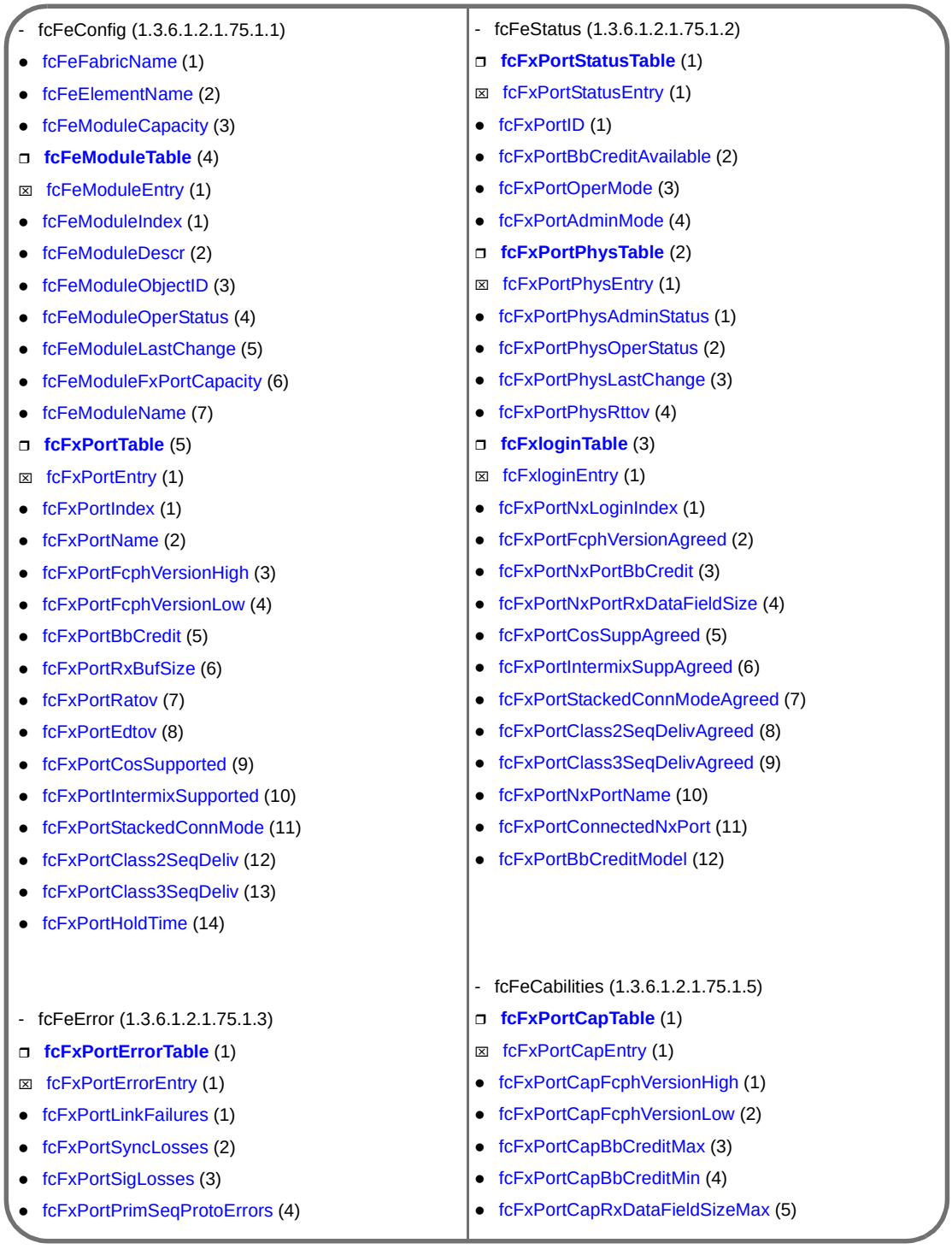


Figure 3-3 Tree Structure for fcFeAccounting Tables

Definitions for FIBRE-CHANNEL-FE-MIB

The following definitions are used for FIBRE-CHANNEL-FE-MIB.

Table 3-2 FIBRE-CHANNEL-FE-MIB Definitions

Type Definition	Value	Description
Display string	Octet string of size 0 to 255	
Milliseconds	Integer from 0 to 2147383647	
Microseconds	Integer from 0 to 2147383647	
FcNameId	Octet string of size 8	World Wide Name or Fibre Channel name associated with an FC entity. It is a Network_Destination_ID or Network_Source_ID composed of a value up to 60 bits wide, occupying the remaining 8 bytes while the first nibble identifies the format of the Name_Identifier. Name_Identifier hex values: 0 (ignored) 1 (IEEE 48-bit address) 2 (IEEE extended) 3 (locally assigned) 4 (32-bit IP address)
FabricName	Octet string of size 8	The name identifier of a fabric. Each fabric provides a unique fabric name. Valid formats include: IEEE 48 Local
FcPortName	Octet string of size 8	The name identifier associated with a port. Valid formats include: IEEE 48 IEEE extended Local
FcAddressId	Octet string of size 3	A 24-bit value unique within the address space of a fabric.
FcRxDataFieldSize	Integer from 128 to 2112	Receive data field size of an Nx_Port or Fx_Port.
FcBbCredit	Integer from 0 to 32767	Buffer-to-buffer credit of an Nx_Port or Fx_Port.
FcphVersion	Integer from 0 to 255	Version of FC-PH supported by an Nx_Port or Fx_Port.
FcStackedConnMode	Integer from 1 to 3	Indicates the Class 1 Stacked Connect Mode supported by an Nx_Port or Fx_Port. 1 (none) 2 (transparent) 3 (lockedDown)

Table 3-2 FIBRE-CHANNEL-FE-MIB Definitions (Continued)

Type Definition	Value	Description
FcCosCap	Integer from 1 to 127	Class of service capability of an Nx_Port or Fx_Port. bit 0 (Class F) bit 1 (Class 1) bit 2 (Class 2) bit 3 (Class 3) bit 4 (Class 4) bit 5 (Class 5) bit 6 (Class 6) bit 7 (reserved for future)
Fc0BaudRate	Integer according to FC-0 baud rates	1 (other) None of below 2 (one-eighth) 155 Mbaud (12.5 MB/s) 4 (quarter) 266 Mbaud (25.0 MB/s) 8 (half) 532 Mbaud (50.0 MB/s) 16 (full) 1 Gbaud (100 MB/s) 32 (double) 2 Gbaud (200 MB/s) 64 (quadruple) 4 Gbaud (400 MB/s)
Fc0BaudRateCap	Integer from 0 to 127	bit 0 (other) bit 1 (one-eighth) bit 2 (quarter) bit 3 (half) bit 4 (full) bit 5 (double) bit 6 (quadruple) bit 7 (Reserved for future)
Fc0MediaCap	Integer from 0 to 65535	bit 0 (unknown) bit 1 (single mode fibre (sm)) bit 2 (multimode fibre 50 micron (m5)) bit 3 (multimode fibre 62.5 micron (m6)) bit 4 (video cable (tv)) bit 5 (miniature cable (mi)) bit 6 (shielded twisted pair (stp)) bit 7 (twisted wire (tw)) bit 8 (long video (lv)) bits 9-15 (Reserved for future use)
Fc0Medium	Integer	1 (unknown) 2 (sm) 4 (m5) 8 (m6) 16 (tv) 32 (mi) 64 (stp) 128 (tw) 256 (lv)

Table 3-2 FIBRE-CHANNEL-FE-MIB Definitions (Continued)

Type Definition	Value	Description
Fc0TxType	Integer	1 (unknown) 2 (longWaveLaser (LL)) 3 (shortWaveLaser (SL)) 4 (longWaveLED (LE)) 5 (electrical (EL)) 6 (shortWaveLaser-noOFC (SN))
Fc0Distance	Integer	The FC-0 distance range associated with a port transmitter: 1 (unknown) 2 (long) 3 (intermediate) 4 (short)
FcFeModuleCapacity	Integer from 1 to 256	Maximum number of modules within a fabric element; returns 1 for all devices.
FcFeFxPortCapacity	Integer from 1 to 256	Maximum number of Fx_Ports within a module. For the SilkWorm 4100, this value is 32.
FcFeModuleIndex	Integer from 1 to 256	Module index within a conceptual table.
FcFeFxPortIndex	Integer from 1 to 256	Fx_Port index within a conceptual table.
FcFeNxPortIndex	Integer from 1 to 256	Nx_Port index within a conceptual table.
FcFxPortMode	Integer	1 (unknown) 2 (F_Port) 3 (FL_Port)
FcBbCreditModel	Integer	BB_Credit model of an Fx_Port. 1 (regular) 2 (alternate)

Configuration Group

This group consists of scalar objects and tables. It contains the configuration and service parameters of the fabric element and the Fx_Ports.

The group represents a set of parameters associated with the fabric element or an Fx_Port to support its Nx_Ports.

fcFeFabricName

OID 1.3.6.1.2.1.75.1.1.1

Description The Name_Identifier of the fabric to which this fabric element belongs.

Note Returns the WWN of the primary switch in the fabric.

fcFeElementName

OID 1.3.6.1.2.1.75.1.1.2

Description The Name_Identifier of the fabric element.

Note Returns the WWN of the switch.

fcFeModuleCapacity

OID 1.3.6.1.2.1.75.1.1.3

Description The maximum number of modules in the fabric element, regardless of their current state.

Note The valid value for all SilkWorm switches is 1.

fc Fabric Element Module Table

This table contains one entry for each module, and information of the modules.

fcFeModuleTable

OID 1.3.6.1.2.1.75.1.1.4

Description A table that contains information about the modules, one entry for each module in the fabric element.

fcFeModuleEntry

OID 1.3.6.1.2.1.75.1.1.4.1

Description An entry containing the configuration parameters of a module.

Index fcFeModuleIndex

fcFeModuleIndex

OID 1.3.6.1.2.1.75.1.1.4.1.1

Description Identifies the module within the fabric element for which this entry contains information. This value is never greater than fcFeModuleCapacity.

fcFeModuleDescr

OID 1.3.6.1.2.1.75.1.1.4.1.2

Description A textual description of the module. This value should include the full name and version identification of the module. It should contain printable ASCII characters.

Note Refer to “sysDescr” on page 2-6.

fcFeModuleObjectID

OID 1.3.6.1.2.1.75.1.1.4.1.3

Description The vendor's authoritative identification of the module. This value might be allocated within the SMI enterprises subtree (1.3.6.1.4.1) and provides a straightforward and unambiguous means for determining what kind of module is being managed.

For example, this object could take the value 1.3.6.1.4.1.99649.3.9 if vendor "Neufe Inc." was assigned the subtree 1.3.6.1.4.1.99649 and had assigned the identifier 1.3.6.1.4.1.99649.3.9 to its "FeFiFo-16 PlugInCard."

Note Refer to "sysObjectID" on page 2-6.

fcFeModuleOperStatus

OID 1.3.6.1.2.1.75.1.1.4.1.4

Description Indicates the operational status of the module:

online (1)	The module is functioning properly.
offline (2)	The module is not available.
testing (3)	The module is under testing.
faulty (4)	The module is defective in some way.

fcFeModuleLastChange

OID 1.3.6.1.2.1.75.1.1.4.1.5

Description Contains the value of sysUpTime when the module entered its current operational status. A value of 0 indicates that the operational status of the module has not changed since the agent last restarted.

fcFeModuleFxPortCapacity

OID 1.3.6.1.2.1.75.1.1.4.1.6

Description The number of Fx_Ports that can be contained within the module. Within each module, the ports are uniquely numbered in the range from 1 to fcFeModuleFxPortCapacity, inclusive. However, the numbers are not required to be contiguous.

Note The valid values are as follows:

SilkWorm 3200 and 3250	8
SilkWorm 3800 and 3850	16
SilkWorm 3900 and 4100	32
SilkWorm 12000	64
SilkWorm 24000	128

fcFeModuleName

OID 1.3.6.1.2.1.75.1.1.4.1.7

Description The Name_Identifier of the module.

Note The return value is the WWN of the switch.

Fx_Port Table

This table contains the port configuration parameters, one entry for each Fx_Port.

fcFxPortTable

OID 1.3.6.1.2.1.75.1.1.5

Description A table that contains configuration and service parameters of the Fx_Ports, one entry for each Fx_Port in the fabric element.

fcFxPortEntry

OID 1.3.6.1.2.1.75.1.1.5.1

Description An entry containing the configuration and service parameters of an Fx_Port.

Index fcFeModuleIndex
fcFxPortIndex

fcFxPortIndex

OID 1.3.6.1.2.1.75.1.1.5.1.1

Description Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized.

fcFxPortName

OID 1.3.6.1.2.1.75.1.1.5.1.2

Description The World Wide Name of this Fx_Port. Each Fx_Port has a unique port World Wide Name within the fabric.

Note The return value is the WWN of the port.

Fx_Port Common Service Parameters

fcFxPortFcphVersionHigh

OID 1.3.6.1.2.1.75.1.1.5.1.3

Description The highest or most recent version of FC-PH that the Fx_Port is configured to support.

fcFxPortFcphVersionLow

OID 1.3.6.1.2.1.75.1.1.5.1.4

Description The lowest or earliest version of FC-PH that the Fx_Port is configured to support.

fcFxPortBbCredit

OID 1.3.6.1.2.1.75.1.1.5.1.5

Description The total number of receive buffers available for holding Class 1 connect-request, and Class 2 or 3 frames from the attached Nx_Port. It is for buffer-to-buffer flow control in the direction from the attached Nx_Port (if applicable) to Fx_Port.

fcFxPortRxBufSize

OID 1.3.6.1.2.1.75.1.1.5.1.6

Description The largest Data_Field Size (in octets) for an FT_1 frame that can be received by the Fx_Port.

fcFxPortRatov

OID 1.3.6.1.2.1.75.1.1.5.1.7

Description The Resource_Allocation_Timeout value configured for the Fx_Port. This is used as the time-out value for determining when to reuse an Nx_Port resource such as a Recovery_Qualifier. It represents E_D_TOV (see next object) plus twice the maximum time that a frame might be delayed within the fabric and still be delivered.

fcFxPortEdtov

OID 1.3.6.1.2.1.75.1.1.5.1.8

Description The E_D_TOV value configured for the Fx_Port. The Error_Detect_Timeout value is used as the time-out value for detecting an error condition.

Fx_Port Class Service Parameters

fcFxPortCosSupported

OID 1.3.6.1.2.1.75.1.1.5.1.9

Description A value indicating the set of Classes of Service supported by the Fx_Port.

fcFxPortIntermixSupported

OID 1.3.6.1.2.1.75.1.1.5.1.10

Description A flag indicating whether the Fx_Port supports an Intermixed Dedicated Connection.

fcFxPortStackedConnMode

OID 1.3.6.1.2.1.75.1.1.5.1.11

Description A value indicating the mode of Stacked Connect supported by the Fx_Port.

fcFxPortClass2SeqDeliv

OID 1.3.6.1.2.1.75.1.1.5.1.12

Description A flag indicating whether Class 2 Sequential Delivery is supported by the Fx_Port.

fcFxPortClass3SeqDeliv

OID 1.3.6.1.2.1.75.1.1.5.1.13

Description A flag indicating whether Class 3 Sequential Delivery is supported by the Fx_Port.

Other Fx_Port Parameters

fcFxPortHoldTime

OID 1.3.6.1.2.1.75.1.1.5.1.14

Description The maximum time (in microseconds) that the Fx_Port holds a frame before discarding the frame if it is unable to deliver the frame. The value 0 means that the Fx_Port does not support this parameter.

Status Group

This group consists of tables that contain operational status and established service parameters for the fabric element and the attached Nx_Ports.

Fx_Port Status Table

This table contains the operational status and parameters of the Fx_Ports, one entry for each Fx_Port.

fcFxPortStatusTable

OID 1.3.6.1.2.1.75.1.2.1

Description A table that contains operational status and parameters of the Fx_Ports, one entry for each Fx_Port in the fabric element.

fcFxPortStatusEntry

OID 1.3.6.1.2.1.75.1.2.1.1

Description An entry containing operational status and parameters of an Fx_Port.

Index fcFeModuleIndex
fcFxPortIndex

fcFxPortID

OID 1.3.6.1.2.1.75.1.2.1.1.1

Description The address identifier by which this Fx_Port is identified within the fabric. The Fx_Port might assign its address identifier to its attached Nx_Port(s) during fabric login.

fcFxPortBbCreditAvailable

OID 1.3.6.1.2.1.75.1.2.1.1.2

Description The number of buffers currently available for receiving frames from the attached port in the buffer-to-buffer flow control. The value should be less than or equal to fcFxPortBbCredit.

fcFxPortOperMode

OID 1.3.6.1.2.1.75.1.2.1.1.3

Description The current operational mode of the Fx_Port:

unknown (1)
fPort (2)
flPort (3)

fcFxPortAdminMode

OID 1.3.6.1.2.1.75.1.2.1.1.4

Description The desired operational mode of the Fx_Port.

Fx_Port Physical Level Table

This table contains the physical level status and parameters of the Fx_Ports, one entry for each Fx_Port in the fabric element.

fcFxPortPhysTable

OID 1.3.6.1.2.1.75.1.2.2

Description A table that contains the physical level status and parameters of the Fx_Ports, one entry for each Fx_Port in the fabric element.

fcFxPortPhysEntry

OID 1.3.6.1.2.1.75.1.2.2.1

Description An entry containing physical level status and parameters of an Fx_Port.

Index fcFeModuleIndex
fcFxPortIndex

fcFxPortPhysAdminStatus

OID 1.3.6.1.2.1.75.1.2.2.1.1

Description The desired state of the Fx_Port. A management station might place the Fx_Port in a desired state by setting this object accordingly. Possible values are:

online (1) Place port online.

offline (2) Take port offline.

testing (3) Initiate test procedures.

The testing state (3) indicates that no operational frames can be passed. When a fabric element initializes, all Fx_Ports start with fcFxPortPhysAdminStatus in the offline state (2). As the result of either explicit management action or per configuration information accessible by the fabric element, fcFxPortPhysAdminStatus is then changed to either the online (1) or testing (3) states or remains in the offline state (2).

fcFxPortPhysOperStatus

OID 1.3.6.1.2.1.75.1.2.2.1.2

Description The current operational status of the Fx_Port. Possible values are:

online (1) Login might proceed.

offline (2) Login cannot proceed.

testing (3) Port is under test.

linkFailure (4) Failure after online/testing.

The testing state (3) indicates that no operational frames can be passed. If fcFxPortPhysAdminStatus is offline (2), then fcFxPortPhysOperStatus should be offline (2). If fcFxPortPhysAdminStatus is changed to online (1), then fcFxPortPhysOperStatus should change to online (1) if the Fx_Port is ready to accept fabric login request from the attached Nx_Port; it should proceed and remain in the linkFailure (4) state only if there is a fault that prevents it from going to the online state (1).

fcFxPortPhysLastChange

OID 1.3.6.1.2.1.75.1.2.2.1.3

Description The value of sysUpTime at the time the Fx_Port entered its current operational status. A value of 0 indicates that the Fx_Port operational status has not changed since the agent last restarted.

fcFxPortPhysRttov

OID 1.3.6.1.2.1.75.1.2.2.1.4

Description The Receiver_Transmitter_Timeout value of the Fx_Port. This is used by the receiver logic to detect loss of synchronization.

Note This object is read-only. It is listed in the MIB definition as read-write (which is incorrect).

Fx_Port Fabric Login Table

This table contains one entry for each Fx_Port in the fabric element and the service parameters that have been established from the most recent fabric login, whether implicit or explicit.

fcFxloginTable

OID 1.3.6.1.2.1.75.1.2.3

Description A table that contains services parameters established from the most recent fabric login, explicit or implicit, one entry for each Fx_Port in the fabric element.

fcFxloginEntry

OID 1.3.6.1.2.1.75.1.2.3.1

Description An entry containing service parameters established from a successful fabric login.

Index fcFxloginModuleIndex, fcFxloginFxPortIndex, fcFxloginNxPortIndex

fcFxPortNxLoginIndex

OID 1.3.6.1.2.1.75.1.2.3.1.1

Description The associated Nx_Port in the attachment for which the entry contains information.

fcFxPortFcphVersionAgreed

OID 1.3.6.1.2.1.75.1.2.3.1.2

Description The version of FC-PH that the Fx_Port has agreed to support from the fabric login.

fcFxPortNxPortBbCredit

OID 1.3.6.1.2.1.75.1.2.3.1.3

Description The total number of buffers available for holding Class 1 connect-request, and Class 2 or Class 3 frames to be transmitted to the attached Nx_Port. It is for buffer-to-buffer flow control in the direction from Fx_Port to Nx_Port. The buffer-to-buffer flow control mechanism is indicated in the respective fcFxPortBbCreditModel.

fcFxPortNxPortRxDataFieldSize

OID 1.3.6.1.2.1.75.1.2.3.1.4

Description The Receive Data Field Size of the attached Nx_Port. This is a binary value that specifies the largest Data Field Size for an FT_1 frame that can be received by the Nx_Port. The value is a number of bytes in the range 128 to 2112, inclusive.

fcFxPortCosSuppAgreed

OID 1.3.6.1.2.1.75.1.2.3.1.5

Description Indicates that the attached Nx_Port has requested the Fx_Port for the support of classes of services and the Fx_Port has granted the request.

fcFxPortIntermixSuppAgreed

OID 1.3.6.1.2.1.75.1.2.3.1.6

Description A variable indicating that the attached Nx_Port has requested the Fx_Port for Intermix support, and the Fx_Port has granted the request. This flag is only valid if Class 1 service is supported. Possible values are:

yes (1) The attached Nx_Port has requested the Fx_Port for Intermix support, and the Fx_Port has granted the request.

no (2) The attached Nx_Port has not requested the Fx_Port for Intermix support.

fcFxPortStackedConnModeAgreed

OID 1.3.6.1.2.1.75.1.2.3.1.7

Description Indicates whether the Fx_Port has agreed to support stacked connect from the fabric login. This is only meaningful if Class 1 service has been agreed to.

fcFxPortClass2SeqDelivAgreed

OID 1.3.6.1.2.1.75.1.2.3.1.8

Description Indicates whether the Fx_Port has agreed to support Class 2 sequential delivery from the fabric login. This is only meaningful if Class 2 service has been agreed to. Possible values are:

yes (1) The Fx_Port has agreed to support Class 2 sequential delivery from the fabric login.

no (2) The Fx_Port has not agreed to support Class 2 sequential delivery from the fabric login.

fcFxPortClass3SeqDelivAgreed

OID 1.3.6.1.2.1.75.1.2.3.1.9

Description A flag indicating whether the Fx_Port has agreed to support Class 3 sequential delivery from the fabric login. This is only meaningful if Class 3 service has been agreed to. Possible values are:

yes (1) The Fx_Port has agreed to support Class 3 sequential delivery from the fabric login.

no (2) The Fx_Port has not agreed to support Class 3 sequential delivery from the fabric login.

fcFxPortNxPortName

OID 1.3.6.1.2.1.75.1.2.3.1.10

Description The port name of the attached Nx_Port, if applicable. If the value of this object is ‘0000000000000000’H, this Fx_Port has no Nx_Port attached to it.

fcFxPortConnectedNxPort

OID 1.3.6.1.2.1.75.1.2.3.1.11

Description The address identifier of the destination Fx_Port with which this Fx_Port is currently engaged in either a Class 1 or loop connection. If the value of this object is ‘000000’H, this Fx_Port is not engaged in a connection.

fcFxPortBbCreditModel

OID 1.3.6.1.2.1.75.1.2.3.1.12

Description Identifies the BB_Credit model used by the Fx_Port. The regular model refers to the buffer-to-buffer flow control mechanism defined in FC-PH [1] used between the F_Port and the N_Port. For FL_Ports, the alternate buffer-to-buffer flow control mechanism as defined in FC-AL [4] is used between the FL_Port and any attached NL_Ports.

Error Group

This group consists of tables that contain information about the various types of errors detected. The management station might use the information in this group to determine the quality of the link between the Fx_Port and its attached Nx_Port.

Implementation of this group is optional.

Fx_Port Error Table

This table contains counters recording numbers of errors detected since the management agent reinitialized, one entry for each Fx_Port in the fabric element.

The first six columnar objects after the port index correspond to the counters in the link error status block.

fcFxPortErrorTable

OID 1.3.6.1.2.1.75.1.3.1

Description A table that contains counters that record the numbers of errors detected, one entry for each Fx_Port.

fcFxPortErrorEntry

OID 1.3.6.1.2.1.75.1.3.1.1

Description An entry containing error counters of a Fx_Port.

Index fcFxPortErrorModuleIndex
fcFxPortErrorFxPortIndex

fcFxPortLinkFailures

OID 1.3.6.1.2.1.75.1.3.1.1.1

Description The number of link failures detected by this Fx_Port.

fcFxPortSyncLosses

OID 1.3.6.1.2.1.75.1.3.1.1.2

Description The number of loss of synchronization errors detected by the Fx_Port.

fcFxPortSigLosses

OID 1.3.6.1.2.1.75.1.3.1.1.3

Description The number of loss of signal errors detected by the Fx_Port.

fcFxPortPrimSeqProtoErrors

OID 1.3.6.1.2.1.75.1.3.1.1.4

Description The number of primitive sequence protocol errors detected by the Fx_Port.

fcFxPortInvalidTxWords

OID 1.3.6.1.2.1.75.1.3.1.1.5

Description The number of invalid transmission word errors detected by the Fx_Port.

fcFxPortInvalidCrcs

OID 1.3.6.1.2.1.75.1.3.1.1.6

Description The number of invalid cyclic redundancy checks (CRC) detected by this Fx_Port.

fcFxPortDelimiterErrors

OID 1.3.6.1.2.1.75.1.3.1.1.7

Description The number of delimiter errors detected by this Fx_Port.

fcFxPortAddressIdErrors

OID 1.3.6.1.2.1.75.1.3.1.1.8

Description The number of address identifier errors detected by this Fx_Port.

fcFxPortLinkResetIns

OID 1.3.6.1.2.1.75.1.3.1.1.9

Description The number of Link Reset Protocol errors received by this Fx_Port from the attached Nx_Port.

fcFxPortLinkResetOuts

OID 1.3.6.1.2.1.75.1.3.1.1.10

Description The number of Link Reset Protocol errors issued by this Fx_Port to the attached Nx_Port.

fcFxPortOlsIns

OID 1.3.6.1.2.1.75.1.3.1.1.11

Description The number of Offline Sequence errors received by this Fx_Port.

fcFxPortOlsOuts

OID 1.3.6.1.2.1.75.1.3.1.1.12

Description The number of Offline Sequence issued by this Fx_Port.

Accounting Group

The Accounting group is supported only in Fabric OS v4.x.

The Accounting group consists of the following tables:

- Class 1 accounting table
- Class 2 accounting table
- Class 3 accounting table

Each table contains accounting information for the Fx_Ports in the fabric element.

Class 1 Accounting Table

fcFxPortC1AccountingTable

OID 1.3.6.1.2.1.75.1.4.1

Description A table that contains Class 1 accounting information recorded since the management agent reinitialized, one entry for each Fx_Port in the fabric element.

fcFxPortC1AccountingEntry

OID 1.3.6.1.2.1.75.1.4.1.1

Description An entry containing Class 1 accounting information for each Fx_Port.

Index fcFeModuleIndex
fcFePortIndex

fcFxPortC1InFrames

OID 1.3.6.1.2.1.75.1.4.1.1.1

Description The number of Class 1 frames (other than Class 1 connect-request) received by this Fx_Port from its attached Nx_Port.

fcFxPortC1OutFrames

OID 1.3.6.1.2.1.75.1.4.1.1.2

Description The number of Class 1 frames (other than Class 1 connect-request) delivered through this Fx_Port to its attached Nx_Port.

fcFxPortC1InOctets

OID 1.3.6.1.2.1.75.1.4.1.1.3

Description The number of Class 1 frame octets, including the frame delimiters, received by this Fx_Port from its attached Nx_Port.

fcFxPortC1OutOctets

OID 1.3.6.1.2.1.75.1.4.1.1.4

Description The number of Class 1 frame octets, including the frame delimiters, delivered through this Fx_Port its attached Nx_Port.

fcFxPortC1Discards

OID 1.3.6.1.2.1.75.1.4.1.1.5

Description The number of Class 1 frames discarded by this Fx_Port.

fcFxPortC1FbsyFrames

OID 1.3.6.1.2.1.75.1.4.1.1.6

Description The number of F_BSY frames generated by this Fx_Port against Class 1 connect-request.

fcFxPortC1FrjtFrames

OID 1.3.6.1.2.1.75.1.4.1.1.7

Description The number of F_RJT frames generated by this Fx_Port against Class 1 connect-request.

fcFxPortC1InConnections

OID 1.3.6.1.2.1.75.1.4.1.1.8

Description The number of Class 1 connections successfully established in which the attached Nx_Port is the source of the connect-request.

fcFxPortC1OutConnections

OID 1.3.6.1.2.1.75.1.4.1.1.9

Description The number of Class 1 connections successfully established in which the attached Nx_Port is the destination of the connect-request.

fcFxPortC1ConnTime

OID 1.3.6.1.2.1.75.1.4.1.1.10

Description The cumulative time that this Fx_Port has been engaged in Class 1 connection. The amount of time is counted from after a connect-request has been accepted until the connection is disengaged, either by an EOFdt or Link Reset.

Class 2 Accounting Table

fcFxPortC2AccountingTable

OID 1.3.6.1.2.1.75.1.4.2

Description A table that contains Class 2 accounting information recorded since the management agent has reinitialized, one entry for each Fx_Port in the fabric element.

fcFxPortC2AccountingEntry

OID 1.3.6.1.2.1.75.1.4.2.1

Description An entry containing Class 2 accounting information for each Fx_Port.

Index fcFeModuleIndex

fcFePortIndex

fcFxPortC2InFrames

OID 1.3.6.1.2.1.75.1.4.2.1.1

Description The number of Class 2 frames received by this Fx_Port from its attached Nx_Port.

fcFxPortC2OutFrames

OID 1.3.6.1.2.1.75.1.4.2.1.2

Description The number of Class 2 frames delivered through this Fx_Port to its attached Nx_Port.

fcFxPortC2InOctets

OID 1.3.6.1.2.1.75.1.4.2.1.3

Description The number of Class 2 frame octets, including the frame delimiters, received by this Fx_Port from its attached Nx_Port.

fcFxPortC2OutOctets

OID 1.3.6.1.2.1.75.1.4.2.1.4

Description The number of Class 2 frame octets, including the frame delimiters, delivered through this Fx_Port to its attached Nx_Port.

fcFxPortC2Discards

OID 1.3.6.1.2.1.75.1.4.2.1.5

Description The number of Class 2 frames discarded by this Fx_Port.

fcFxPortC2FbsyFrames

OID 1.3.6.1.2.1.75.1.4.2.1.6

Description The number of F_BSY frames generated by this Fx_Port against Class 2 frames.

fcFxPortC2FrjtFrames

OID 1.3.6.1.2.1.75.1.4.2.1.7

Description The number of F_RJT frames generated by this Fx_Port against Class 2 frames.

Class 3 Accounting Table

fcFxPortC3AccountingTable

OID 1.3.6.1.2.1.75.1.4.3

Description A table that contains Class 3 accounting information recorded since the management agent has reinitialized, one entry for each Fx_Port in the fabric element.

fcFxPortC3AccountingEntry

OID 1.3.6.1.2.1.75.1.4.3.1

Description An entry containing Class 3 accounting information for each Fx_Port.

Index fcFeModuleIndex

fcFePortIndex

fcFxPortC3InFrames

OID 1.3.6.1.2.1.75.1.4.3.1.1

Description The number of Class 3 frames received by this Fx_Port from its attached Nx_Port.

fcFxPortC3OutFrames

OID 1.3.6.1.2.1.75.1.4.3.1.2

Description The number of Class 3 frames delivered through this Fx_Port to its attached Nx_Port.

fcFxPortC3InOctets

OID 1.3.6.1.2.1.75.1.4.3.1.3

Description The number of Class 3 frame octets, including the frame delimiters, received by this Fx_Port from its attached Nx_Port.

fcFxPortC3OutOctets

OID 1.3.6.1.2.1.75.1.4.3.1.4

Description The number of Class 3 frame octets, including the frame delimiters, delivered through this Fx_Port to its attached Nx_Port.

fcFxPortC3Discards

OID 1.3.6.1.2.1.75.1.4.3.1.5

Description The number of Class 3 frames discarded by this Fx_Port.

Capability Group

This group consists of a table describing information about what each Fx_Port is inherently capable of operating or supporting. A capability might be used, as expressed in its respective object value in the Configuration group.

Implementation of this group is optional.

Fx_Port Capability Table

fcFxPortCapTable

OID 1.3.6.1.2.1.75.1.5.1

Description A table that contains the capabilities of the port within the fabric element, one entry for each Fx_Port.

fcFxPortCapEntry

OID 1.3.6.1.2.1.75.1.5.1.1

Description An entry containing the capabilities of a Fx_Port.

Index fcFxPortCapModuleIndex
fcFxPortCapFxPortIndex

fcFxPortCapFcphVersionHigh

OID 1.3.6.1.2.1.75.1.5.1.1.1

Description The highest or most recent version of FC-PH that the Fx_Port is capable of supporting.

fcFxPortCapFcphVersionLow

OID 1.3.6.1.2.1.75.1.5.1.1.2

Description The lowest or earliest version of FC-PH that the Fx_Port is capable of supporting.

fcFxPortCapBbCreditMax

OID 1.3.6.1.2.1.75.1.5.1.1.3

Description The maximum number of receive buffers available for holding Class 1 connect-request, and Class 2 or Class 3 frames from the attached Nx_Port.

fcFxPortCapBbCreditMin

OID 1.3.6.1.2.1.75.1.5.1.1.4

Description The minimum number of receive buffers available for holding Class 1 connect-request, and Class 2 or Class 3 frames from the attached Nx_Port.

fcFxPortCapRxDataFieldSizeMax

OID 1.3.6.1.2.1.75.1.5.1.1.5

Description The maximum size (in bytes) of the data field in a frame that the Fx_Port is capable of receiving from its attached Nx_Port.

fcFxPortCapRxDataFieldSizeMin

OID 1.3.6.1.2.1.75.1.5.1.1.6

Description The minimum size (in bytes) of the data field in a frame that the Fx_Port is capable of receiving from its attached Nx_Port.

fcFxPortCapCos

OID 1.3.6.1.2.1.75.1.5.1.1.7

Description A value indicating the set of Classes of Service that the Fx_Port is capable of supporting.

fcFxPortCapIntermix

OID 1.3.6.1.2.1.75.1.5.1.1.8

Description A flag indicating whether the Fx_Port is capable of supporting the intermixing of Class 2 and Class 3 frames during a Class 1 connection. This flag is only valid if the port is capable of supporting Class 1 service. Possible values are yes (1) and no (2).

fcFxPortCapStackedConnMode

OID 1.3.6.1.2.1.75.1.5.1.1.9

Description A value indicating the mode of Stacked Connect request that the Fx_Port is capable of supporting.

fcFxPortCapClass2SeqDeliv

OID 1.3.6.1.2.1.75.1.5.1.1.10

Description A flag indicating whether the Fx_Port is capable of supporting Class 2 Sequential Delivery. Possible values are yes (1) and no (2).

fcFxPortCapClass3SeqDeliv

OID 1.3.6.1.2.1.75.1.5.1.1.11

Description A flag indicating whether the Fx_Port is capable of supporting Class 3 Sequential Delivery. Possible values are yes (1) and no (2).

fcFxPortCapHoldTimeMax

OID 1.3.6.1.2.1.75.1.5.1.1.12

Description The maximum holding time (in microseconds) that the Fx_Port is capable of supporting.

fcFxPortCapHoldTimeMin

OID 1.3.6.1.2.1.75.1.5.1.1.13

Description	The minimum holding time (in microseconds) that the Fx_Port is capable of supporting.

FCFABRIC-ELEMENT-MIB (Experimental Branch)

Note
The FCFABRIC-ELEMENT-MIB is supported only in Fabric OS v2.6.x and v3.0.x.

This section contains descriptions and other information that is specific to FCFABRIC-ELEMENT-MIB (*in the experimental branch*), including the following:

- "FCFABRIC-ELEMENT-MIB Organization" on page 3-26
- "Definitions for FCFABRIC-ELEMENT-MIB" on page 3-29
- "Configuration Group" on page 3-32
- "Operation Group" on page 3-37
- "Error Group" on page 3-43
- "Accounting Group" on page 3-45
- "Capability Group" on page 3-45

Note
Brocade does not support the settable "Write" function for any of the Fibre Channel FE MIB objects except "fcFxPortPhysAdminStatus".

The descriptions of each of the MIB variables in this chapter come directly from the FCFABRIC-ELEMENT-MIB itself. The notes that follow the descriptions typically pertain to Brocade-specific information and are provided by Brocade.

The object types in FCFABRIC-ELEMENT-MIB are organized into the following groups:

- Configuration
- Operational
- Error
- Accounting (not supported or listed)
- Capability

FCFABRIC-ELEMENT-MIB Organization

Figure 3-4 through Figure 3-6 depict the organization and structure of FCFABRIC-ELEMENT-MIB.

Figure 3-4 FCFABRIC-ELEMENT-MIB Overall Tree Structure

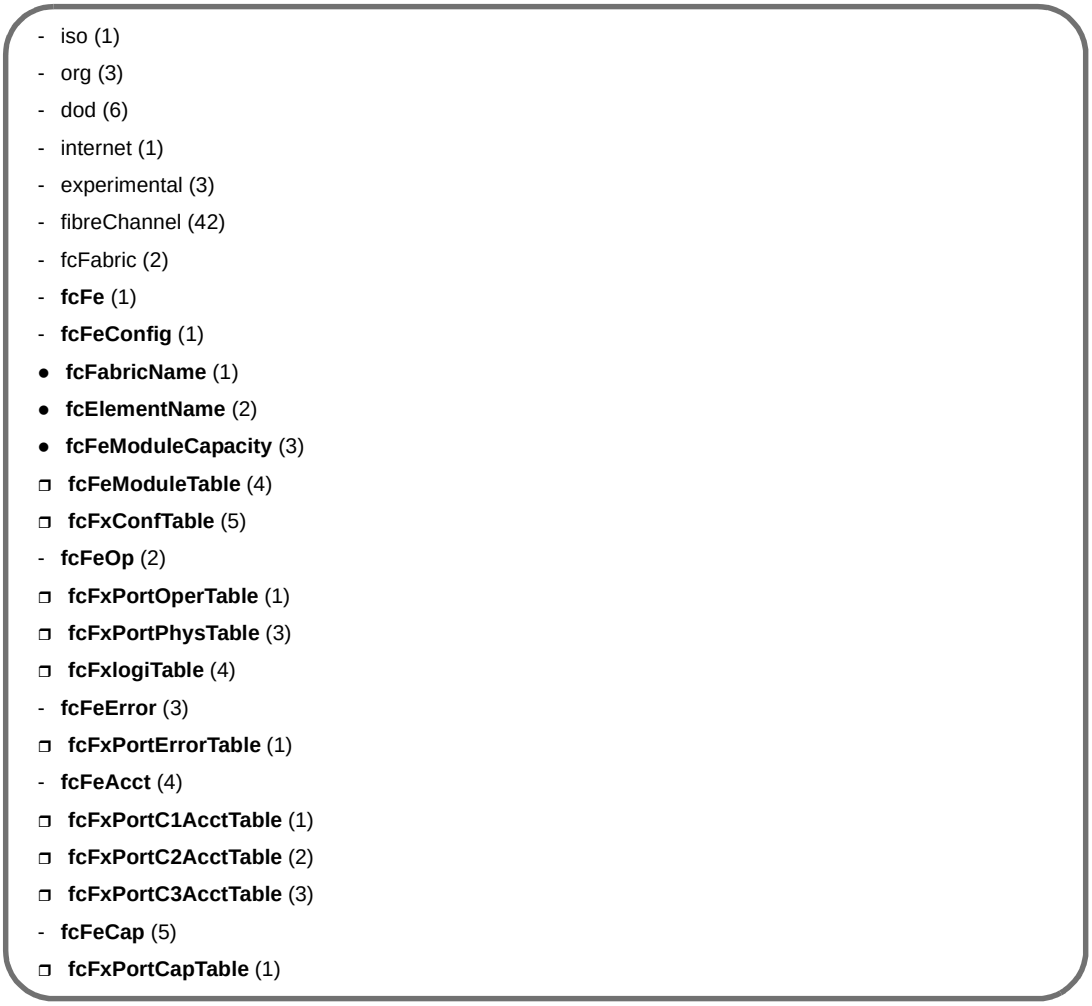


Figure 3-5 Tree Structure for fcFeConfig and fcFeOpTables

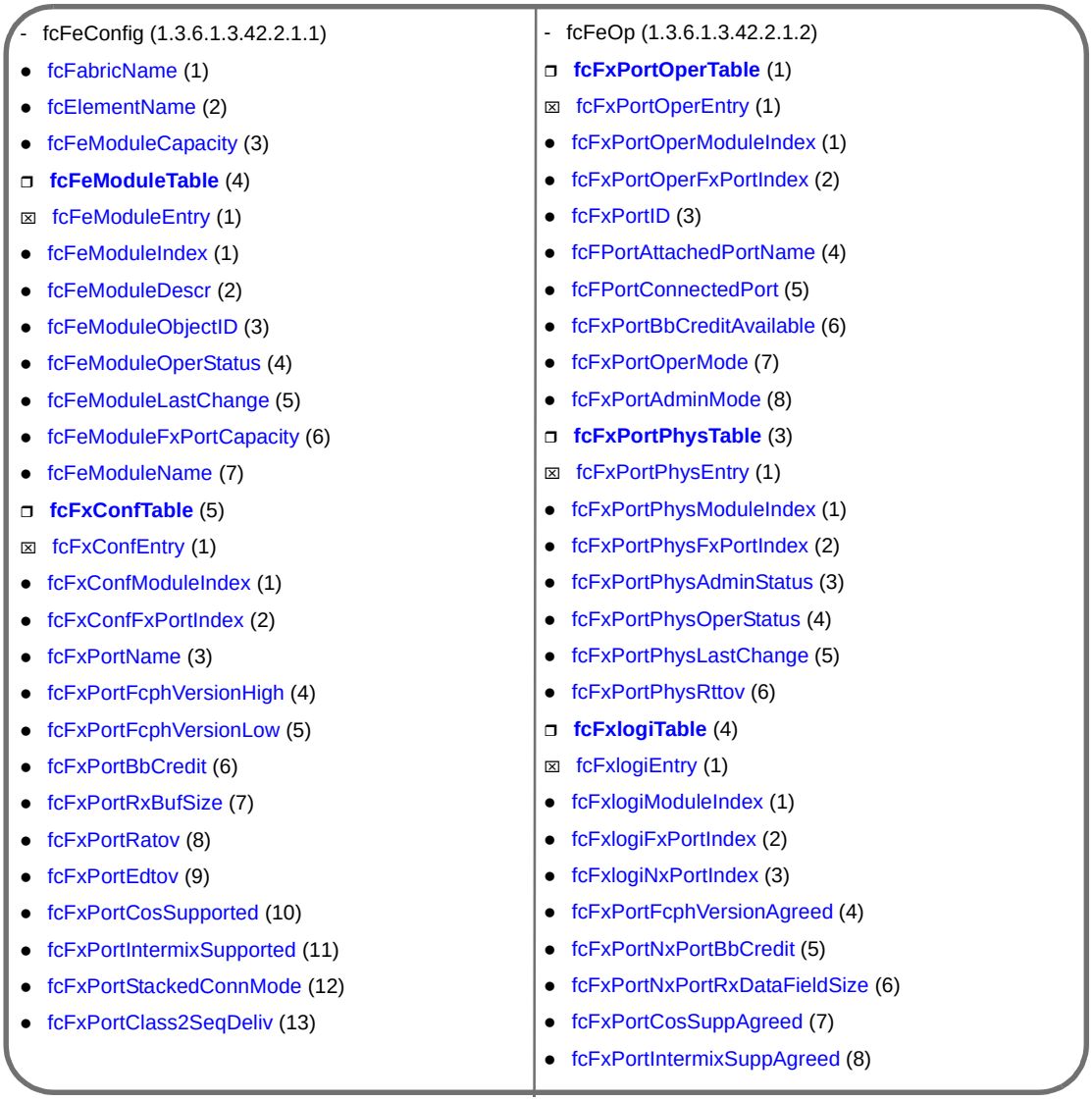
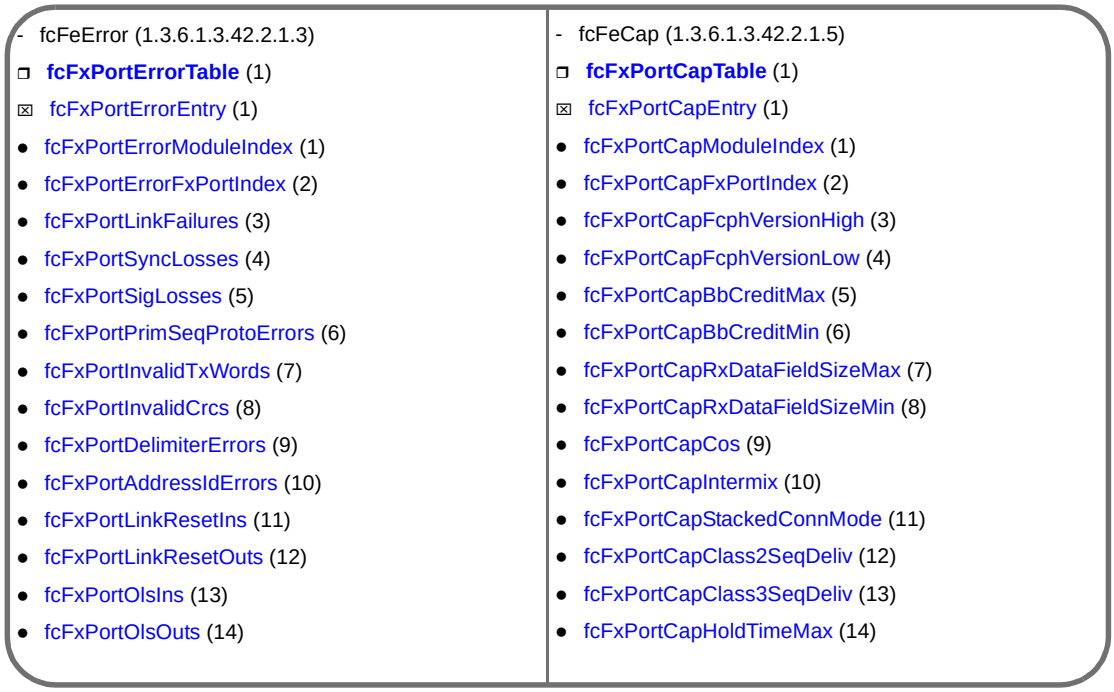


Figure 3-6 Tree Structure for fcFeError, fcFeAcct, and fcFeCap Tables



Definitions for FCFABRIC-ELEMENT-MIB

The following definitions are used for FCFABRIC-ELEMENT-MIB.

Table 3-3 FCFABRIC-ELEMENT-MIB Definitions

Type Definition	Value	Description
Display string	Octet string of size 0 to 255	
Milliseconds	Integer from 0 to 2147383647	
Microseconds	Integer from 0 to 2147383647	
FcNameId	Octet string of size 8	World Wide Name or Fibre Channel name associated with an FC entry. This is a Network_Destination_ID or Network_Source_ID composed of a value up to 60 bits wide, occupying the remaining 8 bytes while the first nibble identifies the format of the Name_Identifier. Name_Identifier hex values: 0 (Ignored) 1 (IEEE 48-bit address) 2 (IEEE extended) 3 (Locally assigned) 4 (32-bit IP address)

Table 3-3 FCFABRIC-ELEMENT-MIB Definitions (Continued)

Type Definition	Value	Description
FabricName	FcNameId	The name identifier of a fabric. Each fabric provides a unique fabric name. Only the following formats are allowed: IEEE48 Local
FcPortName	FcNameId	The name identifier associated with a port. Only the following formats are allowed: IEEE48 IEEE extended Local
FcAddressId	Octet string of size 3	A 24-bit value unique within the address space of a fabric.
FcRxDataFieldSize	Integer from 128 to 2112	Receive Data_Field size.
FcBbCredit	Integer from 0 to 32767	Buffer-to-buffer credit.
FcphVersion	Integer from 0 to 255	
FcStackedConnMode	Integer from 1 to 3	1 (none) 2 (transparent) 3 (lockedDown)
FcCosCap	Integer from 1 to 127	bit 0 (Class F) bit 1 (Class 1) bit 2 (Class 2) bit 3 (Class 3) bit 4 (Class 4) bit 5 (Class 5) bit 6 (Class 6) bit 7 (reserved for future)
Fc0BaudRate	Integer according to FC-0 baud rates	1 (other) None of below 2 (one-eighth) 155 Mbaud (12.5 MB/s) 4 (quarter) 266 Mbaud (25.0 MB/s) 8 (half) 532 Mbaud (50.0 MB/s) 16 (full) 1 Gbaud (100 MB/s) 32 (double) 2 Gbaud (200 MB/s) 64 (quadruple) 4 Gbaud (400 MB/s)
Fc0BaudRateCap	Integer from 0 to 127	bit 0 (other) bit 1 (one-eighth) bit 2 (quarter) bit 3 (half) bit 4 (full) bit 5 (double) bit 6 (quadruple) bit 7 (reserved for future)

Table 3-3 FCFABRIC-ELEMENT-MIB Definitions (Continued)

Type Definition	Value	Description
Fc0MediaCap	Integer from 0 to 65535	bit 0 (unknown) bit 1 (single mode fibre (sm)) bit 2 (multimode fiber 50 micron (m5)) bit 3 (multimode fiber 62.5 micron (m6)) bit 4 (video cable (tv)) bit 5 (miniature cable (mi)) bit 6 (shielded twisted pair (stp)) bit 7 (twisted wire (tw)) bit 8 (long video (lv)) bits 9-15 (reserved for future use)
Fc0Medium	Integer	1 (unknown) 2 (sm) 4 (m5) 8 (m6) 16 (tv) 32 (mi) 64 (stp) 128 (tw) 256 (lv)
Fc0TxType	Integer	1 (unknown) 2 (longWaveLaser (LL)) 3 (shortWaveLaser (SL)) 4 (longWaveLED (LE)) 5 (electrical (EL)) 6 (shortWaveLaser-noOFC (SN))
Fc0Distance	Integer	The FC-0 distance range associated with a port transmitter: 1 (unknown) 2 (long) 3 (intermediate) 4 (short)
FcFeModuleCapacity	Integer from 1 to 256	
FcFeFxPortCapacity	Integer from 1 to 256	
FcFeModuleIndex	Integer from 1 to 256	
FcFeFxPortIndex	Integer from 1 to 256	
FcFeNxPortIndex	Integer from 1 to 256	
FcFxPortMode	Integer	1 (unknown) 2 (fPort) 3 (flPort)
FcBbCreditModel	Integer	1 (regular) 2 (alternate)

Configuration Group

This group consists of scalar objects and tables. It contains the configuration and service parameters of the fabric element and the Fx_Ports.

The group represents a set of parameters associated with the fabric element or an Fx_Port to support its Nx_Ports.

Implementation of this group is mandatory.

fcFabricName

OID	1.3.6.1.3.42.2.1.1.1
Description	The Name_Identifier of the fabric to which this fabric element belongs.
Note	Returns the WWN of the primary switch in the fabric.

fcElementName

OID	1.3.6.1.3.42.2.1.1.2
Description	The Name_Identifier of the fabric element.
Note	Returns the WWN of the switch.

fcFeModuleCapacity

OID	1.3.6.1.3.42.2.1.1.3
Description	The maximum number of modules in the fabric element, regardless of their current state.
Note	The SilkWorm 12000/24000 switch does not support this MIB variable.

fc Fabric Element Module Table

This table contains one entry for each module, information of the modules.

fcFeModuleTable

OID	1.3.6.1.3.42.2.1.1.4
Description	A table that contains, one entry for each module in the fabric element, information of the modules.

fcFeModuleEntry

OID	1.3.6.1.3.42.2.1.1.4.1
Status	Mandatory
Description	An entry containing the configuration parameters of a module.
Index	fcFeModuleIndex

fcFeModuleIndex

OID 1.3.6.1.3.42.2.1.1.4.1.1

Description Identifies the module within the fabric element for which this entry contains information. This value is never greater than fcFeModuleCapacity.

fcFeModuleDescr

OID 1.3.6.1.3.42.2.1.1.4.1.2

Description A textual description of the module. This value should include the full name and version identification of the module. It should contain printable ASCII characters.

Note Refer to "sysDescr" on page 2-6.

fcFeModuleObjectID

OID 1.3.6.1.3.42.2.1.1.4.1.3

Description The vendor's authoritative identification of the module. This value might be allocated within the SMI enterprises subtree (1.3.6.1.4.1) and provides a straight-forward and unambiguous means for determining what kind of module is being managed.

For example, this object could take the value 1.3.6.1.4.1.99649.3.9 if vendor "Neufe Inc." was assigned the subtree 1.3.6.1.4.1.99649, and had assigned the identifier 1.3.6.1.4.1.99649.3.9 to its 'FeFiFo-16 PlugInCard.'

Note Refer to "sysObjectID" on page 2-6.

fcFeModuleOperStatus

OID 1.3.6.1.3.42.2.1.1.4.1.4

Description Indicates the operational status of the module:

online (1)	The module is functioning properly.
offline (2)	The module is not available.
testing (3)	The module is under testing.
faulty (4)	The module is defective in some way.

fcFeModuleLastChange

OID 1.3.6.1.3.42.2.1.1.4.1.5

Description Contains the value of "sysUpTime" when the module entered its current operational status. A value of 0 indicates that the operational status of the module has not changed since the agent last restarted.

fcFeModuleFxPortCapacity

OID 1.3.6.1.3.42.2.1.1.4.1.6

Description The number of Fx_Port that can be contained within the module. Within each module, the ports are uniquely numbered in the range from 1 to fcFeModuleFxPortCapacity, inclusive; however, the numbers are not required to be contiguous.

fcFeModuleName

OID 1.3.6.1.3.42.2.1.1.4.1.7

Description The Name_Identifier of the module.

Note The return value is the WWN of the switch.

Fx_Port Configuration Table

This table contains, one entry for each Fx_Port, the configuration parameters of the ports.

fcFxConfTable

OID 1.3.6.1.3.42.2.1.1.5

Description A table that contains, one entry for each Fx_Port in the fabric element, configuration and service parameters of the Fx_Ports.

fcFxConfEntry

OID 1.3.6.1.3.42.2.1.1.5.1

Description An entry containing the configuration and service parameters of an Fx_Port.

Index FcFxConfModuleIndex, fcFxConfFxPortIndex

fcFxConfModuleIndex

OID 1.3.6.1.3.42.2.1.1.5.1.1

Description Identifies the module containing the Fx_Port for which this entry contains information.

fcFxConfFxPortIndex

OID 1.3.6.1.3.42.2.1.1.5.1.2

Description Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized.

fcFxPortName

OID 1.3.6.1.3.42.2.1.1.5.1.3

Description The name identifier of this Fx_Port. Each Fx_Port has a unique port name within the address space of the fabric.

Note The return value is the WWN of the port.

fcFxPortFcphVersionHigh

OID 1.3.6.1.3.42.2.1.1.5.1.4

Description The highest or most recent version of FC-PH that the Fx_Port is configured to support.

fcFxPortFcphVersionLow

OID 1.3.6.1.3.42.2.1.1.5.1.5

Description The lowest or earliest version of FC-PH that the Fx_Port is configured to support.

fcFxPortBbCredit

OID 1.3.6.1.3.42.2.1.1.5.1.6

Description The total number of receive buffers available for holding Class 1 connect-request Class 2 or 3 frames from the attached Nx_Port. It is for buffer-to-buffer flow control in the direction from the attached Nx_Port (if applicable) to Fx_Port.

fcFxPortRxBufSize

OID 1.3.6.1.3.42.2.1.1.5.1.7

Description The largest Data_Field Size (in octets) for an FT_1 frame that can be received by the Fx_Port.

fcFxPortRatov

OID 1.3.6.1.3.42.2.1.1.5.1.8

Description The Resource_Allocation_Timeout Value configured for the Fx_Port. This is used as the time-out value for determining when to reuse an Nx_Port resource such as a Recovery_Qualifier. It represents E_D_TOV (see next object) plus twice the maximum time that a frame might be delayed within the fabric and still be delivered.

fcFxPortEdtov

OID 1.3.6.1.3.42.2.1.1.5.1.9

Description The E_D_TOV value configured for the Fx_Port. The Error_Detect_Timeout Value is used as the time-out value for detecting an error condition.

fcFxPortCosSupported

OID 1.3.6.1.3.42.2.1.1.5.1.10

Description A value indicating the set of Classes of Service supported by the Fx_Port.

fcFxPortIntermixSupported

OID 1.3.6.1.3.42.2.1.1.5.1.11

Description A flag indicating whether the Fx_Port supports an Intermixed Dedicated Connection. Possible values are yes (1) or no (2).

fcFxPortStackedConnMode

OID 1.3.6.1.3.42.2.1.1.5.1.12

Description A value indicating the mode of stacked connect supported by the Fx_Port.

fcFxPortClass2SeqDeliv

OID 1.3.6.1.3.42.2.1.1.5.1.13

Description A flag indicating whether Class 2 sequential delivery is supported by the Fx_Port. Possible values are yes (1) or no (2).

fcFxPortClass3SeqDeliv

OID 1.3.6.1.3.42.2.1.1.5.1.14

Description A flag indicating whether Class 3 sequential delivery is supported by the Fx_Port. Possible values are yes (1) or no (2).

fcFxPortHoldTime

OID 1.3.6.1.3.42.2.1.1.5.1.15

Description The maximum time (in microseconds) that the Fx_Port holds a frame before discarding the frame if it is unable to deliver the frame. The value 0 means that the Fx_Port does not support this parameter.

fcFxPortBaudRate

OID 1.3.6.1.3.42.2.1.1.5.1.16

Description The FC-0 baud rate of the Fx_Port.

Note The SilkWorm 12000/24000 switch does not support this MIB variable.

fcFxPortMedium

OID 1.3.6.1.3.42.2.1.1.5.1.17

Description The FC-0 medium of the Fx_Port.

fcFxPortTxType

OID 1.3.6.1.3.42.2.1.1.5.1.18

Description The FC-0 transmitter type of the Fx_Port.

fcFxPortDistance

OID 1.3.6.1.3.42.2.1.1.5.1.19

Description The FC-0 distance range of the Fx_Port transmitter.

Operation Group

This group consists of tables that contain operational status and established service parameters for the fabric element and the attached Nx_Ports.

Note

Implementation of this group is mandatory.

Fx_Port Operation Table

This table contains one entry for each Fx_Port, the operational status, and parameters of the Fx_Ports.

fcFxPortOperTable

OID 1.3.6.1.3.42.2.1.2.1

Description A table that contains one entry for each Fx_Port in the fabric element, operational status, and parameters of the Fx_Ports.

fcFxPortOperEntry

OID 1.3.6.1.3.42.2.1.2.1.1

Description An entry containing operational status and parameters of an Fx_Port.

Index fcFxPortOperModuleIndex, fcFxPortOperFxPortIndex

fcFxPortOperModuleIndex

OID 1.3.6.1.3.42.2.1.2.1.1.1

Description Identifies the module containing the Fx_Port for which this entry contains information.

fcFxPortOperFxPortIndex

OID 1.3.6.1.3.42.2.1.2.1.1.2

Description Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized.

fcFxPortID

OID 1.3.6.1.3.42.2.1.2.1.1.3

Description The address identifier by which this Fx_Port is identified within the fabric. The Fx_Port might assign its address identifier to its attached Nx_Port(s) during fabric login.

fcFPortAttachedPortName

OID 1.3.6.1.3.42.2.1.2.1.1.4

Description The port name of the attached N_Port, if applicable. If the value of this object is ‘0000000000000000’H, this Fx_Port has no Nx_Port attached to it. This variable has been deprecated and might be implemented for backward compatibility.

fcFPortConnectedPort

OID 1.3.6.1.3.42.2.1.2.1.1.5

Description The address identifier of the destination Fx_Port with which this Fx_Port is currently engaged in either a Class 1 or loop connection. If the value of this object is ‘000000’H, this Fx_Port is not engaged in a connection. This variable has been deprecated and might be implemented for backward compatibility.

fcFxPortBbCreditAvailable

OID 1.3.6.1.3.42.2.1.2.1.1.6

Description The number of buffers currently available for receiving frames from the attached port in the buffer-to-buffer flow control. The value should be less than or equal to fcFxPortBbCredit.

fcFxPortOperMode

OID 1.3.6.1.3.42.2.1.2.1.1.7

Description The current operational mode of the Fx_Port.

fcFxPortAdminMode

OID 1.3.6.1.3.42.2.1.2.1.1.8

Description The desired operational mode of the Fx_Port.

Fx_Port Physical Level Table

This table contains one entry for each Fx_Port in the fabric element, and the physical level status and parameters of the Fx_Ports.

fcFxPortPhysTable

OID 1.3.6.1.3.42.2.1.2.3

Description A table that contains, one entry for each Fx_Port in the fabric element, physical level status and parameters of the Fx_Ports.

fcFxPortPhysEntry

OID 1.3.6.1.3.42.2.1.2.3.1

Description An entry containing physical level status and parameters of an Fx_Port.

Index fcFxPortPhysModuleIndex, fcFxPortPhysFxPortIndex

fcFxPortPhysModuleIndex

OID 1.3.6.1.3.42.2.1.2.3.1.1

Description Identifies the module containing the Fx_Port for which this entry contains information.

fcFxPortPhysFxPortIndex

OID 1.3.6.1.3.42.2.1.2.3.1.2

Description Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized.

fcFxPortPhysAdminStatus

OID 1.3.6.1.3.42.2.1.2.3.1.3

Description The desired state of the Fx_Port:

online (1) Place port online.

offline (2) Take port offline.

testing (3) Initiate test procedures.

A management station might place the Fx_Port in a desired state by setting this object accordingly. The testing state (3) indicates that no operational frames can be passed. When a fabric element initializes, all Fx_Ports start with fcFxPortPhysAdminStatus in the offline state (2). As the result of either explicit management action or per configuration information accessible by the fabric element, fcFxPortPhysAdminStatus is then changed to either the online (1) or testing (3) states or remains in the offline state (2).

fcFxPortPhysOperStatus

OID 1.3.6.1.3.42.2.1.2.3.1.4

Description The current operational status of the Fx_Port:

online (1)	Login might proceed.
offline (2)	Login cannot proceed.
testing (3)	Port is under test.
link-failure (4)	Failure after online/testing.

The testing state (3) indicates that no operational frames can be passed. If fcFxPortPhysAdminStatus is offline (2), then fcFxPortPhysOperStatus should be offline (2). If fcFxPortPhysAdminStatus is changed to online (1), then fcFxPortPhysOperStatus should change to 1 (online) if the Fx_Port is ready to accept fabric login request from the attached Nx_Port; it should proceed and remain in the link-failure state (4) if and only if there is a fault that prevents it from going to the online state (1).

fcFxPortPhysLastChange

OID 1.3.6.1.3.42.2.1.2.3.1.5

Description The value of sysUpTime at the time the Fx_Port entered its current operational status. A value of 0 indicates that the Fx_Port's operational status has not changed since the agent last restarted.

fcFxPortPhysRttov

OID 1.3.6.1.3.42.2.1.2.3.1.6

Description The Receiver_Transmitter_Timeout value of the Fx_Port. This is used by the receiver logic to detect Loss of Synchronization.

Fx_Port Fabric Login Table

This table contains one entry for each Fx_Port in the fabric element, and the Service Parameters that have been established from the most recent fabric login, whether implicit or explicit.

fcFxlogiTable

OID 1.3.6.1.3.42.2.1.2.4

Description A table that contains, one entry for each Fx_Port in the fabric element, services parameters established from the most recent fabric login, explicit or implicit.

fcFxlogiEntry

OID 1.3.6.1.3.42.2.1.2.4.1

Description An entry containing service parameters established from a successful fabric login.

Index fcFxloginModuleIndex, fcFxloginFxPortIndex, fcFxloginNxPortIndex

fcFxlogiModuleIndex

OID 1.3.6.1.3.42.2.1.2.4.1.1

Description Identifies the module containing the Fx_Port for which this entry contains information.

fcFxlogiFxPortIndex

OID 1.3.6.1.3.42.2.1.2.4.1.2

Description Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized.

fcFxlogiNxPortIndex

OID 1.3.6.1.3.42.2.1.2.4.1.3

Description The object identifies the associated Nx_Port in the attachment for which the entry contains information.

fcFxPortFcphVersionAgreed

OID 1.3.6.1.3.42.2.1.2.4.1.4

Description The version of FC-PH that the Fx_Port has agreed to support from the fabric login.

fcFxPortNxPortBbCredit

OID 1.3.6.1.3.42.2.1.2.4.1.5

Description The total number of buffers available for holding Class 1 connect-request Class 2 or Class 3 frames to be transmitted to the attached Nx_Port. It is for buffer-to-buffer flow control in the direction from Fx_Port to Nx_Port. The buffer-to-buffer flow control mechanism is indicated in the respective fcFxPortBbCreditModel.

fcFxPortNxPortRxDataFieldSize

OID 1.3.6.1.3.42.2.1.2.4.1.6

Description The Receive Data Field Size of the attached Nx_Port. This is a binary value that specifies the largest Data Field Size for an FT_1 frame that can be received by the Nx_Port. The value is a number of bytes in the range 128 to 2112, inclusive.

fcFxPortCosSuppAgreed

OID 1.3.6.1.3.42.2.1.2.4.1.7

Description Indicates that the attached Nx_Port has requested the Fx_Port for the support of classes of services and the Fx_Port has granted the request.

fcFxPortIntermixSuppAgreed

OID 1.3.6.1.3.42.2.1.2.4.1.8

Description A variable indicating that the attached Nx_Port has requested the Fx_Port for Intermix support and the Fx_Port has granted the request. This flag is only valid if Class 1 service is supported. Possible values are yes (1) or no (2).

fcFxPortStackedConnModeAgreed

OID 1.3.6.1.3.42.2.1.2.4.1.9

Description Indicates whether the Fx_Port has agreed to support stacked connect from the fabric login. This is only meaningful if Class 1 service has been agreed to.

fcFxPortClass2SeqDelivAgreed

OID 1.3.6.1.3.42.2.1.2.4.1.10

Description A variable indicating whether the Fx_Port has agreed to support Class 2 sequential delivery from the fabric login. This is only meaningful if Class 2 service has been agreed. Possible values are yes (1) or no (2).

fcFxPortClass3SeqDelivAgreed

OID 1.3.6.1.3.42.2.1.2.4.1.11

Description A flag indicating whether the Fx_Port has agreed to support Class 3 sequential delivery from the fabric login. This is only meaningful if Class 3 service has been agreed to. Possible values are yes (1) or no (2).

fcFxPortNxPortName

OID 1.3.6.1.3.42.2.1.2.4.1.12

Description The port name of the attached Nx_Port, if applicable. If the value of this object is ‘0000000000000000’H, this Fx_Port has no Nx_Port attached to it.

fcFxPortConnectedNxPort

OID 1.3.6.1.3.42.2.1.2.4.1.13

Description The address identifier of the destination Fx_Port with which this Fx_Port is currently engaged in either a Class 1 or loop connection. If the value of this object is ‘000000’H, this Fx_Port is not engaged in a connection.

fcFxPortBbCreditModel

OID 1.3.6.1.3.42.2.1.2.4.1.14

Description Identifies the BB_Credit model used by the Fx_Port. The regular model refers to the buffer-to-buffer flow control mechanism defined in FC-PH [1] used between the F_Port and the N_Port. For FL_Ports, the alternate buffer-to-buffer flow control mechanism as defined in FC-AL [4] is used between the FL_Port and any attached NL_Ports.

Error Group

This group consists of tables that contain information about the various types of errors detected. The management station might use the information in this group to determine the quality of the link between the Fx_Port and its attached Nx_Port.

Implementation of this group is optional.

Fx_Port Error Table

This table contains one entry for each Fx_Port in the fabric element, and counters recording numbers of errors detected since the management agent reinitialized.

The first six columnar objects after the port index correspond to the counters in the Link ErrorStatus Block.

fcFxPortErrorTable

OID 1.3.6.1.3.42.2.1.3.1

Description A table that contains one entry for each Fx_Port, and counters that record the numbers of errors detected since the management agent reinitialized.

fcFxPortErrorEntry

OID 1.3.6.1.3.42.2.1.3.1.1

Description An entry containing error counters of an Fx_Port.

Index fcFxPortErrorModuleIndex, fcFxPortErrorFxPortIndex

fcFxPortErrorModuleIndex

OID 1.3.6.1.3.42.2.1.3.1.1.1

Description Identifies the module containing the Fx_Port for which this entry contains information.

fcFxPortErrorFxPortIndex

OID 1.3.6.1.3.42.2.1.3.1.1.2

Description Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized.

fcFxPortLinkFailures

OID 1.3.6.1.3.42.2.1.3.1.1.3

Description The number of link failures detected by this Fx_Port.

fcFxPortSyncLosses

OID 1.3.6.1.3.42.2.1.3.1.1.4

Description The number of loss of synchronization errors detected by the Fx_Port.

fcFxPortSigLosses

OID 1.3.6.1.3.42.2.1.3.1.1.5

Description The number of loss of signal errors detected by the Fx_Port.

fcFxPortPrimSeqProtoErrors

OID 1.3.6.1.3.42.2.1.3.1.1.6

Description The number of primitive sequence protocol errors detected by the Fx_Port.

fcFxPortInvalidTxWords

OID 1.3.6.1.3.42.2.1.3.1.1.7

Description The number of invalid transmission word errors detected by the Fx_Port.

fcFxPortInvalidCrcs

OID 1.3.6.1.3.42.2.1.3.1.1.8

Description The number of invalid Cyclic Redundancy Checks (CRCs) detected by this Fx_Port.

fcFxPortDelimiterErrors

OID 1.3.6.1.3.42.2.1.3.1.1.9

Description The number of Delimiter errors detected by this Fx_Port.

fcFxPortAddressIdErrors

OID 1.3.6.1.3.42.2.1.3.1.1.10

Description The number of address identifier errors detected by this Fx_Port.

fcFxPortLinkResetIns

OID 1.3.6.1.3.42.2.1.3.1.1.11

Description The number of Link Reset Protocol errors received by this Fx_Port from the attached Nx_Port.

fcFxPortLinkResetOuts

OID 1.3.6.1.3.42.2.1.3.1.1.12

Description The number of Link Reset Protocol errors issued by this Fx_Port to the attached Nx_Port.

fcFxPortOlsIns

OID 1.3.6.1.3.42.2.1.3.1.1.13

Description The number of Offline Sequence errors received by this Fx_Port.

fcFxPortOlsOuts

OID 1.3.6.1.3.42.2.1.3.1.1.14

Description The number of Offline Sequence errors issued by this Fx_Port.

Accounting Group

Brocade does not support Accounting tables; this section is not applicable.

Capability Group

This group consists of a table describing information about what each Fx_Port is inherently capable of operating or supporting. A capability might be used or not, as expressed in its respective object value in the Configuration group.

Implementation of this group is optional.

Fx_Port Capability Table

fcFxPortCapTable

OID 1.3.6.1.3.42.2.1.5.1

Description A table that contains one entry for each Fx_Port, and the capabilities of the port within the fabric element.

fcFxPortCapEntry

OID 1.3.6.1.3.42.2.1.5.1.1

Description An entry containing the capabilities of a Fx_Port.

Index fcFxPortCapModuleIndex, fcFxPortCapFxPortIndex

fcFxPortCapModuleIndex

OID 1.3.6.1.3.42.2.1.5.1.1.1

Description Identifies the module containing the Fx_Port for which this entry contains information.

fcFxPortCapFxPortIndex

OID 1.3.6.1.3.42.2.1.5.1.1.2

Description Identifies the Fx_Port within the module. This number ranges from 1 to the value of fcFeModulePortCapacity for the associated module. The value remains constant for the identified Fx_Port until the module is reinitialized.

fcFxPortCapFcphVersionHigh

OID 1.3.6.1.3.42.2.1.5.1.1.3

Description The highest or most recent version of FC-PH that the Fx_Port is capable of supporting.

fcFxPortCapFcphVersionLow

OID 1.3.6.1.3.42.2.1.5.1.1.4

Description The lowest or earliest version of FC-PH that the Fx_Port is capable of supporting.

fcFxPortCapBbCreditMax

OID 1.3.6.1.3.42.2.1.5.1.1.5

Description The maximum number of receive buffers available for holding Class 1 connect-request Class 2 or Class 3 frames from the attached Nx_Port.

fcFxPortCapBbCreditMin

OID 1.3.6.1.3.42.2.1.5.1.1.6

Description The minimum number of receive buffers available for holding Class 1 connect-request Class 2 or Class 3 frames from the attached Nx_Port.

fcFxPortCapRxDataFieldSizeMax

OID 1.3.6.1.3.42.2.1.5.1.1.7

Description The maximum size (in bytes) of the Data Field in a frame that the Fx_Port is capable of receiving from its attached Nx_Port.

fcFxPortCapRxDataFieldSizeMin

OID 1.3.6.1.3.42.2.1.5.1.1.8

Description The minimum size (in bytes) of the Data Field in a frame that the Fx_Port is capable of receiving from its attached Nx_Port.

fcFxPortCapCos

OID 1.3.6.1.3.42.2.1.5.1.1.9

Description A value indicating the set of Classes of Service that the Fx_Port is capable of supporting.

fcFxPortCapIntermix

OID 1.3.6.1.3.42.2.1.5.1.1.10

Description A flag indicating whether the Fx_Port is capable of supporting the intermixing of Class 2 and Class 3 frames during a Class 1 connection. This flag is only valid if the port is capable of supporting Class 1 service. Possible values are yes (1) or no (2).

fcFxPortCapStackedConnMode

OID 1.3.6.1.3.42.2.1.5.1.1.11

Description A value indicating the mode of Stacked Connect request that the Fx_Port is capable of supporting.

fcFxPortCapClass2SeqDeliv

OID 1.3.6.1.3.42.2.1.5.1.1.12

Description A flag indicating whether the Fx_Port is capable of supporting Class 2 Sequential Delivery. Possible values are yes (1) or no (2).

fcFxPortCapClass3SeqDeliv

OID 1.3.6.1.3.42.2.1.5.1.1.13

Description A flag indicating whether the Fx_Port is capable of supporting Class 3 Sequential Delivery. Possible values are yes (1) or no (2).

fcFxPortCapHoldTimeMax

OID 1.3.6.1.3.42.2.1.5.1.1.14

Description The maximum holding time (in microseconds) that the Fx_Port is capable of supporting.

fcFxPortCapHoldTimeMin

OID 1.3.6.1.3.42.2.1.5.1.1.15

Description The minimum holding time (in microseconds) that the Fx_Port is capable of supporting.

fcFxPortCapBaudRates

OID 1.3.6.1.3.42.2.1.5.1.1.16

Description A value indicating the set of baud rates that the Fx_Port is capable of supporting. This variable has been deprecated and might be implemented for backward compatibility.

fcFxPortCapMedia

OID 1.3.6.1.3.42.2.1.5.1.1.17

Description A value indicating the set of media that the Fx_Port is capable of supporting. This variable has been deprecated and might be implemented for backward compatibility.

Entity MIB Objects

Chapter 4

This chapter provides descriptions and other information specific to Entity MIB object types and includes the following information:

- "Entity MIB Overview" next
- "Entity MIB Objects" on page 4-5
- "Entity MIB Trap" on page 4-19
- "Entity MIB Conformance Information" on page 4-19

Entity MIB Overview

Entity MIB is the module for representing multiple logical entities supported by a single SNMP agent. This MIB is supported only in Fabric OS v4.*x*.

The descriptions of each of the MIB variables in this chapter come directly from Entity MIB itself. The notes that follow the descriptions typically pertain to Brocade-specific information and are provided by Brocade.

The object types in Entity MIB are organized into the following groupings:

- "Entity MIB Objects" on page 4-5
- "Entity MIB Trap" on page 4-19
- "Entity MIB Conformance Information" on page 4-19

Entity MIB System Organization of MIB Objects

Figure 4-1 and Figure 4-2 depict the organization and structure of the Entity MIB file system.

Figure 4-1 Overall Tree Structure for Entity MIB

- iso (1)
- org (3)
- dod (6)
- internet (1)
- mgmt (2)
- mib-2 (1)
- **entityMIB** (47)
- entityMIBObjects (1)
- entityPhysical (1)
- entityLogical (2)
- entityMapping (3)
- entityGeneral (4)

Figure 4-2 Structure for Entity MIB Objects

- entityPhysical (1.3.6.1.2.1.47.1.1)
- ❒ **entPhysicalTable** (1)
- ☒ entPhysicalEntry (1)
- ● entPhysicalIndex (1)
- ● entPhysicalDescr (2)
- ● entPhysicalVendorType (3)
- ● entPhysicalContainedIn (4)
- ● entPhysicalClass (5)
- ● entPhysicalParentRelPos (6)
- ● entPhysicalName (7)
- ● entPhysicalHardwareRev (8)
- ● entPhysicalFirmwareRev (9)
- ● entPhysicalSoftwareRev (10)
- ● entPhysicalSerialNum (11)
- ● entPhysicalMfgName (12)
- ● entPhysicalModelName (13)
- ● entPhysicalAlias (14)
- ● entPhysicalAssetID (15)
- ● entPhysicalIsFRU (16)

- entityLogical (1.3.6.1.2.1.47.1.2)
- ❒ **entLogicalTable** (1)
- ☒ entLogicalEntry (1)
- ● entLogicalIndex (1)
- ● entLogicalDescr (2)

- entityMapping (1.3.6.1.2.1.47.1.3)
- ❒ **entLPMappingTable** (1)
- ☒ entLPMappingEntry (1)
- ● entLPPhysicalIndex (1)
- ❒ **entAliasMappingTable** (2)
- ☒ entAliasMappingEntry (1)
- ● entAliasLogicalIndexOrZero (1)
- ● entAliasMappingIdentifier (2)
- ❒ **entPhysicalContainsTable** (3)
- ☒ entPhysicalContainsEntry (1)
- ● entPhysicalChildIndex (1)

- entityGeneral (1.3.6.1.2.1.47.1.4)
- ● entLastChangeTime (1)

- entityMIBTraps (1.3.6.1.2.1.47.2)
- entityMIBTrapPrefix (0)
- ● entConfigChange (1)

- entityConformance (1.3.6.1.2.1.47.3)
- entityCompliances (1)
- ● entityCompliance (1)
- ● entity2Compliance (2)
- entityGroups (2)
- ● entityPhysicalGroup (1)

Definitions for Entity MIB

Table 4-1 lists the objects or definitions that are imported into the Entity MIB and the modules from which they are imported.

Table 4-1 Objects Imported into the Entity MIB

Object	Imported from this module
MODULE-IDENTITY	SNMPv2-SMI
OBJECT-TYPE	
NOTIFICATION-TYPE	
mib-2	
TDomain	SNMPv2-TC
TAddress	
TEXTUAL-CONVENTION	
AutonomousType	
RowPointer	
TimeStamp	
TruthValue	
MODULE-COMPLIANCE	SNMPv2-CONF
OBJECT-GROUP	
NOTIFICATION-GROUP	
SnmpAdminString	SNMP-FRAMEWORK-MIB

Textual Conventions

PhysicalIndex

Status Current

Description Arbitrary value that uniquely identifies the physical entity. Value should be a small positive integer; index values for different physical entities are not necessarily contiguous.

Syntax Integer (1... 2147483647)

PhysicalClass

Status Current

Description An enumerated value that provides an indication of the general hardware type of a particular physical entity. There are no restrictions as to the number of entPhysicalEntries of each entPhysicalClass, which must be instantiated by an agent.

Syntax Integer

Table 4-2 Possible Values for PhysicalClass

Values	Description
other (1)	The physical entity class is known but does not match any of the supported values.
unknown (2)	The physical entity class is unknown to the agent.
chassis (3)	The physical entity class is an overall container for networking equipment. Any class of physical entity except a stack can be contained within a chassis, and a chassis might be contained only within a stack.
backplane (4)	The physical entity class is a device for aggregating and forwarding networking traffic, such as a shared backplane in a modular Ethernet switch. Note that an agent might model a backplane as a single physical entity, which is actually implemented as multiple discrete physical components (within a chassis or stack).
container (5)	The physical entity class is capable of containing one ore more removable physical entities, possibly of different types (such as a chassis slot or daughter-card holder). For example, each (empty or full) slot in a chassis is modeled as a container. Note that all removable physical entities should be modeled within a container entity, such as field-replaceable modules, fans, or power supplies. Note that all known containers, including empty containers, should be modeled by the agent.
powerSupply (6)	The physical entity class is a power-supplying component.
fan (7)	The physical entity class is a fan or other heat-reduction component.
sensor (8)	The physical entity class is a sensor, such as a temperature sensor within a router chassis.
module (9)	The physical entity class is a self-contained subsystem (such as a plug-in card or daughter-card). If it is removable, then it should be modeled within a container entity; otherwise, it should be modeled directly within another physical entity (for example, a chassis or another module).
port (10)	The physical entity class is a networking port, capable of receiving or transmitting networking traffic.
stack (11)	The physical entity class is a super-container (possibly virtual), intended to group together multiple chassis entities (such as a stack of multiple chassis entities). A stack might be realized by a virtual cable or a real interconnect cable attached to multiple chassis, or it can comprise multiple interconnect cables. A stack should not be modeled within any other physical entities, but a stack might be contained within another stack. Only chassis entities should be contained within a stack.

SnmpEngineIdOrNone

Status Current

Description A specially formatted SnmpEngineID string for use with the Entity MIB.

If an instance of an object with syntax SnmpEngineIdOrNone has a non-zero length, then the object encoding and semantics are defined by the SnmpEngineID textual convention (refer to RFC 2571 [RFC2571]).

If an instance of an object with syntax SnmpEngineIdOrNone contains a zero-length string, then no appropriate SnmpEngineID is associated with the logical entity (that is, SNMPv3 not supported).

Syntax OCTET STRING (SIZE(0..32)) Empty string or SnmpEngineID

Entity MIB Objects

The Entity MIB objects are divided into the following groups:

- *Physical Entity Group* on page 4-5
- *Logical Entity Group* on page 4-13
- *Entity Mapping Group* on page 4-15
- *General Group* on page 4-18

The following sections list the MIBs in each group.

Physical Entity Group

entPhysicalTable

OID 1.3.6.1.2.1.47.1.1.1

Status Current

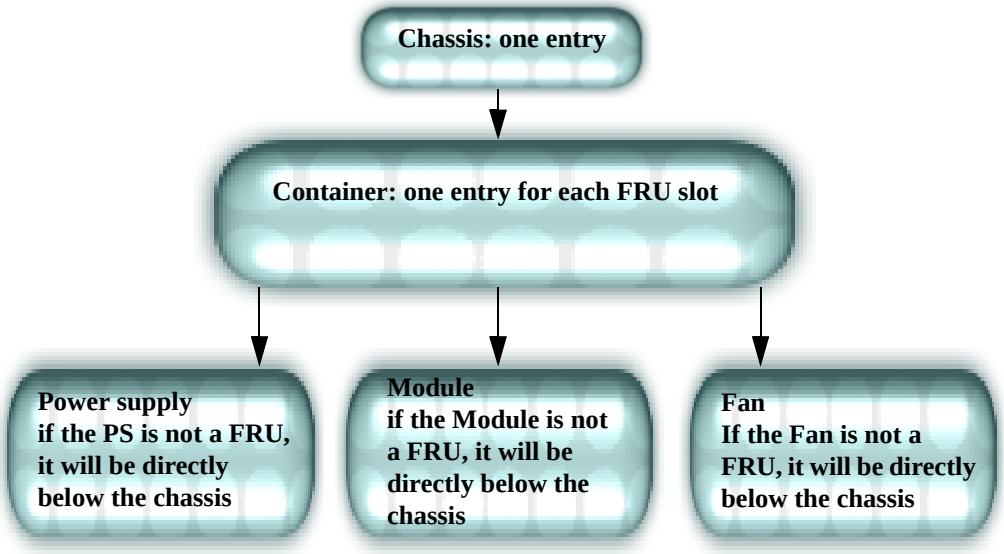
Description This table contains one row per physical entity (see Figure 4-3). The table always contains at least one row for an "overall" physical entity.

Note This object is implemented for Fabric OS v4.1 and above.

Table 4-3 entPhysicalTable Entries for SilkWorm Switches

Platform	Blades	Fans	Power Supply	WWN Card
SilkWorm 3016	1	NA	NA	1 WWN unit not a FRU
SilkWorm 3250	1	3 fans not a FRU	1 PS not a FRU	1 WWN unit not a FRU
SilkWorm 3850	1	4 fans not a FRU	2 PS not a FRU	1 WWN unit not a FRU
SilkWorm 3900	1	6 fans in 3 FRUs	2 PS	1 WWN unit not a FRU
SilkWorm 4100	1	3 FRUs	2 PS	1 WWN unit not a FRU
SilkWorm 12000	10 blades	3 fans	4 PS	2 WWN units in 1 FRU
SilkWorm 24000	10 blades	3 fans	4 PS	2 WWN units in 1 FRU

Figure 4-3 entPhysicalTable Containment Hierarchy (entPhysicalContainsTable)



entPhysicalEntry

OID	1.3.6.1.2.1.47.1.1.1.1
Status	Current
Description	Information about a particular physical entity. Each entry provides objects (entPhysicalDescr, entPhysicalVendorType, and entPhysicalClass) to help an NMS identify and characterize the entry, and objects (entPhysicalContainedIn and entPhysicalParentRelPos) to help an NMS relate the particular entry to other entries in this table.
Index	entPhysicalIndex

entPhysicalIndex

OID	1.3.6.1.2.1.47.1.1.1.1.1
Status	Current
Description	Unique identifier of the physical entity.

entPhysicalDescr

OID	1.3.6.1.2.1.47.1.1.1.1.2
Status	Current
Description	A textual description of the physical entity (physical name of the entity, such as chassis, blade, port, and so on). This object should contain a string that identifies the entity manufacturer's name and should be set to a distinct value for each version or model of the physical entity.

Note	The name provides the entity type and number (for example, slot 1, power supply, and so on). The description gives the textual description of the type of the entry (for example, power supply, module, and so on).

entPhysicalVendorType

OID	1.3.6.1.2.1.47.1.1.1.1.3
Status	Current
Description	An indication of the vendor-specific hardware type of the physical entity. Note that this is different from the definition of MIB-II sysObjectID. An agent should set this object to an enterprise-specific registration identifier value, indicating the specific equipment type in detail. The associated instance of entPhysicalClass indicates the general type of hardware device. If no vendor-specific registration identifier exists for this physical entity, or if the value is unknown by this agent, then the value { 0, 0 } is returned.
Note	Currently, NULL OID { 0, 0 } is returned.

entPhysicalContainedIn

OID	1.3.6.1.2.1.47.1.1.1.1.4
Status	Current
Description	The value of entPhysicalIndex for the physical entity that “contains” this physical entity. A value of 0 indicates this physical entity is not contained in any other physical entity. Note that the set of containment relationships define a strict hierarchy; that is, recursion is not allowed. In the event a physical entity is contained by more than one physical entity (for example, double-wide modules), this object should identify the containing entity with the lowest value of entPhysicalIndex.
Note	Value 0 for chassis entry. All containers have ContainedIn set to 1. All FRUs are contained in their respective slot container entries.

entPhysicalClass

OID	1.3.6.1.2.1.47.1.1.1.1.5
Status	Current
Description	An indication of the general hardware type of the physical entity. An agent should set this object to the standard enumeration value that most accurately indicates the general class of the physical entity, or the primary class if there is more than one. If no appropriate standard registration identifier exists for this physical entity, then the value `other(1)` is returned. If the value is unknown by this agent, then the value `unknown(2)` is returned.

Note — SilkWorm 12000 and 24000 switches can have the following hierarchy of physical objects:

- Chassis: One entry (one row)
- Container: One entry for each FRU slot (eight port blades, two CPs, four power supplies, three fans)
- Module: Eight entries for port blades, two entries for CPs, four entries for power supplies, and three entries for fans.

SilkWorm 3900 switches can have the following hierarchy of physical objects:

- Chassis: One entry (one row)
- Container: One entry for each FRU slot (one switch blade, two power supplies, six fans)
- Module: One entry for switch blade, up to two entries for power supplies, and up to six entries for fans.

SilkWorm 4100 switches can have the following hierarchy of physical objects:

- Chassis: One entry (one row)
- Container: One entry for each FRU slot (one switch blade, two power supplies, three fans)
- Module: 1 entry for switch blade, up to two entries for power supplies, and up to three entries for fans.

entPhysicalParentRelPos

OID — 1.3.6.1.2.1.47.1.1.1.1.6

Status — Current

Description — An indication of the relative position of this child component among all its *sibling* components. Sibling components are defined as entPhysicalEntries that share the same instance values of each of the entPhysicalContainedIn and entPhysicalClass objects.

Note — For chassis entry, this value is -1; for containers, it is the sequential number of the container from the first one; for all FRUs, it is always 1.

An NMS can use this object to identify the relative ordering for all sibling components of a particular parent (identified by the entPhysicalContainedIn instance in each sibling entry).

This value should match any external labeling of the physical component if possible. For example, for a container (such as a card slot) labeled slot #3, entPhysicalParentRelPos should have the value 3. Note that the entPhysicalEntry for the module plugged into slot 3 should have an entPhysicalParentRelPos value of 1.

If the physical position of this component does not match any external numbering or clearly visible ordering, then user documentation or other external reference material should be used to determine the parent-relative position. If this is not possible, then the agent should assign a consistent (but possibly arbitrary) ordering to a given set of sibling components, perhaps based on internal representation of the components.

If the agent cannot determine the parent-relative position for some reason, or if the associated value of entPhysicalContainedIn is 0, then the value -1 is returned; otherwise, a non-negative integer is returned, indicating the parent-relative position of this physical entity.

Parent-relative ordering normally starts from 1 and continues to *n*, where *n* represents the highest-positioned child entity. However, if the physical entities (for example, slots) are labeled from a starting position of zero, then the first sibling should be associated with an entPhysicalParentRelPos value of 0. Note that this ordering might be sparse or dense, depending on agent implementation.

The actual values returned are not globally meaningful, as each parent component might use different numbering algorithms. The ordering is meaningful only among siblings of the same parent component.

The agent should retain parent-relative position values across reboots, either through algorithmic assignment or use of nonvolatile storage.

entPhysicalName

OID 1.3.6.1.2.1.47.1.1.1.1.7

Status Current

Description The textual name of the physical entity (physical name of the entity such as chassis, blade, port, and so on). The value of this object should be the name of the component as assigned by the local device and should be suitable for use in commands entered at the device's "console." This might be a text name, such as "console," or a simple component number (for example, port or module number) such as 1, depending on the physical component naming syntax of the device.

If there is no local name, or this object is otherwise not applicable, then this object contains a zero-length string.

Note that the value of entPhysicalName for two physical entities is the same in the event that the console interface does not distinguish between them (for example, slot-1 and the card in slot-1).

Note The name provides the type of the entry and its number (for example, slot 1, power supply, and so on). The description gives the textual description of the type of the entry (for example, power supply, module, and so on)

entPhysicalHardwareRev

OID 1.3.6.1.2.1.47.1.1.1.1.8

Status Current

Description The vendor-specific hardware revision string for the physical entity. The preferred value is the hardware revision identifier actually printed on the component itself (if present).

Note that if revision information is stored internally in a nonprintable (for example, binary) format, then the agent must convert such information to a printable format, in an implementation-specific manner.

If no specific hardware revision string is associated with the physical component, or if this information is unknown to the agent, then this object will contain a zero-length string.

Note — Set to empty string.

entPhysicalFirmwareRev

OID — 1.3.6.1.2.1.47.1.1.1.1.9

Status — Current

Description — The vendor-specific firmware revision string for the physical entity.

Note that if revision information is stored internally in a nonprintable (for example, binary) format, then the agent must convert such information to a printable format, in an implementation-specific manner.

If no specific firmware programs are associated with the physical component, or if this information is unknown to the agent, then this object will contain a zero-length string.

Note — Set to empty string.

entPhysicalSoftwareRev

OID — 1.3.6.1.2.1.47.1.1.1.1.10

Status — Current

Description — The vendor-specific software revision string for the physical entity.

Note that if revision information is stored internally in a nonprintable (for example, binary) format, then the agent must convert such information to a printable format, in an implementation-specific manner.

If no specific software programs are associated with the physical component, or if this information is unknown to the agent, then this object will contain a zero-length string.

Note — Set to empty string.

entPhysicalSerialNum

OID — 1.3.6.1.2.1.47.1.1.1.1.11

Status — Current

Description — The vendor-specific serial number string for the physical entity. The preferred value is the serial number actually printed on the component (if present).

On the first instantiation of a physical entity, the value of entPhysicalSerialNum associated with that entity is set to the correct vendor-assigned serial number, if this information is available to the agent. If a serial number is unknown or nonexistent, the entPhysicalSerialNum is set to a zero-length string instead.

Note that implementations that can correctly identify the serial numbers of all installed physical entities do not need to provide write access to the entPhysicalSerialNum object. Agents that cannot provide nonvolatile storage for the entPhysicalSerialNum strings are not required to implement write access for this object.

Not every physical component has a serial number or even needs one. Physical entities for which the associated value of the entPhysicalIsFRU object is equal to "false(2)" (for example, the repeater ports within a repeater module), do not need their own unique serial number. An agent does not have to provide write access for such entities and might return a zero-length string.

If write access is implemented for an instance of entPhysicalSerialNum and a value is written into the instance, the agent must retain the supplied value in the entPhysicalSerialNum instance associated with the same physical entity for as long as that entity remains instantiated. This includes instantiations across all reinitializations/reboots of the network management system, including those that result in a change of the physical entity's entPhysicalIndex value.

Note — Set to serial number and part number (if available), respectively.

entPhysicalMfgName

OID — 1.3.6.1.2.1.47.1.1.1.1.12

Status — Current

Description — The name of the manufacturer of this physical component. The preferred value is the name actually printed on the component (if present).

Note that comparisons between instances of the entPhysicalModelName, entPhysicalFirmwareRev, entPhysicalSoftwareRev, and the entPhysicalSerialNum objects are meaningful only amongst entPhysicalEntries with the same value of entPhysicalMfgName.

If the manufacturer name string associated with the physical component is unknown to the agent, then this object contains a zero-length string.

Note — Set to empty string.

entPhysicalModelName

OID — 1.3.6.1.2.1.47.1.1.1.1.13

Status — Current

Description — The vendor-specific model name associated with this physical component. The preferred value is the customer-visible part number, which might be printed on the component.

If the model name string associated with the physical component is unknown to the agent, then this object contains a zero-length string.

Note — Set to serial number and part number (if available) respectively.

entPhysicalAlias

OID 1.3.6.1.2.1.47.1.1.1.1.14

Status Current

Description This object is an alias name for the physical entity as specified by a network manager; it provides a nonvolatile handle for the physical entity.

On the first instantiation of a physical entity, the value of entPhysicalAlias associated with that entity is set to the zero-length string. However, the agent might set the value to a locally unique default value instead of a zero-length string.

If write access is implemented for an instance of entPhysicalAlias and a value is written into the instance, the agent must retain the supplied value in the entPhysicalAlias instance associated with the same physical entity for as long as that entity remains instantiated. This includes instantiations across all reinitializations/ reboots of the network management system, including those that result in a change of the physical entity's entPhysicalIndex value.

Note Set to empty string.

entPhysicalAssetID

OID 1.3.6.1.2.1.47.1.1.1.1.15

Status Current

Description This object is a user-assigned asset tracking identifier for the physical entity as specified by a network manager; it provides nonvolatile storage of this information.

On the first instantiation of a physical entity, the value of entPhysicalAssetID associated with that entity is set to the zero-length string.

Not every physical component has an asset tracking identifier or even need one. Physical entities for which the associated value of the entPhysicalIsFRU object is equal to "false(2)" (for example, the repeater ports within a repeater module) do not need their own unique asset tracking identifier. An agent does not have to provide write access for such entities and might instead return a zero-length string.

If write access is implemented for an instance of entPhysicalAssetID and a value is written into the instance, the agent must retain the supplied value in the entPhysicalAssetID instance associated with the same physical entity for as long as that entity remains instantiated. This includes instantiations across all re-initializations/reboots of the network management system, including those that result in a change of the physical entity's entPhysicalIndex value.

If no asset tracking information is associated with the physical component, then this object contains a zero-length string.

Note Set to empty string.

entPhysicalIsFRU

OID 1.3.6.1.2.1.47.1.1.1.1.16

Status Current

Description The entPhysicalIsFRU object indicates whether this physical entity is considered a field replaceable unit by the vendor. If this object contains the value “true(1),” then this entPhysicalEntry identifies a field replaceable unit. For all entPhysicalEntries representing components that are permanently contained within a field replaceable unit, the value “false(2)” should be returned for this object.

Note Set to True (1) for FRU entries (port blades, CPs, sensors, power supplies, and fans; False (2) for container and chassis type entries.

Logical Entity Group

This section lists the entityLogical MIBs.

entLogicalTable

OID 1.3.6.1.2.1.47.1.2.1

Description This table contains one row per logical entity. For agents that implement more than one naming scope, at least one entry must exist. Agents that instantiate all MIB objects within a single naming scope are not required to implement this table.

entLogicalEntry

OID 1.3.6.1.2.1.47.1.2.1.1

Description Information about a particular logical entity. Entities might be managed by this agent or other SNMP agents in the same chassis.

Index entLogicalIndex

entLogicalIndex

OID 1.3.6.1.2.1.47.1.2.1.1.1

Description The value of this object uniquely identifies the logical entity. The value should be a small positive integer; index values for different logical entities are not necessarily contiguous.

entLogicalDescr

OID 1.3.6.1.2.1.47.1.2.1.1.2

Description A textual description of the logical entity. This object should contain a string that identifies the manufacturer’s name for the logical entity and should be set to a distinct value for each version of the logical entity.

entLogicalType

OID 1.3.6.1.2.1.47.1.2.1.1.3

Description An indication of the type of logical entity. This is typically the Object Identifier name of the node in the SMI's naming hierarchy that represents the major MIB module, or the majority of the MIB modules, supported by the logical entity. For example:

- a logical entity of a regular host/router -> mib-2
- a logical entity of a 802.1d bridge -> dot1dBridge
- a logical entity of a 802.3 repeater -> snmpDot3RptrMgmt

If an appropriate node in the SMI's naming hierarchy cannot be identified, the value mib-2 should be used.

entLogicalCommunity

OID 1.3.6.1.2.1.47.1.2.1.1.4

Description An SNMPv1 or SNMPv2C community string, which can be used to access detailed management information for this logical entity. The agent should allow read access with this community string (to an appropriate subset of all managed objects) and might also return a community string based on the privileges of the request used to read this object.

Note that an agent might return a community string with read-only privileges, even if this object is accessed with a read-write community string. However, the agent must take care not to return a community string that allows more privileges than the community string used to access this object.

A compliant SNMP agent might want to conserve naming scopes by representing multiple logical entities in a single default naming scope. This is possible when the logical entities represented by the same value of entLogicalCommunity have no object instances in common. For example, "bridge1" and "repeater1" might be part of the main naming scope, but at least one additional community string is needed to represent "bridge2" and "repeater2."

Logical entities "bridge1" and "repeater1" would be represented by sysOREntries associated with the default naming scope.

For agents not accessible through SNMPvl or SNMPv2C, the value of this object is the empty string. This object might also contain an empty string if a community string has not yet been assigned by the agent, or no community string with suitable access rights can be returned for a particular SNMP request.

Note that this object is deprecated. Agents that implement SNMPv3 access should use the entLogicalContextEngineID and entLogicalContextName objects to identify the context associated with each logical entity. SNMPv3 agents might return a zero-length string for this object or might continue to return a community string (for example, tri-lingual agent support).

entLogicalTAddress

OID 1.3.6.1.2.1.47.1.2.1.1.5

Description The transport service address by which the logical entity receives network management traffic, formatted according to the corresponding value of entLogicalTDomain.

For snmpUDPDomain, a TAddress is 6 octets long, the initial 4 octets containing the IP-address in network-byte order and the last 2 containing the UDP port in network-byte order. Consult *Transport Mappings for Version 2 of the Simple Network Management Protocol* (RFC1906) for further information on snmpUDPDomain.

entLogicalTDomain

OID 1.3.6.1.2.1.47.1.2.1.1.6

Description Indicates the kind of transport service by which the logical entity receives network management traffic. Possible values for this object are currently found in the *Transport Mappings for SNMPv2* document (RFC1906).

entLogicalContextEngineID

OID 1.3.6.1.2.1.47.1.2.1.1.7

Description The authoritative contextEngineID that can be used to send an SNMP message concerning information held by this logical entity to the address specified by the associated entLogicalTAddress/entLogicalTDomain pair.

This object, together with the associated entLogicalContextName object, defines the context associated with a particular logical entity; it allows access to SNMP engines identified by a contextEngineId and contextName pair.

If no value has been configured by the agent, a zero-length string is returned, or the agent might choose not to instantiate this object at all.

entLogicalContextName

OID 1.3.6.1.2.1.47.1.2.1.1.8

Description The contextName that can be used to send an SNMP message concerning information held by this logical entity to the address specified by the associated entLogicalTAddress/entLogicalTDomain pair.

This object, together with the associated entLogicalContextEngineID object, defines the context associated with a particular logical entity and allows access to SNMP engines identified by a contextEngineId and contextName pair.

If no value has been configured by the agent, a zero-length string is returned, or the agent might choose not to instantiate this object at all.

Entity Mapping Group

This section lists the entityMapping MIBs.

entLPMappingTable

OID 1.3.6.1.2.1.47.1.3.1

Description This table contains zero or more rows of logical entity to physical equipment associations. For each logical entity known by this agent, there are zero or more mappings to the physical resources used to realize that logical entity.

An agent should limit the number and nature of entries in this table such that only meaningful and nonredundant information is returned. For example, in a system that contains a single power supply, mappings between logical entities and the power supply are not useful and should not be included.

Also, only the most appropriate physical component that is closest to the root of a particular containment tree should be identified in an entLPMapping entry.

For example, suppose a bridge is realized on a particular module and all ports on that module are ports on this bridge. A mapping between the bridge and the module would be useful, but additional mappings between the bridge and each of the ports on that module would be redundant (since the entPhysicalContainedIn hierarchy can provide the same information). If, however, more than one bridge was utilizing ports on this module, then mappings between each bridge and the ports it used would be appropriate.

Also, in the case of a single backplane repeater, a mapping for the backplane to the single repeater entity is not necessary.

entLPMappingEntry

OID 1.3.6.1.2.1.47.1.3.1.1

Description Information about a particular logical entity to physical equipment association. Note that the nature of the association is not specifically identified in this entry. It is expected that sufficient information exists in the MIBs used to manage a particular logical entity to infer how physical component information is utilized.

Index entLogicalIndex
entLPPhysicalIndex

entLPPhysicalIndex

OID 1.3.6.1.2.1.47.1.3.1.1.1

Description The value of this object identifies the index value of a particular entPhysicalEntry associated with the indicated entLogicalEntity.

entAliasMappingTable

OID 1.3.6.1.2.1.47.1.3.2

Description This table contains zero or more rows, representing mappings of logical entity and physical component to external MIB identifiers. Each physical port in the system might be associated with a mapping to an external identifier, which itself is associated with a particular logical entity's naming scope. A wildcard mechanism is provided to indicate that an identifier is associated with more than one logical entity.

entAliasMappingEntry

OID 1.3.6.1.2.1.47.1.3.2.1

Description — Information about a particular physical equipment, logical entity to external identifier binding. Each logical entity/physical component pair might be associated with one alias mapping. The logical entity index might also be used as a wildcard (refer to the entAliasLogicalIndexOrZero object description for details.)

Note that only entPhysicalIndex values that represent physical ports (that is, associated entPhysicalClass value is “port(10)”) are permitted to exist in this table.

Index — entPhysicalIndex
entAliasLogicalIndexOrZero

entAliasLogicalIndexOrZero

OID — 1.3.6.1.2.1.47.1.3.2.1.1

Description — The value of this object identifies the logical entity that defines the naming scope for the associated instance of the entAliasMappingIdentifier object.

If this object has a nonzero value, then it identifies the logical entity named by the same value of entLogicalIndex.

If this object has a value of zero, then the mapping between the physical component and the alias identifier for this entAliasMapping entry is associated with all unspecified logical entities. That is, a value of zero (the default mapping) identifies any logical entity that does not have an explicit entry in this table for a particular entPhysicalIndex/entAliasMappingIdentifier pair.

For example, to indicate that a particular interface (such as “physical component 33”) is identified by the same value of ifIndex for all logical entities, the following instance might exist:

```
entAliasMappingIdentifier.33.0 = ifIndex.5
```

In the event an entPhysicalEntry is associated differently for some logical entities, additional entAliasMapping entries might exist:

```
entAliasMappingIdentifier.33.0 = ifIndex.6
entAliasMappingIdentifier.33.4 = ifIndex.1
entAliasMappingIdentifier.33.5 = ifIndex.1
entAliasMappingIdentifier.33.10 = ifIndex.12
```

Note that entries with nonzero entAliasLogicalIndexOrZero index values have precedence over any zero-indexed entry. In this example, all logical entities except 4, 5, and 10 associate physical entity 33 with ifIndex.6.

entAliasMappingIdentifier

OID — 1.3.6.1.2.1.47.1.3.2.1.2

Description — The value of this object identifies a particular conceptual row associated with the indicated entPhysicalIndex and entLogicalIndex pair.

Since only physical ports are modeled in this table, only entries that represent interfaces or ports are allowed. If an ifEntry exists on behalf of a particular physical port, then this object should identify the associated ifEntry. For repeater ports, the appropriate row in the rptrPortGroupTable should be identified instead.

For example, suppose a physical port was represented by entPhysicalEntry.3, entLogicalEntry.15 existed for a repeater, and entLogicalEntry.22 existed for a bridge. Then there might be two related instances of entAliasMappingIdentifier:

```
   entAliasMappingIdentifier.3.15 ==
rptrPortGroupIndex.5.2

   entAliasMappingIdentifier.3.22 == ifIndex.17
```

It is possible that other mappings (besides interfaces and repeater ports) might be defined in the future, as required.

Bridge ports are identified by examining the Bridge MIB and appropriate ifEntries associated with each dot1dBasePort and are thus not represented in this table.

entPhysicalContainsTable

OID 1.3.6.1.2.1.47.1.3.3

Description A table that exposes the container/containee relationships between physical entities. This table provides all the information found by constructing the virtual containment tree for a given entPhysicalTable, but in a more direct format.

In the event a physical entity is contained by more than one other physical entity (for example, double-wide modules), this table should include these additional mappings, which cannot be represented in the entPhysicalTable virtual containment tree.

entPhysicalContainsEntry

OID 1.3.6.1.2.1.47.1.3.3.1

Description A single container/“containee” relationship.

Index entPhysicalIndex
entPhysicalChildIndex

entPhysicalChildIndex

OID 1.3.6.1.2.1.47.1.3.3.1.1

Description The value of entPhysicalIndex for the contained physical entity. Through this the containment hierarchy of the physical entities is displayed (see Figure 4-3).

General Group

This section lists the entityGeneral MIB.

entLastChangeTime

OID 1.3.6.1.2.1.47.1.4.1

Description The value of sysUpTime at the time a conceptual row is created, modified, or deleted in any of the following tables:

- entPhysicalTable
- entLogicalTable
- entLPMappingTable
- entAliasMappingTable
- entPhysicalContainsTable

Entity MIB Trap

This section lists the entityMIBTrap objects. Figure 4-2 on page 4-2 displays the structure of the entityMIBTraps group.

entConfigChange

OID 1.3.6.1.2.1.47.2.0.1

Status Current

Description An entConfigChange notification is generated when the value of entLastChangeTime changes. It can be utilized by an NMS to trigger logical/physical entity table maintenance polls.

An agent should not generate more than one entConfigChange notification event in a given time interval (five seconds is the suggested default). A notification event is the transmission of a single trap or inform PDU to a list of notification destinations.

If additional configuration changes occur within the throttling period, then notification events for these changes should be suppressed by the agent until the current throttling period expires. At the end of a throttling period, one notification event should be generated if any configuration changes occurred since the start of the throttling period; in such a case, another throttling period is started right away.

An NMS should periodically check the value of entLastChangeTime to detect any missed entConfigChange notification events: for example, due to throttling or transmission loss.

Entity MIB Conformance Information

This section lists the entityConformance MIBs. Figure 4-2 on page 4-2 shows the structure of the entityConformance group.

entityCompliance

OID 1.3.6.1.2.1.47.3.1.1

Status Deprecated

Description	The compliance statement for SNMP entities that implement version 1 of the Entity MIB.

Module	This module
	MANDATORY-GROUPS {
	entityPhysicalGroup,
	entityLogicalGroup,
	entityMappingGroup,
	entityGeneralGroup,
	entityNotificationsGroup
	}

entity2Compliance

OID	1.3.6.1.2.1.47.3.1.2
Status	Current
Description	The compliance statement for SNMP entities that implement version 2 of the Entity MIB.

Module	This module
	MANDATORY-GROUPS {
	entityPhysicalGroup,
	entityPhysical2Group,
	entityGeneralGroup,
	entityNotificationsGroup
	}

Group	entityLogical2Group
Description	Implementation of this group is not mandatory for agents that model all MIB object instances within a single naming scope.
Group	entityMappingGroup
Description	Implementation of the entPhysicalContainsTable is mandatory for all agents. Implementation of the entLPMappingTable and entAliasMappingTables are not mandatory for agents that model all MIB object instances within a single naming scope. Note that the entAliasMappingTable might be useful for all agents; however, implementation of the entityLogicalGroup or entityLogical2Group is required to support this table.
Object	entPhysicalSerialNum
Access	Not-accessible
Description	Read and write access is not required for agents that cannot identify serial number information for physical entities or cannot provide nonvolatile storage for NMS-assigned serial numbers. Write access is not required for agents that can identify serial number information for physical entities but cannot provide nonvolatile storage for NMS-assigned serial numbers.

Write access is not required for physical entities for which the associated value of the entPhysicalIsFRU object is equal to false(2).

Object	entPhysicalAlias
Access	Read-only
Description	Write access is required only if the associated entPhysicalClass value is equal to chassis(3).

Object	entPhysicalAssetID
Access	Not-accessible
Description	Read and write access is not required for agents that cannot provide nonvolatile storage for NMS-assigned asset identifiers. Write access is not required for physical entities for which the associated value of entPhysicalIsFRU is equal to false(2).

entityPhysicalGroup

OID	1.3.6.1.2.1.47.3.2.1
Objects	entPhysicalDescr entPhysicalVendorType entPhysicalContainedIn entPhysicalClass entPhysicalParentRelPos entPhysicalName
Status	Current
Description	The collection of objects used to represent physical system components, for which a single agent provides management information.

entityLogicalGroup

OID	1.3.6.1.2.1.47.3.2.2
Objects	entLogicalDescr entLogicalType entLogicalCommunity entLogicalTAddress entLogicalTDomain
Status	Deprecated
Description	The collection of objects used to represent the list of logical entities, for which a single agent provides management information.

entityMappingGroup

OID	1.3.6.1.2.1.47.3.2.3

Objects	entLPPhysicalIndex entAliasMappingIdentifier entPhysicalChildIndex
Status	Current
Description	The collection of objects used to represent the associations between multiple logical entities, physical components, interfaces, and port identifiers, for which a single agent provides management information.

entityGeneralGroup

OID	1.3.6.1.2.1.47.3.2.4
Objects	entLastChangeTime
Status	Current
Description	The collection of objects that are used to represent general entity information for which a single agent provides management information.

entityNotificationsGroup

OID	1.3.6.1.2.1.47.3.2.5
Notifications	entConfigChange
Status	Current
Description	The collection of notifications used to indicate Entity MIB data consistency and general status information.

entityPhysical2Group

OID	1.3.6.1.2.1.47.3.2.6
Objects	entPhysicalHardwareRev entPhysicalFirmwareRev entPhysicalSoftwareRev entPhysicalSerialNum entPhysicalMfgName entPhysicalModelName entPhysicalAlias entPhysicalAssetID entPhysicalIsFRU
Status	Current
Description	The collection of objects used to represent physical system components, for which a single agent provides management information. This group augments the objects contained in the entityPhysicalGroup.

entityLogical2Group

OID	1.3.6.1.2.1.47.3.2.7

Objects	entLogicalDescr entLogicalType entLogicalTAddress entLogicalTDomain entLogicalContextEngineID entLogicalContextName
Status	Current
Description	The collection of objects used to represent the list of logical entities, for which a single SNMP entity provides management information.

SW-MIB Objects

Chapter 5

This chapter contains descriptions and other information specific to FC Switch MIB (SW-MIB) object types. This chapter provides information on:

- "SW MIB Overview" next
- "sw Traps" on page 5-9
- "System Group" on page 5-14
- "Fabric Group" on page 5-24
- "SW Agent Configuration Group" on page 5-28
- "Fibre Channel Port Group" on page 5-29
- "Name Server Database Group" on page 5-35
- "Event Group" on page 5-38
- "Fabric Watch Group" on page 5-39
- "End Device Group" on page 5-49
- "Switch Group" on page 5-51
- "ASIC Performance Monitoring Group" on page 5-52
- "Trunking Group" on page 5-55

SW MIB Overview

The descriptions of the MIB variables in this chapter come directly from the FC Switch MIB. The notes that follow the descriptions typically pertain to Brocade-specific information as provided by Brocade.

SW-MIB System Organization of MIB Objects

Figure 5-1 through Figure 5-5 depict the organization and structure of SW-MIB.

Figure 5-1 SW-MIB Overall Tree Structure

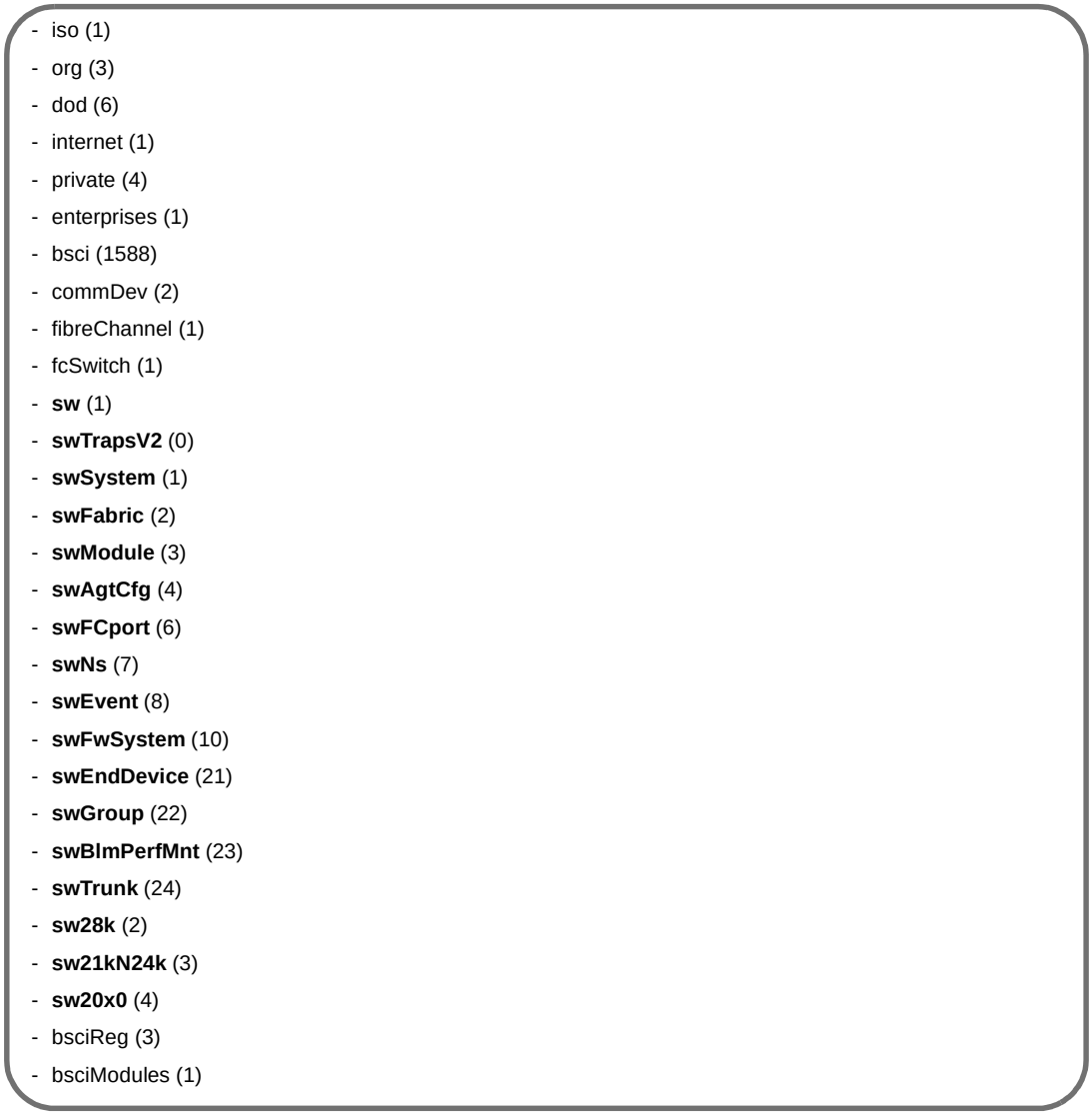


Figure 5-2 Tree Structure for swTrapsV2, swSystem, swFabric, swModule, and swAgtCfg

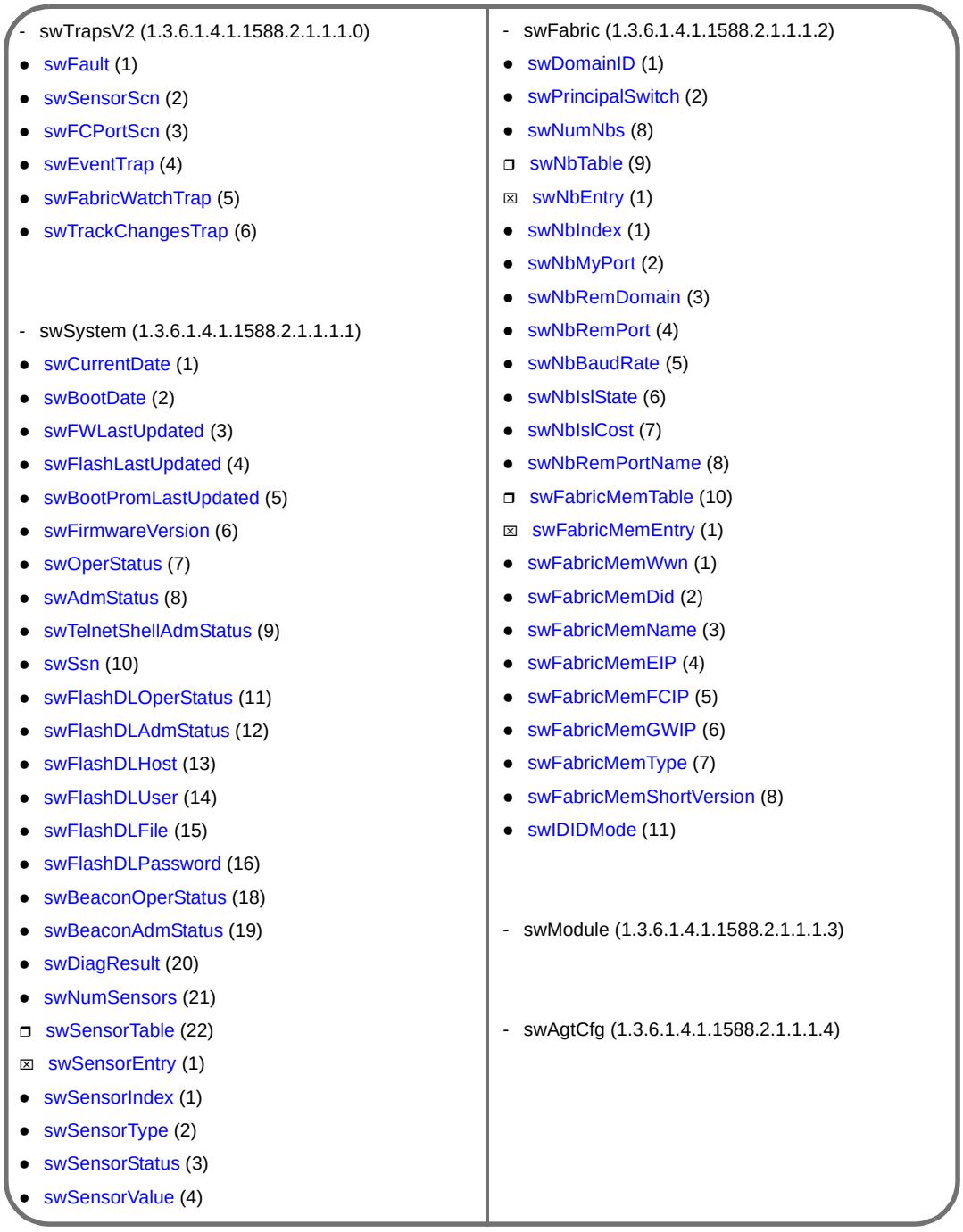


Figure 5-3 Tree Structure for swFCport, swNs, and swEvent Groups

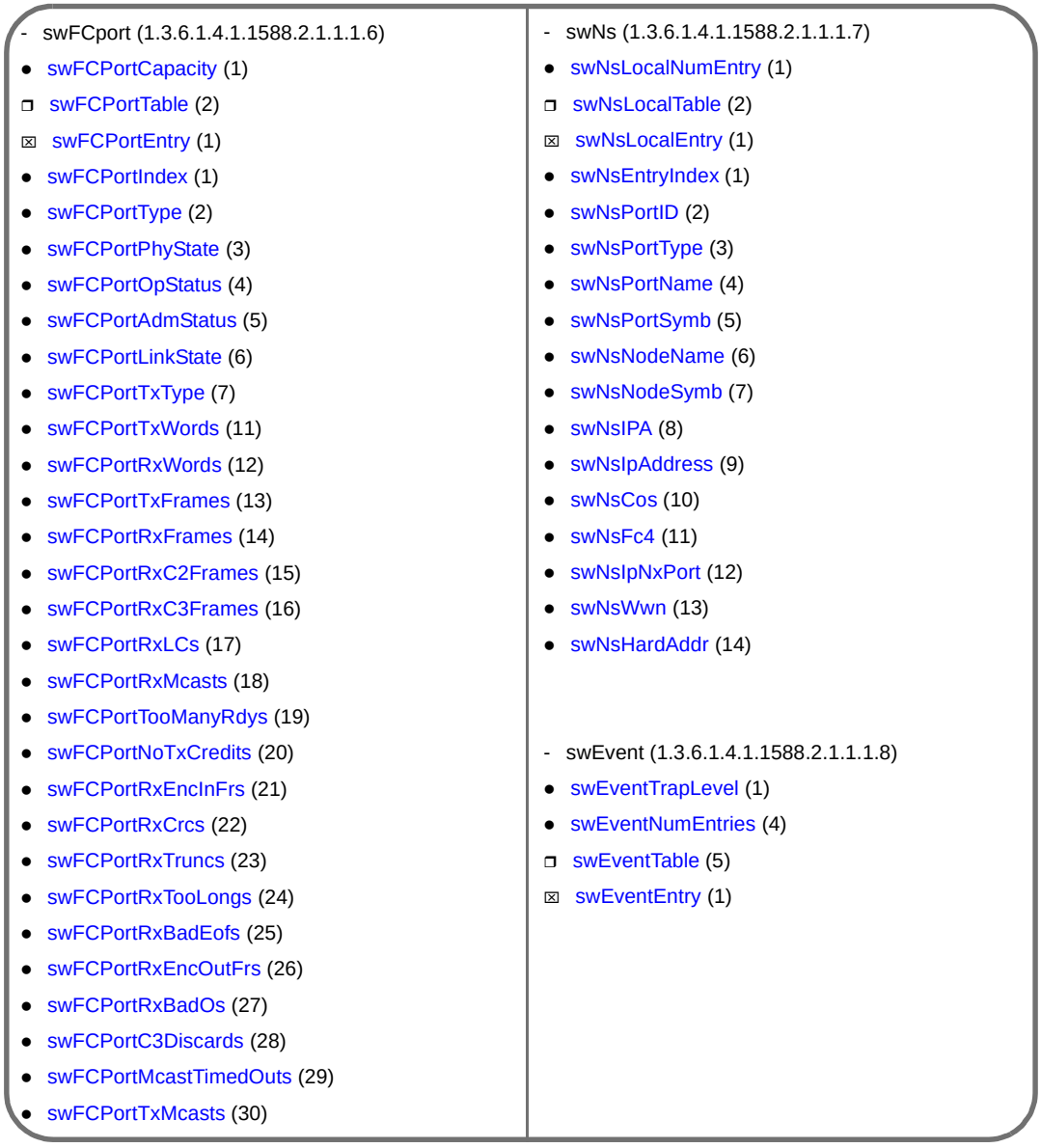
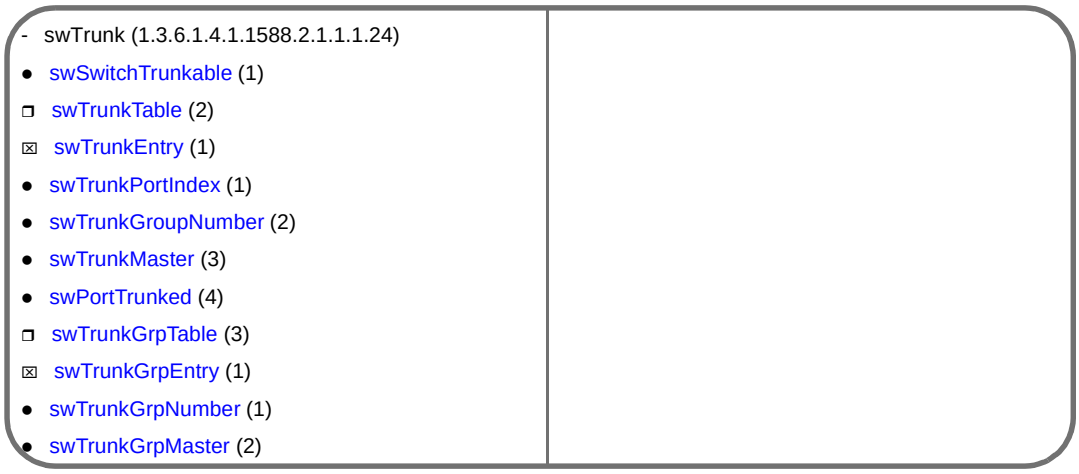


Figure 5-4 Tree Structure for swFwSystem, swEndDevice, swGroup, and swBlmPerfMnt

Figure 5-5 Tree Structure for the swTrunk Group



Textual Conventions for SW-MIB

The following textual conventions are used for SW-MIB.

Table 5-1 SW-MIB Textual Conventions

Type Definition	Value	Description
FcWwn	Octet String of size 8	The World Wide Name (WWN) of Brocade-specific products and ports.
SwDomainIndex	Integer of size 1 to 239	Fibre Channel domain ID of the switch.
SwNbIndex	Integer of size 1 to 2048	Index of the neighbor inter-switch link (ISL) entry.
SwSensorIndex	Integer of size 1 to 1024	Index of the sensor entry.
SwPortIndex	Integer32	Index of the port, starting from 1 up to the maximum number of ports on the Brocade switch.
SwTrunkMaster	Integer32	Index of the trunk master, starting from 1 up to the maximum number of trunk groups on the Brocade switch.
SwFwActs	Integer	Valid action matrix: 0 swFwNoAction 1 swFwErrlog 2 swFwSnmptrap 3 swFwErrlogSnmptrap 4 swFwPortloglock 5 swFwErrlogPortloglock 6 swFwSnmptrapPortloglock 7 swFwErrlogSnmptrapPortloglock 8 swFwRn 9 swFwElRn 10 swFwStRn 11 swFwElStRn 12 swFwPlRn 13 swFwElPlRn 14 swFwStPlRn 15 swFwElStPlRn 16 swFwMailAlert 17 swFwMailAlertErrlog 18 swFwMailAlertSnmptrap 19 swFwMailAlertErrlogSnmptrap 20 swFwMailAlertPortloglock 21 swFwMailAlertErrlogPortloglock 22 swFwMailAlertSnmptrapPortloglock 23 swFwMailAlertErrlogSnmptrapPortloglock 24 swFwMailAlertRn 25 swFwElMailAlertRn 26 swFwMailAlertStRn 27 swFwMailAlertElStRn 28 swFwMailAlertPlRn 29 swFwMailAlertElPlRn 30 swFwMailAlertStPlRn 31 swFwMailAlertElStPlRn

Table 5-1 SW-MIB Textual Conventions (Continued)

Type Definition	Value	Description	
SwFwLevels	Integer	Threshold values or action matrix level: 1 swFwReserved 2 swFwDefault 3 swFwCustom	
SwFwClassesAreas	Integer	Classes and area index: 1 swFwEnvTemp 2 swFwEnvFan 3 swFwEnvPs 4 swFwTransceiverTemp 5 swFwTransceiverRxp 6 swFwTransceiverTxp 7 swFwTransceiverCurrent 8 swFwPortLink 9 swFwPortSync 10 swFwPortSignal 11 swFwPortPe 12 swFwPortWords 13 swFwPortCrcs 14 swFwPortRXPerf 15 swFwPortTXPerf 16 swFwPortState 17 swFwFabricEd 18 swFwFabricFr 19 swFwFabricDi 20 swFwFabricSc 21 swFwFabricZc 22 swFwFabricFq 23 swFwFabricFl 24 swFwFabricGs 25 swFwEPortLink 26 swFwEPortSync 27 swFwEPortSignal 28 swFwEPortPe 29 swFwEPortWords 30 swFwEPortCrcs 31 swFwEPortRXPerf 32 swFwEPortTXPerf 33 swFwEPortState 34 swFwFCUPortLink 35 swFwFCUPortSync 36 swFwFCUPortSignal 37 swFwFCUPortPe 38 swFwFCUPortWords 39 swFwPortCrcs 40 swFwFCUPortRXPerf 41 swFwFCUPortTXPerf	42 swFwFCUPortState 43 swFwFOPPortLink 44 swFwFOPPortSync 45 swFwFOPPortSignal 46 swFwFOPPortPe 47 swFwFOPPortWords 48 swFwFOPPortCrcs 49 swFwFOPPortRXPerf 50 swFwFOPPortTXPerf 51 swFwFOPPortState 52 swFwPerfALPACRC 53 swFwPerfEToECRC 54 swFwPerfEToERxCnt 55 swFwPerfEToETxCnt 56 swFwPerffltCusDef 57 swFwTransceiverVoltage 58 swFwSecTelnetViolations 59 swFwSecHTTPViolations 60 swFwSecAPIViolations 61 swFwSecRSNMPViolations 62 swFwSecWSNMPViolations 63 swFwSecSESViolations 64 swFwSecMSViolations 65 swFwSecSerialViolations 66 swFwSecFPViolations 67 swFwSecSCCViolations 68 swFwSecDCCViolations 69 swFwSecLoginViolations 70 swFwSecInvaledTS 71 swFwSecInvalidSign 72 swFwSecInvalidCert 73 swFwSecSlapFail 74 swFwSecSlapBadPkt 75 swFwSecTSOutSync 76 swFwSecNoFcs 77 swFwSecIncompDB 78 swFwSecIllegalCmd 79 swFwSAMTotalDownTime 80 swFwSAMTotalUpTime 81 swFwSAMDurationOfOccur 82 swFwSAMFreqOfOccur 83 swFwResourceFlash

Table 5-1 SW-MIB Textual Conventions (Continued)

Type Definition	Value	Description
SwFwWriteVals	Integer	Write-only variable for applying or canceling values or action matrix changes: 1 swFwCancelWrite 2 swFwApplyWrite
SwFwTimebase	Integer	Timebase for thresholds: 1 swFwTbNone 2 swFwTbSec 3 swFwTbMin 4 swFwTbHour 5 swFwTbDay
SwFwStatus	Integer	Status for thresholds: 1 disabled 2 enabled
SwFwEvent	Integer	Possible events available: 1 started 2 changed 3 exceeded 4 below 5 above 6 inBetween
SwFwBehavior	Integer	Behavior type for thresholds: 1 triggered 2 continuous
SwFwState	Integer	State type for last events: 1 swFwInformative 2 swFwNormal 3 swFwfaulty
SwFwLicense	Integer	License state: 1 swFwLicensed 2 swFwNotLicensed

sw Traps

This section contains descriptions and other information that is specific to sw Traps.

Refer to Table 5-2 for the six traps defined in the SW.MIB, when it occurs, and how to configure the trap, if possible.

Table 5-2 SW MIB Traps

Name	Specific	When	Configure
"swFault" on page 5-10 (not supported)	1	During boot, if diagnostics fail	N.A.
"swSensorScn" on page 5-11	2	Obsolete	N.A.
"swFCPortScn" on page 5-11	3	Port changes state	Always on
"swEventTrap" on page 5-12	4	Switch event	Refer to *Fabric OS Command Reference Manual* and the **agtCfgSet** command help page and **snmpConfig** command help page for more information.
"swFabricWatchTrap" on page 5-13	5	Threshold reached	Command: **fwConfigure**
"swTrackChangesTrap" on page 5-14	6	Login/logout	Command: **swTrackChanges**

Refer to the *Fabric OS Command Reference Manual* and the **snmpMibCapSet** command on how to enable or disable the sending of traps from the various MIBs.

The swSsn variable is optional in trap messages. The swGroupName, swGroupType, and swGroupMemPos variables are optional in trap messages in v2.6.x. Each of these optional variables can be set on or off using the **snmpMibCapSet** command.

swFault

This trap is no longer generated.

Trap # 1

OID 1.3.6.1.4.1.1588.2.1.1.1.0.1

Enterprise sw

Variables "swDiagResult", "swSsn"

Description A swFault (1) is generated whenever the diagnostics detect a fault with the switch.

Example Diagnostics:

#TYPE	Switch is faulty.
#SUMMARY	Faulty reason: %d and SSN is #%s

#ARGUMENTS	0, 1
#SEVERITY	Critical
#TIMEINDEX	1
#STATE	Nonoperational

swSensorScn

(Obsoleted by swFabricWatchTrap)

Trap # 2

OID 1.3.6.1.4.1.1588.2.1.1.1.0.2

Enterprise sw

Variables "swSensorStatus", "swSensorIndex", "swSensorType", "swSensorValue", "swSensorInfo", "swSsn"

Description A swSensorScn (2) is generated whenever an environment sensor changes its operational state: for instance, if a fan stop working. The VarBind in the Trap Data Unit contain the corresponding instance of the sensor status, sensor index, sensor type, sensor value (reading), and sensor information. Note that the sensor information contains the type of sensor and its number, in textual format.

#TYPE	A sensor (temperature, fan, or other) changed its operational state.
#SUMMARY	%s: is currently in state %d and SSN is #%s
#ARGUMENTS	4, 0, 5
#SEVERITY	Informational
#TIMEINDEX	1
#STATE	Operational

swFCPortScn

Trap # 3

OID 1.3.6.1.4.1.1588.2.1.1.1.0.3

Enterprise sw

Variables "swFCPortOpStatus", "swFCPortIndex", "swFCPortName", "swSsn"

Description A swFCPortScn (3) is generated whenever an FC_Port changes its operational state: for instance, the FC_Port goes from online to offline. The VarBind in the Trap Data Unit contain the corresponding instance of the FC_Port's operational status, index, swFCPortName, and swSsn. swFCPortName and swSsn are optional.

#TYPE	A Fibre Channel Port changed its operational state.
#SUMMARY	Port Index %d changed state to %d. Port Name: %s and SSN is #%s
#ARGUMENTS	1, 0, 2, 3
#SEVERITY	Informational
#TIMEINDEX	1
#STATE	Operational

Note Sample trap output for Fabric OS 4.4.0:

```
swFCPortOpStatus.11 = offline(2)
swFCPortIndex.11 = 11
swFCPortName.11 = test
swSsn.0 = none
```

swEventTrap

Trap # 4

OID 1.3.6.1.4.1.1588.2.1.1.1.0.4

Enterprise sw

Variables “swEventIndex”, “swEventTimeInfo”, “swEventLevel”, “swEventRepeatCount”, “swEventDescr”, “swSsn”

Description This trap is generated when an event occurs with a level that is at or below “swEventTrapLevel”.

#TYPE	A firmware event has been logged.
#SUMMARY	Event %d: %s (severity level %d) - %s SSN is #%s
#ARGUMENTS	0, 1, 2, 4, 5
#SEVERITY	Informational
#TIMEINDEX	1
#STATE	Operational

Note Each Trap recipient has a configured severity level association. Whenever an error message is generated at or above that configured severity level the recipient is notified of the event.

This trap is generated for all RASLog messages. From Fabric OS 4.4.0 this trap is only generated for external RASLog messages.

Sample trap output for Fabric OS 4.4.0:

```
swEventIndex.39 = 39
swEventTimeInfo.39 = 2004/08/10-07:00:17
swEventLevel.39 = warning (3)
swEventRepeatCount.39 = 1
swEventDescr.39 = SULB-1001 Firmwaredownload command
has started.
swSsn.0 = none
```

To get more details on any particular event, refer to *Fabric OS System Error Message Reference Manual*.

swFabricWatchTrap

Trap # 5

OID 1.3.6.1.4.1.1588.2.1.1.1.0.5

Enterprise sw

Variables "swFwClassAreaIndex", "swFwThresholdIndex", "swFwName", "swFwLabel", "swFwLastEvent", "swFwLastEventVal", "swFwLastEventTime", "swFwLastState", swSsn

Description Trap to be sent by Fabric Watch to notify of an event.

#TYPE	Fabric Watch has generated an event.
#SUMMARY	Threshold %s in Class/Area %d at index %d has generated event %d with %d on %s. This event is %d and SSN is #%s
#ARGUMENTS	2, 0, 1, 6, 4, 5, 7, 8
#SEVERITY	Warning
#TIMEINDEX	1
#STATE	Operational

Note Refer to the *Fabric OS Fabric Watch User's Guide* for information on setting thresholds in Fabric Watch.

Sample trap output for Fabric OS 4.4.0:

```
swFwClassAreaIndex.1 = swFwEnvTemp(1)
swFwThresholdIndex.1.2 = 2
swFwName.1.2 = envTemp001
swFwLabel.1.2 = Env Temperature 1
swFwLastEventVal.1.2 = 45
swFwLastEventTime.1.2 = 06:17:01 on 08/12/2004
swFwLastEvent.1.2 = inBetween(6)
swFwLastState.1.2 = swFwNormal(2)
swFwLastSeverityLevel.1.2 = 4
swSsn.0 = none
```

swTrackChangesTrap

Trap # 6

OID 1.3.6.1.4.1.1588.2.1.1.1.0.6

Enterprise sw

Variables "swTrackChangesInfo", "swSsn"

Description Trap to be sent for tracking login/logout/configuration changes.

#TYPE	Track changes has generated a trap.
#SUMMARY	%s and SSN is #%s
#ARGUMENTS	0, 1
#SEVERITY	Informational
#TIMEINDEX	1
#STATE	Operational

Note Some of the triggers that will generate this trap are:

- Logout
- Unsuccessful login
- Successful login
- Switch configuration changes
- Track changes on and off

Sample trap output for Fabric OS 4.4.0:

```
swTrackChangesInfo.0 = Logout
swSsn.0 = none
```

This trap gets sent when track-changes is set to ENABLED and is configured to send SNMP traps on track events. Use the **trackchangesset** command to enable the track changes feature and SNMP trap mode.

System Group

swCurrentDate

OID 1.3.6.1.4.1.1588.2.1.1.1.1.1

Description The current date and time.

Note The return string displays using the following format:

```
ddd MMM DD hh:mm:ss yyyy
```

Where:

ddd = day
MMM = month
DD = date
hh = hour
mm = minute
ss = seconds
yyyy = year

Example:

Thu Aug 17 15:16:09 2000

swBootDate

OID 1.3.6.1.4.1.1588.2.1.1.1.1.2

Description The date and time when the system last booted.

Note The return string displays using the following format:

```
ddd MMM DD hh:mm:ss yyyy
```

Where:

ddd = day
MMM = month
DD = date
hh = hour
mm = minute
ss = seconds
yyyy = year

Example:

Thu Aug 17 15:16:09 2000

swFWLastUpdated

OID 1.3.6.1.4.1.1588.2.1.1.1.1.3

Description The date and time when the firmware was last loaded to the switch.

Note The return string displays using the following format:

```
ddd MMM DD hh:mm:ss yyyy
```

Where:

ddd = day
MMM = month
DD = date
hh = hour
mm = minute
ss = seconds
yyyy = year

Example:

Thu Aug 17 15:16:09 2000

swFlashLastUpdated

OID 1.3.6.1.4.1.1588.2.1.1.1.1.4

Description The date and time when the firmware was last downloaded or the configuration file was last changed.

Note The return string displays using the following format:

```
ddd MMM DD hh:mm:ss yyyy
```

Where:

ddd = day
MMM = month
DD = date
hh = hour
mm = minute
ss = seconds
yyyy = year

Example:

Thu Aug 17 15:16:09 2000

swBootPromLastUpdated

OID 1.3.6.1.4.1.1588.2.1.1.1.1.5

Description The date and time when the BootPROM was last updated.

Note The return string displays using the following format:

```
ddd MMM DD hh:mm:ss yyyy
```

Where:

ddd = day
MMM = month
DD = date
hh = hour
mm = minute
ss = seconds
yyyy = year

Example:

Thu Aug 17 15:16:09 2000

swFirmwareVersion

OID 1.3.6.1.4.1.1588.2.1.1.1.1.6

Description The current version of the firmware.

Note The return value is displayed using the following format:

vM.m.f

Where:

v = deployment indicator
M = major version
m = minor version
f = software maintenance version

Example:

v4.4.0 (indicating FOS version 4.4.0)

swOperStatus

OID 1.3.6.1.4.1.1588.2.1.1.1.1.7

Description The current operational status of the switch. Possible values are:

online (1) The switch is accessible by an external Fibre Channel port.

offline (2) The switch is not accessible.

testing (3) The switch is in a built-in test mode and is not accessible by an external Fibre Channel port.

faulty (4) The switch is not operational.

swAdmStatus

OID 1.3.6.1.4.1.1588.2.1.1.1.1.8

Description The desired administrative status of the switch. A management station might place the switch in a desired state by setting this object accordingly. Possible values are:

online (1)	Set the switch to be accessible by an external FC port.
offline (2)	Set the switch to be inaccessible.
testing (3)	Set the switch to run the built-in test.
faulty (4)	Set the switch to a “soft” faulty condition.
reboot (5)	Set the chassis to reboot in 1 second.
fastboot (6)	Set the chassis to fastboot in 1 second. Fastboot causes the chassis to boot but omit the POST.
switchReboot (7)	Set the current switch to reboot in 1 second.

Note When the switch is in faulty state, only two states can be set: faulty and **reboot**/**fastboot**/**switchReboot**.

For the SilkWorm 3900, the testing (3), faulty (4), and **switchReboot** (7) values are not applicable.

For the SilkWorm 4100, the testing (3), faulty (4), and **switchReboot** (7) values are not applicable.

The **switchReboot** (7) value only applies to the SilkWorm 12000/24000.

swTelnetShellAdmStatus

Note	Applicable to Brocade Fabric OS v2.x and v3.x only.
OID	1.3.6.1.4.1.1588.2.1.1.1.1.9
Description	The desired administrative status of the telnet shell. Possible values are: unknown (0) The status of the current telnet shell task is unknown. terminated (1) The current telnet shell task is deleted.
Note	**v2.x, v3.x:** By setting it to 1 (terminated), the current telnet shell task is deleted. When this variable instance is read, it reports the value last set through SNMP. **v4.x:** Not Supported.

swSsn

OID	1.3.6.1.4.1.1588.2.1.1.1.1.10
Description	The soft serial number of the switch.
Note	By default, the return value is the WWN of the switch.

Flash Administration

The next six objects are related to firmware or configuration file management. The underlying method in the transfer of the firmware or configuration file is based on either FTP or remote shell. If a password is provided, then FTP is used. If *no* password is provided, then remote shell is used.

Use one of the two following methods to manage the firmware or switch configuration file in the switch flash.

Method 1

Set swFlashDLHost.0, swFlashDLUser.0, and swFlashDLFile.0 to appropriate host IP address in dot notation (for example, 192.168.1.7), user name (for example, administrator), and file name of the firmware or configuration file (for example, /home/fcswh/v4.4), respectively.

Method 2

1. Set swFlashDLPassword.0 to an appropriate value (for example, secret) if FTP is the desired method of transfer.
2. Set swFlashDLAdmStatus.0 to 3 (swCfUpload) or 4 (swCfDownload), accordingly.

swFlashDLOperStatus

OID	1.3.6.1.4.1.1588.2.1.1.1.1.11
Description	The operational status of the flash. Possible values are: unknown (0) swCurrent (1) - The flash contains the current firmware image or configuration file.

swFwUpgraded (2) - The flash contains the image upgraded from the swFlashDLHost.0.

swCfUploaded (3) - The switch configuration file has been uploaded to the host.

swCfDownloaded (4) - The switch configuration file has been downloaded from the host.

swFwCorrupted (5) - The firmware in the flash of the switch is corrupted.

swFlashDLAdmStatus

Supported in Fabric OS v2.6.x and v3.x only.

OID 1.3.6.1.4.1.1588.2.1.1.1.1.12

Description The desired state of the flash.

The host is specified in swFlashDLHost.0. In addition, the user name is specified in swFlashDLUser.0 and the file name specified in swFlashDLFile.0. Possible values are:

swCurrent (1)	The flash contains the current firmware image or configuration file.
swCfUpload (3)	The switch configuration file is to be uploaded to the host specified.
swCfDownload (4)	The switch configuration file is to be downloaded from the host specified.
swFwCorrupted (5)	The firmware in the flash is corrupted. This value is for informational purposes only; however, setting swFlashDLAdmStatus to this value is not allowed.

Note For more information about the **configDownload** and **configUpload** commands, refer to the *Fabric OS Reference Manual*:

swFlashDLHost

OID 1.3.6.1.4.1.1588.2.1.1.1.1.13

Description The name or IP address (in dot notation) of the host to download or upload a relevant file to the flash.

swFlashDLUser

OID 1.3.6.1.4.1.1588.2.1.1.1.1.14

Description The user name is used on the host for downloading or uploading a relevant file, to or from the flash.

swFlashDLFile

OID 1.3.6.1.4.1.1588.2.1.1.1.1.15

Description The name of the file to be downloaded or uploaded.

swFlashDLPassword

OID 1.3.6.1.4.1.1588.2.1.1.1.1.16

Description The password to be used for FTP transfer of files in the download or upload operation.

swBeaconOperStatus

OID 1.3.6.1.4.1.1588.2.1.1.1.1.18

Description The current operational status of the switch beacon. Possible values are:

- on (1) The LEDs on the front panel of the switch run alternately from left to right and right to left. The color is yellow.
- off (2) Each LED is in its regular status, indicating color and state.

swBeaconAdmStatus

OID 1.3.6.1.4.1.1588.2.1.1.1.1.19

Description The desired status of the switch beacon. Possible values are:

- on (1) The LEDs on the front panel of the switch run alternately from left to right and right to left. Set the color to yellow.
- off (2) Set each LED to its regular status, indicating color and state.

swDiagResult

OID 1.3.6.1.4.1.1588.2.1.1.1.1.20

Description The result of the power-on startup test (POST) diagnostics. Possible values are:

- sw-ok (1) The switch is okay.
- sw-faulty (2) The switch has experienced an unknown fault.
- sw-embedded-port-fault (3) The switch has experienced an embedded port fault.

swNumSensors

OID 1.3.6.1.4.1.1588.2.1.1.1.1.21

Description The number of sensors inside the switch.

Note For example, the SilkWorm 3800 value is between 1 and 13 (temperature = 6, fan = 3, power supply = 4). The value might vary depending on the switch model. For Fabric OS v4.x, if no sensor is available, this variable is assigned the value -1.

swSensorTable

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22

Description Table of sensor entries.

Table 5-3 Sensors on the Various SilkWorm Switches

Platform	Temp	Fans	Power Supply	swNumSensors / connUnitNumSensors
SilkWorm 3016	4 sensors	NA	NA	4
SilkWorm 3200	3 sensors 2 absent	5 fans 1 absent	2 absent	13 Note: Shows absent entries.
SilkWorm 3250	4 sensors	3 fans	1 PS	8
SilkWorm 3800	3 sensors 2 absent	4 fans 2 absent	2 PS	13 Note: Shows absent entries.
SilkWorm 3850	4 sensors	4 fans	2 PS	10
SilkWorm 3900	5 sensors	6 fans	2 PS	13
SilkWorm 4100	5 sensors	3 fans	2 PS	10
SilkWorm 12000	10 sensors	3 fans	4 PS	17
SilkWorm 24000	10 sensors	3 fans	4 PS	17

swSensorEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1

Description An entry of the sensor information.

Index swSensorIndex

swSensorIndex

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.1

Description The index of the sensor.

Note The values are 1 through the value in swNumSensors.

swSensorType

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.2

Description The type of sensor.

swSensorStatus

OID 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.3

Description The current status of the sensor. Possible values are:

unknown (1)	The status of the sensor is unknown.
faulty (2)	The status of the sensor is faulty.
below-min (3)	The sensor value is below the minimal threshold.
nominal (4)	The status of the sensor is nominal.
above-max (5)	The sensor value is above the maximum threshold.
absent (6)	The sensor is missing.

Note — See the following list for valid values:

- For Temperature, valid values include 3 (below-min), 4 (above-max), and 4 (nominal).
- For Fan, valid values include 3 (below-min), 4 (nominal), and 6 (absent).
- For Power Supply, valid values include 2 (faulty), 4 (nominal), and 6 (absent).

swSensorValue

OID — 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.4

Description — The current value (reading) of the sensor.

The value -2147483648 represents the maximum value of integer value; it also means that the sensor does not have the capability to measure the actual value. In v2.0, the temperature sensor value is in Celsius, the fan value is in RPM (revolutions per minute), and the power supply sensor reading is unknown.

Note — The unknown value -2147483648 indicates the maximum value of integer value.

swSensorInfo

OID — 1.3.6.1.4.1.1588.2.1.1.1.1.22.1.5

Description — Additional information on the sensor. It contains the sensor type and number, in textual format; for example, Temp 3 or Fan 6.

SilkWorm 3800:

- For swSensorIndex 1 through 5, valid return values include:
  - Temp #1
  - Temp #2
  - Temp #3
  - Temp #4
  - Temp #5
- For swSensorIndex 6 through 11, valid return values include:
  - Fan #1
  - Fan #2
  - Fan #3
  - Fan #4
  - Fan #5
  - Fan #6
- For swSensorIndex 12 and 13, valid return values include:
  - Power Supply #1
  - Power Supply #2

SilkWorm 12000 and SilkWorm 24000:

- Return values for the SilkWorm 12000/24000 depend upon the configuration of your system.

swTrackChangesInfo

OID 1.3.6.1.4.1.1588.2.1.1.1.1.23

Description Track changes string; for trap only.

Note If there are no events to track, the default return value is “No event so far.”
If there are events to track, the following are valid return values:

- Successful login
- Unsuccessful login
- Logout
- Configuration file change from task [*name of task*]
- Track-changes on
- Track-changes off

swID

Not supported in Fabric OS v3.2.0.

OID 1.3.6.1.4.1.1588.2.1.1.1.1.24

Description The number of the logical switch (either 0 or 1).

swEtherIPAddress

Not supported in Fabric OS v3.2.0.

OID 1.3.6.1.4.1.1588.2.1.1.1.1.25

Description The IP address of the Ethernet interface of this logical switch.

swEtherIPMask

Not supported in Fabric OS v3.2.0.

OID 1.3.6.1.4.1.1588.2.1.1.1.1.26

Description The IP mask of the Ethernet interface of this logical switch.

swFCIPAddress

Not supported in Fabric OS v3.2.0.

OID 1.3.6.1.4.1.1588.2.1.1.1.1.27

Description The IP address of the FC interface of this logical switch.

swFCIPMask

Not supported in Fabric OS v3.2.0.

OID 1.3.6.1.4.1.1588.2.1.1.1.1.28

Description The IP mask of the FC interface of this logical switch.

Fabric Group

swDomainID

OID 1.3.6.1.4.1.1588.2.1.1.1.2.1

Description The current Fibre Channel domain ID of the switch. To set a new value, the switch (swAdmStatus) must be in offline or testing state.

swPrincipalSwitch

OID 1.3.6.1.4.1.1588.2.1.1.1.2.2

Description Indicates whether the switch is the principal switch, yes (1) or no (1), as per FC-SW.

swNumNbs

OID 1.3.6.1.4.1.1588.2.1.1.1.2.8

Description The number of inter-switch links (ISLs) in the (immediate) neighborhood.

swNbTable

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9

Description This table contains the ISLs in the immediate neighborhood of the switch.

swNbEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1

Description An entry containing each neighbor ISL parameters.

Index swNbIndex

swNbIndex

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.1

Description The index for neighborhood entry.

swNbMyPort

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.2

Description This is the port that has an ISL to another switch.

Note This value is the same as the physical port number of the local switch +1. The valid values for the Brocade SilkWorm 12000/24000 switch are 1 through the maximum number of ports.

swNbRemDomain

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.3

Description This is the Fibre Channel domain on the other end of the ISL.

Note This is the domain ID of the remote switch.Valid values are 1 through 239 as defined by FCS-SW.

swNbRemPort

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.4

Description This is the port index on the other end of the ISL.

Note The physical port number of the remote switch, plus 1. The valid values for the Brocade SilkWorm 12000/24000 switch are 0 through the maximum number of ports.

swNbBaudRate

OID 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.5

Description The baud rate of the ISL. Possible values are:

other (1)	None of the following.
oneEighth (2)	155 Mbaud.
quarter (4)	266 Mbaud.
half (8)	532 Mbaud.
full (16)	1 Gbaud.
double (32)	2 Gbaud.
quadruple (64)	4 Gbaud.

Note — The valid values for the Brocade SilkWorm 12000/24000 switch are 16 (full) and 32 (double).

The valid value for the SilkWorm 4100 is 64 (quadruple).

swNbIslState

OID — 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.6

Description — The current state of the ISL.

swNbIslCost

OID — 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.7

Description — The current link cost of the ISL. In other words, the cost of a link to control the routing algorithm.

swNbRemPortName

OID — 1.3.6.1.4.1.1588.2.1.1.1.2.9.1.8

Description — The WWN of the remote port.

swFabricMemTable

Supported in Fabric OS v2.6.1 and not v3.2.0.

OID — 1.3.6.1.4.1.1588.2.1.1.1.2.10

Description — This table contains information on the member switches of a fabric. This might not be available on all versions of Fabric OS.

swFabricMemEntry

OID — 1.3.6.1.4.1.1588.2.1.1.1.2.10.1

Description — An entry containing each switch in the fabric.

Index — swFabricMemWwn

swFabricMemWwn

OID — 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.1

Description — This object identifies the World Wide Name of the member switch.

swFabricMemDid

OID 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.2

Description This object identifies the domain ID of the member switch.

swFabricMemName

OID 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.3

Description This object identifies the name of the member switch.

swFabricMemEIP

OID 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.4

Description This object identifies the Ethernet IP address of the member switch.

swFabricMemFCIP

OID 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.5

Description This object identifies the Fibre Channel IP address of the member switch.

swFabricMemGWIP

OID 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.6

Description This object identifies the Gateway IP address of the member switch.

swFabricMemType

OID 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.7

Description This object identifies the member switch type.

swFabricMemShortVersion

OID 1.3.6.1.4.1.1588.2.1.1.1.2.10.1.8

Description This object identifies the Fabric OS version of the member switch.

Note Provides the short version of the Fabric OS version number. It gives v260 for Fabric OS v2.6.x.

swIDIDMode

OID 1.3.6.1.4.1.1588.2.1.1.1.2.11

Description This identifies the status of Insistent Domain ID (IDID) mode. Status indicating if IDID mode is enabled or not.

SW Agent Configuration Group

swAgtCmtyTable

OID 1.3.6.1.4.1.1588.2.1.1.1.4.11

Description A table that contains, one entry for each community, the access control and parameters of the community.

Note The table displays all of the community strings (read and write) if it is accessed by the "write" community string. Only "read" community strings are displayed if it is accessed by the "read" community string.

In Secure Fabric OS, the community strings can only be modified on the primary switch.

swAgtCmtyEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.4.11.1

Description An entry containing the community parameters.

Index swAgtCmtyIdx

swAgtCmtyIdx

OID 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.1

Description The SNMPv1 community entry.

Note The return value for this entry is 1 through 6.

swAgtCmtyStr

OID 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.2

Description This is a community string supported by the agent. If a new value is set successfully, it takes effect immediately.

Note Default values for communities are as follows:

1 (Secret Code)
2 (OrigEquipMfr)
3 (private)
4 (public)
5 (common)
6 (FibreChannel)

Community strings 1-3 are read-write and strings 4-6 are read-only.

You can change the community setting using the **agtCfgSet** telnet command.

swAgtTrapRcp

OID 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.3

Description This is the trap recipient associated with the community. If a new value is set successfully, it takes effect immediately.

Note If not otherwise set, the default IP address for this trap recipient is 0.0.0.0 and the SNMP trap is not sent for the associated community string.

With a setting of non-0.0.0.0 IP address, SNMP traps are sent to the host with the associated community string.

Any or all of the trap recipients can be configured to send a trap for the associated community string. The maximum number of trap recipients that can be configured is six. If no trap recipient is configured, no traps are sent.

The trap recipient IP address should be part of the Access Control List for Fabric OS v2.6.1, v3.1, and v4.x (refer to the **agtCfgSet** command).

swAgtTrapSeverityLevel

OID 1.3.6.1.4.1.1588.2.1.1.1.4.11.1.4

Description This is the trap severity level associated with swAgtTrapRcp. The trap severity level, is in conjunction with the event's severity level. When an event occurs, and if its severity level is at or below the set value, the SNMP trap is sent to configure trap recipients. The severity level is limited to particular events. If a new value is set successfully, it takes effect immediately.

Note This object obsoletes swEventTrapLevel.

Fibre Channel Port Group

This group contains information about the physical state, operational status, performance, and error statistics of each Fibre Channel port on the switch. A Fibre Channel port is one which supports the Fibre Channel protocol, such as F_Port, E_Port, U_Port, or FL_Port.

swFCPortCapacity

OID 1.3.6.1.4.1.1588.2.1.1.1.6.1

Description The maximum number of Fibre Channel ports on this switch. It includes U_Port, F_Port, FL_Port, and any other types of Fibre Channel port.

Note The valid values are as follows:

SilkWorm 3200/3250	8
SilkWorm 3800/3850	16
SilkWorm 3900	32
SilkWorm 4100	32
SilkWorm 12000	64
SilkWorm 24000	128

swFCPortTable

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2

Description A table that contains, one entry for each switch port, configuration and service parameters of the port.

swFCPortEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1

Description An entry containing the configuration and service parameters of the switch port.

Index swFCPortIndex

swFCPortIndex

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.1

Description The switch port index.

Note The physical port number of the switch, plus 1. The valid values for the SilkWorm 12000/24000 are 0 through maximum number of ports.

swFCPortType

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.2

Description The type of ASIC for the switch port. Possible values are:

stitch (1)	
flannel (2)	
loom (3)	(SilkWorm 2000 series)
bloom (4)	(SilkWorm 3250, 3850, 3900, 12000, and 24000)
rdbloom (5)	
wormhole (6)	
unknown (7)	(SilkWorm 4100)

Note The valid value for the SilkWorm 3250, 3850, 3900, 12000, and 24000 is 4.

The valid value for the SilkWorm 4100 is 7.

All platforms from SilkWorm 4100 onwards will return a value of 7.

swFCPortPhyState

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.3

Description The physical state of the port. Possible values are:

noCard (1)	No card is present in this switch slot.
noTransceiver (2)	No Transceiver module in this port (Transceiver is the generic name for GBIC, SFP, and so on).
laserFault (3)	The module is signaling a laser fault (defective GBIC).
noLight (4)	The module is not receiving light.
noSync (5)	The module is receiving light but is out of sync.
inSync (6)	The module is receiving light and is in sync.

portFault (7)	The port is marked faulty (defective GBIC, cable, or device).
diagFault (8)	The port failed diagnostics (defective G_Port or FL_Port card or motherboard).
lockRef (9)	Port is locking to the reference signal.

swFCPortOpStatus

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.4

Description The operational status of the port. Possible values are:

unknown (0)	The port module is physically absent.
online (1)	User frames can be passed.
offline (2)	No user frames can be passed.
testing (3)	No user frames can be passed.
faulty (4)	The port module is physically faulty.

swFCPortAdmStatus

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.5

Description The desired state of the port. A management station might place the port in a desired state by setting this object accordingly. Possible values are:

online (1)	User frames can be passed.
offline (2)	No user frames can be passed.
testing (3)	No user frames can be passed.
faulty (4)	No user frames can be passed.

Note **For Fabric OS v3.x:**
The 3 (testing) state indicates that no user frames can be passed. As the result of either explicit management action or per configuration information accessible by the switch, swFCPortAdmStatus is then changed to either the 1 (online) or 3 (testing) states or remains in the 2 (offline) state.
For Fabric OS v4.x:
The 3 (testing) state is not supported.

swFCPortLinkState

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.6

Description Indicates the link state of the port.

enabled (1) The port is allowed to participate in the FC-PH protocol with its attached port (or ports if it is in an FC-AL loop).

disabled (2) The port is not allowed to participate in the FC-PH protocol with its attached ports.

loopback (3) The port might transmit frames through an internal path to verify the health of the transmitter and receiver path.

Note When the port's link state changes, its operational status (swFCPortOpStatus) is affected.

swFCPortTxType

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.7

Description Indicates the media transmitter type of the port. Possible values are:

unknown (1)	Cannot determine the port driver.
lw (2)	Long wave laser.
sw (3)	Short wave laser.
ld (4)	Long wave LED.
cu (5)	Copper (electrical).

swFCPortTxWords

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.11

Description Counts the number of Fibre Channel words that the port has transmitted.

swFCPortRxWords

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.12

Description Counts the number of Fibre Channel words that the port has received.

swFCPortTxFrames

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.13

Description Counts the number of Fibre Channel frames that the port has transmitted.

swFCPortRxFrames

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.14

Description Counts the number of Fibre Channel frames that the port has received.

swFCPortRxC2Frames

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.15

Description Counts the number of Class 2 frames that the port has received.

swFCPortRxC3Frames

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.16

Description Counts the number of Class 3 frames that the port has received.

swFCPortRxLCs

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.17

Description Counts the number of link control frames that the port has received.

swFCPortRxMcasts

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.18

Description Counts the number of multicast frames that the port has received.

swFCPortTooManyRdys

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.19

Description Counts the number of times that RDYs exceeds the frames received.

swFCPortNoTxCredits

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.20

Description Counts the number of times that the transmit credit has reached 0.

swFCPortRxEncInFrs

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.21

Description Counts the number of encoding error or disparity error inside frames received.

swFCPortRxCrcs

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.22

Description Counts the number of CRC errors detected for frames received.

swFCPortRxTruncs

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.23

Description Counts the number of truncated frames that the port has received.

swFCPortRxTooLongs

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.24

Description Counts the number of received frames that are too long.

swFCPortRxBadEofs

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.25

Description Counts the number of received frames that have bad EOF delimiters.

swFCPortRxEncOutFrs

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.26

Description Counts the number of encoding error or disparity error outside frames received.

swFCPortRxBadOs

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.27

Description Counts the number of invalid ordered sets received.

swFCPortC3Discards

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.28

Description Counts the number of Class 3 frames that the port has discarded.

swFCPortMcastTimedOuts

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.29

Description Counts the number of multicast frames that have been timed out.

swFCPortTxMcasts

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.30

Description Counts the number of multicast frames that have been transmitted.

swFCPortLipIns

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.31

Description Counts the number of loop initializations that have been initiated by loop devices attached.

swFCPortLipOuts

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.32

Description Counts the number of loop initializations that have been initiated by the port.

swFCPortLipLastAlpa

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.33

Description Indicates the physical address (AL_PA) of the loop device that initiated the last loop initialization.

swFCPortWwn

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.34

Description The WWN of the Fibre Channel port. The contents of an instance are in IEEE extended format, as specified in FC-PH.

swFCPortSpeed

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.35

Description The desired baud rate for the port.

Note The baud rate can be 1 Gbit/sec, 2 Gbit/sec, or 4 Gbit/sec. 4 Gbit/sec is only applicable to the SilkWorm 4100.

swFCPortName

Supported in Fabric OS v4.1.x and later.

OID 1.3.6.1.4.1.1588.2.1.1.1.6.2.1.36

Description A string that indicates the name of the addressed port.

The names should be persistent across switch reboots. Port names do not have to be unique within a switch or within a fabric.

swFCPortSpecifier

Syntax DisplayString

Access read-only

Status current

Description This string indicates the physical port number of the addressed port.

Note This string can be entered as argument on CLI commands such as **portShow** or wherever a physical port number is expected.

The format of the string is: <slot/>port, 'slot' being present only for bladed systems. An Example for bladed systems, such as Silkworm 12000:

```
swFCPortSpecifier.64 = 4/15
```

An Example for non-bladed systems, such as Silkworm 4100:

```
swFCPortSpecifier.31 = 31
```

Name Server Database Group

swNsLocalNumEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.7.1

Description The number of local Name Server entries.

swNsLocalTable

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2

Description The table of local Name Server entries.

swNsLocalEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1

Description An entry from the local Name Server database.

Index swNsEntryIndex

swNsEntryIndex

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.1

Description The index of the Name Server database entry.

swNsPortID

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.2

Description The Fibre Channel port address ID of the entry.

swNsPortType

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.3

Description The type of port for this entry. Possible values, as defined in FC-GS-2, are:

unknown (0)
nPort (1)
nlPort (2)

swNsPortName

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.4

Description The Fibre Channel WWN of the port entry.

swNsPortSymb

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.5

Description The contents of a symbolic name of the port entry. In FC-GS-2, a symbolic name consists of a byte array of 1 through 256 bytes, and the first byte of the array specifies the length of its contents. This object variable corresponds to the contents of the symbolic name, with the first byte removed.

swNsNodeName

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.6

Description The Fibre Channel WWN of the associated node, as defined in FC-GS-2.

swNsNodeSymb

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.7

Description The contents of a Symbolic Name of the node associated with the entry. In FC-GS-2, a Symbolic Name consists of a byte array of 1 through 256 bytes, and the first byte of the array specifies the length of its contents. This object variable corresponds to the contents of the Symbolic Name, with the first byte removed.

swNsIPA

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.8

Description The Initial Process Associators of the node for the entry as defined in FC-GS-2.

swNsIpAddress

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.9

Description The IP address of the node for the entry as defined in FC-GS-2. The format of the address is in IPv6.

swNsCos

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.10

Description The class of services supported by the port.

swNsFc4

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.11

Description The FC-4s supported by the port, as defined in FC-GS-2.

swNsIpNxPort

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.12

Description The object identifies IpAddress of the Nx_Port for the entry.

swNsWwn

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.13

Description The object identifies the World Wide Name (WWN) of the Fx_Port for the entry.

swNsHardAddr

OID 1.3.6.1.4.1.1588.2.1.1.1.7.2.1.14

Description The object identifies the 24-bit hard address of the node for the entry.

Event Group

Logically, the swEventTable is separate from the error log since it is essentially a view of the error log within a particular time window.

swEventTrapLevel

OID 1.3.6.1.4.1.1588.2.1.1.1.8.1

Description swAgtTrapSeverityLevel, in the absence of swEventTrapLevel, specifies the trap severity level of each defined trap recipient host. This object specifies the swEventTrap level in conjunction with an event's severity level. When an event occurs, and if its severity level is at or below the value specified by the object instance, the agent sends the associated swEventTrap to configured recipients.

Note This object is obsoleted by swFwLastSeverityLevel and swAgtTrapSeverityLevel.

swEventNumEntries

OID 1.3.6.1.4.1.1588.2.1.1.1.8.4

Description The number of entries in the event table.

Note (v3.0 only) The value ranges from 0 to 64.

(v4.0 only) The value ranges from 0 to 255.

(v4.2 only) The value ranges from 0 to 2048.

(v4.4 only) The value ranges from 0 to 1024.

swEventTable

OID 1.3.6.1.4.1.1588.2.1.1.1.8.5

Description The table of event entries.

Note Only external RAS log messages are supported. Fabric OS v4.4.0 does not have Panic or Debug level messages. All messages are documented in the *Fabric OS System Error Message Reference Manual*.

swEventEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.8.5.1

Description An entry of the event table.

Index swEventIndex

swEventIndex

OID 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.1

Description The index of the event entry.

swEventTimeInfo

OID 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.2

Description The date and time that this event occurred.

The return string is displayed using the following format:

MMM DD hh:mm:ss

Where:

MMM = Month
DD = Date
hh = Hour
mm = Minute
ss = Seconds

Example: (Brocade Fabric OS v3.0 only)

Aug 17 15:16:09.

swEventLevel

OID 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.3

Description The severity level of this event entry. Possible values are:

critical (1)
error (2)
warning (3)
informational (4)

swEventRepeatCount

OID 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.4

Description If the most recent event is the same as the previous, this number increments by 1, and is the count of consecutive times this particular event has occurred.

swEventDescr

OID 1.3.6.1.4.1.1588.2.1.1.1.8.5.1.5

Description A textual description of the event.

Note For Fabric OS v4.4.0, the format of error messages has changed. This field now uses the message title and number (for example, WEBD-1006) and the message text. Previously this field used the task ID, and all the message number and message text. For more information on error messages, refer to the *Fabric OS System Error Message Reference Manual*.

Fabric Watch Group

The Fabric Watch group contains one license scalar and two tables.

- The scalar, swFwFabricWatchLicense, is used to tell is if the switch has proper license for Fabric Watch.
- One table, "swFwClassAreaTable", contains classArea information such as threshold unit string, time base, low thresholds, and so forth. SwFwClassAreaEntry contains control information for a particular class/area's thresholds.
- The other table, "swFwThresholdTable", contains individual threshold information such as name, label, last event, and so forth. The thresholds are contained in SwFwThresholdEntry.

swFwFabricWatchLicense

OID 1.3.6.1.4.1.1588.2.1.1.1.10.1

Description If the license key is installed on the switch for Fabric Watch, the return value is swFwLicensed; otherwise, the value is swFwNotLicensed.

swFwClassAreaTable

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2

Description The table of classes and areas.

swFwClassAreaEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1

Description An entry of the classes and areas.

Index swFwClassAreaIndex

swFwClassAreaIndex

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.1

Description This index represents the Fabric Watch classArea combination.

swFwWriteThVals

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.2

Description This applies or cancels the configuration value changes.

Note For a read operation, the return value is always swFwCancelWrite.
The following custom configuration variables can be modified:

swFwCustUnit

swFwCustTimebase

swFwCustLow

swFwCustHigh

swFwCustBufSize

Changes to these custom configuration variables can be saved by setting this variable to swFwApplyWrite; they can be removed by setting this variable to swFwCancelWrite.

swFwDefaultUnit

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.3

Description A default unit string name, used to identify the unit of measure for a Fabric Watch classArea combination.

Example:

- C = environment (class), temperature (area).
- RPM = environment (class), fan (area).

swFwDefaultTimebase

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.4

Description A default polling period for the Fabric Watch classArea combination.

Example:

- swFwTbMin = port (class), link loss (area).
- swFwTbNone = environment (class), temperature (area).

swFwDefaultLow

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.5

Description A default low threshold value.

swFwDefaultHigh

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.6

Description A default high threshold value.

swFwDefaultBufSize

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.7

Description A default buffer size value.

swFwCustUnit

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.8

Description A customizable unit string name, used to identify the unit of measure for a Fabric Watch classArea combination.

Example:

- C = environment (class), temperature (area).
- RPM = environment (class), fan (area).

swFwCustTimebase

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.9

Description A customizable polling period for the Fabric Watch classArea combination. For example:

- swFwTbMin = port (class), link loss (area).
- swFwTbNone = environment (class), temperature (area).

swFwCustLow

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.10

Description A customizable low-threshold value for a Fabric Watch classArea combination.

swFwCustHigh

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.11

Description A customizable high-threshold value for a Fabric Watch classArea combination.

swFwCustBufSize

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.12

Description A customizable buffer size value for a Fabric Watch classArea combination.

swFwThLevel

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.13

Description swFwThLevel is used to point to the current level for classArea values. It is either default or custom.

Note For a read operation, the return value is either 2 (swFwDefault) or 3 (swFwCustom). 1 (swFwReserved) is obsolete.

If the write operation sets the variable to 2 (swFwDefault), the following default configuration variables are used for the Fabric Watch classArea combination:

swFwDefaultUnit

swFwDefaultTimebase

swFwDefaultLow

swFwDefaultHigh

swFwDefaultBufSize

If the write operation sets the variable to 3 (swFwCustom), the following custom configuration variables are used for the Fabric Watch classArea combination:

swFwCustUnit

swFwCustTimebase

swFwCustLow

swFwCustHigh

swFwCustBufSize

swFwWriteActVals

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.14

Description This applies or cancels the alarm value changes.

Note For a read operation, the return value is always swFwCancelWrite.

The following are the custom alarm variables that can be modified:

swFwCustChangedActs

swFwCustExceededActs

swFwCustBelowActs

swFwCustAboveActs

swFwCustInBetweenActs

Changes to these custom alarm variables can be saved by setting this variable to swFwApplyWrite.

Changes to these custom alarm variables can be removed by setting this variable to swFwCancelWrite.

swFwDefaultChangedActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.15

Description Default action matrix for changed event.

swFwDefaultExceededActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.16

Description Default action matrix for an exceeded event. The exceeded value might be either above the high threshold or below the low threshold.

swFwDefaultBelowActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.17

Description Default action matrix for below event.

swFwDefaultAboveActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.18

Description Default action matrix for above event.

swFwDefaultInBetweenActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.19

Description Default action matrix for in-between event.

swFwCustChangedActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.20

Description Custom action matrix for changed event.

swFwCustExceededActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.21

Description Custom action matrix for an exceeded event.

swFwCustBelowActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.22

Description Custom action matrix for below event.

swFwCustAboveActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.23

Description Custom action matrix for above event.

swFwCustInBetweenActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.24

Description Custom action matrix for in-between event.

swFwValidActs

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.25

Description Matrix of valid acts for a classArea.

swFwActLevel

OID 1.3.6.1.4.1.1588.2.1.1.1.10.2.1.26

Description swFwActLevel is used to point to the current level for classArea values. It is either default or custom.

Note For a read operation, the return value is either 2 (swFwDefault) or 3 (swFwCustom). 1 (swFwReserved) is obsolete.

If the write operation sets the variable to 2 (swFwDefault), the following default action matrix variables are used for the Fabric Watch classArea combination:

swFwDefaultChangedActs

swFwDefaultExceededActs

swFwDefaultBelowActs

swFwDefaultAboveActs

swFwDefaultInBetweenActs

If the write operation sets the variable to 3 (swFwCustom), the following custom action matrix variables are used for the Fabric Watch classArea combination:

swFwCustChangedActs

swFwCustExceededActs

swFwCustBelowActs

swFwCustAboveActs

swFwCustInBetweenActs

swFwThresholdTable

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3

Description The table of individual thresholds.

swFwThresholdEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1

Description An entry of an individual threshold.

Index swFwClassAreaIndex, swFwThresholdIndex

swFwThresholdIndex

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.1

Description Represents the element index of a threshold.

Note For environment class, the indexes are from 2 through (number of environment sensors+1).
For example, the indexes for environment class temperature area are:

envTemp001: index of 2

envTemp002: index of 3

envTemp003: index of 4

envTemp004: index of 5

envTemp005: index of 6

For port-related classes such as E_Port, the indexes are from 1 through (number of ports). For example, the indexes for E_Port classlink loss area:

eportLink000: index of 1

eportLink001: index of 2

eportLink002: index of 3

eportLink003: index of 4

eportLink004: index of 5

eportLink005: index of 6

eportLink006: index of 7

eportLink007: index of 8

eportLink008: index of 9

eportLink009: index of 10

eportLink010: index of 11

eportLink011: index of 12

eportLink012: index of 13

eportLink013: index of 14

eportLink014: index of 15

eportLink015: index of 16

swFwStatus

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.2

Description Indicates whether a threshold is enabled or disabled.

swFwName

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.3

Description Name of the threshold.

For examples, refer to Table 5-4.

Table 5-4 swFwName Objects and Object Types

swFwName Objects (swFwName)	Object Types (Threshold Names)
envFan001	Env Fan 1
envPS002	Env Power Supply 2
envTemp001	Env Temperature 1
gbicTemp001	GBIC Temperature 1

Table 5-4 swFwName Objects and Object Types (Continued)

swFwName Objects (swFwName)	Object Types (Threshold Names) (Continued)
gbicRXP001	GBIC RX power 1
gbicTXP001	GBIC TX power 1
gbicCrnt001	GBIC Current 1
eportCRCs007	E Port Invalid CRCs 7
eportLink007	E Port Link Failures 7
eportProtoErr007	E Port Protocol Errors 7
eportRXPerf007	E Port RX Performance 7
eportSignal007	E Port Loss of Signal 7
eportState007	E Port State Changes 7
eportSync007	E Port Loss of Sync 7
eportTXPerf007	E Port TX Performance 7
eportWords007	E Port Invalid Words 7
fabricDI000	Fabric Domain ID
fabricED000	Fabric E-port down
fabricFL000	Fabric Fabric login
fabricFQ000	Fabric Fabric<->QL
fabricFR000	Fabric Reconfigure
fabricGS000	Fabric GBIC change 0
fabricSC000	Fabric Segmentation
fabricZC000	Fabric Zoning change
fcuportCRCs013	FCU Port Invalid CRCs 13
fcuportLink013	FCU Port Link Failures 13
fcuportProtoErr0	FCU Port Protocol Errors 13
fcuportRXPerf013	FCU Port RX Performance 13
fcuportSignal013	FCU Port Loss of Signal 13
fcuportState013	FCU Port State Changes 13
fcuportSync013	FCU Port Loss of Sync 13
fcuportTXPerf013	FCU Port TX Performance 13
fcuportWords013	FCU Port Invalid Words 13
portCRCs000 Port Invalid CRCs 0	Port Invalid CRCs 0
portLink000	Port Link Failures 0
portProtoErr000	Port Protocol Errors 0
portRXPerf000	Port RX Performance 0

Table 5-4 swFwName Objects and Object Types (Continued)

swFwName Objects (swFwName)	Object Types (Threshold Names) (Continued)
portSignal000	Port Loss of Signal 0
portState000	Port State Changes 0
portSync000	Port Loss of Sync 0
portTXPerf000	Port TX Performance 0
portWords000	Port Invalid Words 0
fopportCRCs013	FOP Port Invalid CRCs 13
fopportLink013	FOP Port Link Failures 13
fopportProtoErr0	FOP Port Protocol Errors 13
fopportRXPerf013	FOP Port RX Performance 13
fopportSignal013	FOP Port Loss of Signal 13
fopportState013	FOP Port State Changes 13
fopportSync013	FOP Port Loss of Sync 13
fopportTXPerf013	FOP Port TX Performance 13
fopportWords013	FOP Port Invalid Words 13

swFwLabel

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.4

Description Label of the threshold.

Note Refer to “swFwName”.

swFwCurVal

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.5

Description Current counter of the threshold.

swFwLastEvent

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.6

Description Last event type of the threshold.

swFwLastEventVal

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.7

Description Last event value of the threshold.

swFwLastEventTime

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.8

Description Last event time of the threshold.

Note This value is in the same format as in swCurrentDate.

swFwLastState

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.9

Description Last event state of the threshold.

swFwBehaviorType

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.10

Description A behavior of which the thresholds generate event.

swFwBehaviorInt

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.11

Description An integer of which the thresholds generate continuous event.

swFwLastSeverityLevel

OID 1.3.6.1.4.1.1588.2.1.1.1.10.3.1.12

Description This object is a last event severity level of the threshold.

Note This object obsoletes swEventTrapLevel.

End Device Group

swEndDeviceRlsTable

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1

Description The table of RLS for individual end devices.

Note By default, no data appears in this table.

swEndDeviceRlsEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1

Description An entry of an individual end devices' RLS.

Index swEndDevicePort, swEndDeviceAlpa

Note Since SilkWorm switches start with port # 0, the SNMP port # should be physical port # plus 1. In turn, that means that SNMP port # 3 translates to port # 2.

swEndDevicePort

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.1

Description This object represents the port of the local switch to which the end device is connected.

swEndDeviceAlpa

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.2

Description This object represents the AL_PA of the end device. SNMP AL_PA number should be the logical AL_PA number plus 1. For example, SNMP AL_PA number 0xf0 translates to 0xef.

swEndDevicePortID

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.3

Description The Fibre Channel port address ID of the entry.

swEndDeviceLinkFailure

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.4

Description Link failure count for the end device.

swEndDeviceSyncLoss

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.5

Description Sync loss count for the end device.

swEndDeviceSigLoss

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.6

Description Sig loss count for the end device.

swEndDeviceProtoErr

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.7

Description Protocol err count for the end device.

swEndDeviceInvalidWord

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.8

Description Invalid word count for the end device.

swEndDeviceInvalidCRC

OID 1.3.6.1.4.1.1588.2.1.1.1.21.1.1.9

Description Invalid CRC count for the end device.

Switch Group

Not supported.

swGroupTable

OID 1.3.6.1.4.1.1588.2.1.1.1.22.1

Description The table of groups. This might not be available on all versions of Fabric OS.

swGroupEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.22.1.1

Description An entry of table of groups.

Index swGroupIndex

swGroupIndex

OID 1.3.6.1.4.1.1588.2.1.1.1.22.1.1.1

Description This object is the group index, starting from 1.

swGroupName

OID 1.3.6.1.4.1.1588.2.1.1.1.22.1.1.2

Description This object identifies the name of the group.

swGroupType

OID 1.3.6.1.4.1.1588.2.1.1.1.22.1.1.3

Description This object identifies the type of the group.

swGroupMemTable

OID 1.3.6.1.4.1.1588.2.1.1.1.22.2

Description The table of members of all groups. This might not be available on all versions of the Fabric OS.

swGroupMemEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.22.2.1

Description An entry for a member of a group.

Index swGroupID, swGroupMemWwn

swGroupID

OID 1.3.6.1.4.1.1588.2.1.1.1.22.2.1.1

Description This object identifies the Group ID of the member switch.

swGroupMemWwn

OID 1.3.6.1.4.1.1588.2.1.1.1.22.2.1.2

Description This object identifies the WWN of the member switch.

swGroupMemPos

OID 1.3.6.1.4.1.1588.2.1.1.1.22.2.1.3

Description This object identifies the position of the member switch in the group, based on the order that the switches were added in the group.

ASIC Performance Monitoring Group

swBlmPerfALPAMntTable

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1

Description AL_PA monitoring counter table.

Note For the SilkWorm 4100, 12 filter monitors per port are supported.

swBlmPerfALPAMntEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1

Description AL_PA monitoring counter for given AL_PA.

Index swEndDevicePort, swEndDeviceAlpa

swBlmPerfAlpaPort

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.1

Description This object identifies the port index of the switch.

swBlmPerfAlpaIndx

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.2

Description This object identifies the AL_PA index. There can be 126 AL_PA values.

swBlmPerfAlpa

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.3

Description This object identifies the AL_PA values. These values range between x'01' and x'EF' (1 to 239). AL_PA value x'00' is reserved for FL_Port. If Alpha device is invalid, then it will have -1 value.

swBlmPerfAlpaCRCCnt

OID 1.3.6.1.4.1.1588.2.1.1.1.23.1.1.4

Description Get CRC count for given AL_PA and port. This monitoring provides information on the number of CRC errors that occurred on the frames destined to each possible AL_PA attached to a specific port.

Note For the SilkWorm 4100, this value will always be 0. CRC counters are not supported on this platform.

swBlmPerfEEMntTable

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2

Description End-to-end monitoring counter table.

swBlmPerfEEMntEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1

Description End-to-end monitoring counter for given port.

Index swBlmPerfEEPort, swBlmPerfEERefKey

swBlmPerfEEPort

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.1

Description This object identifies the port number of the switch.

swBlmPerfEERefKey

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.2

Description This object identifies the reference number of the counter. This reference is a number assigned when a filter is created. In the SNMP Index, start with one instead of 0, add one to the actual reference key.

swBlmPerfEECRC

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.3

Description End-to-end CRC error for the frames that matched the SID-DID pair.

swBlmPerfEEFCWRx

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.4

Description Get end-to-end count of Fibre Channel words (FCW) received by the port that matched the SID-DID pair.

swBlmPerfEEFCWTx

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.5

Description Get end-to-end count of Fibre Channel words (FCW) transmitted by the port that matched the SID-DID pair.

swBlmPerfEESid

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.6

Description Gets DID information by reference number.

swBlmPerfEEDid

OID 1.3.6.1.4.1.1588.2.1.1.1.23.2.1.7

Description Gets SID information by reference number. SID (Source Identifier) is a 3-byte field in the frame header used to indicate the address identifier of the N_Port from which the frame was sent.

swBlmPerfFltMntTable

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3

Description Filter-based monitoring counter.

swBlmPerfFltMntEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1

Description Filter-based monitoring counter for given port.

Index swBlmPerfFltPort, swBlmPerfFltRefkey

swBlmPerfFltPort

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.1

Description This object identifies the port number of the switch.

swBlmPerfFltRefkey

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.2

Description This object identifies the reference number of the filter. This reference number is assigned when a filter is created. In the SNMP Index, start with one instead of 0, add one to actual reference key.

swBlmPerfFltCnt

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.3

Description Get statistics of filter-based monitor. Filter-based monitoring provides information about a filter hit count, such as:

- Read command
- SCSI or IP traffic
- SCSI Read/Write

swBlmPerfFltAlias

OID 1.3.6.1.4.1.1588.2.1.1.1.23.3.1.4

Description Alias name for the filter.

Trunking Group

swSwitchTrunkable

OID 1.3.6.1.4.1.1588.2.1.1.1.24.1

Description Whether the switch supports the trunking feature or not: no (0) or yes (8).

swTrunkTable

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2

Description Displays trunking information for the switch.

Note For the SilkWorm 4100, 8 ports per trunk are supported. The SilkWorm 4100 supports masterless trunking, or dynamic swapping of master port. Refer to the *Brocade Fabric OS Features Guide* for more information on these features.

swTrunkEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1

Description Entry for the trunking table.

Index swTrunkPortIndex

swTrunkPortIndex

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.1

Description This object identifies the switch port index.

Note The value of a port index is 1 higher than the port number labeled on the front panel. For example, port index 1 corresponds to port number 0.

swTrunkGroupNumber

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.2

Description This object is a logical entity that specifies the group number to which the port belongs. If this value is 0, the port is not trunked.

swTrunkMaster

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.3

Description Port number that is the trunk master of the group. The trunk master implicitly defines the group. All ports with the same master are considered to be part of the same group.

swPortTrunked

OID 1.3.6.1.4.1.1588.2.1.1.1.24.2.1.4

Description The current state of trunking for a member port: disabled (0) or enabled (1).

swTrunkGrpTable

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3

Description Displays trunking performance information for the switch.

swTrunkGrpEntry

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3.1

Description Entry for the trunking group table.

Index swTrunkGrpNumber

swTrunkGrpNumber

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.1

Description This object is a logical entity that specifies the group number to which port belongs.

swTrunkGrpMaster

OID 1.3.6.1.4.1.1588.2.1.1.1.24.3.1.2

Description This object gives the master port ID for the trunk group.

swTrunkGrpTx

OID	1.3.6.1.4.1.1588.2.1.1.1.24.3.1.3
Description	Gives the aggregate value of the transmitted words from this trunk group.
Note	The syntax for this MIB variable is an OCTET STRING. The output is shown in hexadecimal value. The value of **swTrunkGrpTx** is the 4-byte word transmitted in the TrunkGrp port. This value can be obtained through the CLI in the output of the **portStatsShow** command (stat_wtx value) for the corresponding trunk ports.

swTrunkGrpRx

OID	1.3.6.1.4.1.1588.2.1.1.1.24.3.1.4
Description	Gives the aggregate value of the received words by this trunk group.
Note	The syntax for this MIB variable is an OCTET STRING. The output is shown in hexadecimal value. The value of **swTrunkGrpRx** is the 4-byte word received in the TrunkGrp port. This value can be obtained through the CLI in the output of the **portStatsShow** command (stat_wrx value) for the corresponding trunk ports.

High-Availability MIB Objects

Chapter 6

This chapter provides descriptions and other information specific to High-Availability MIB object types and includes the following sections:

- "HA MIB Overview" next
- "High-Availability Group" on page 6-3
- "HA-MIB Traps" on page 6-8
- "HA-MIB Traps and Sample Triggers" on page 6-9

HA MIB Overview

The HA-MIB provides information about the High Availability features of Fabric OS v4.*x*. This MIB is supported only in Fabric OS v4.*1.0* and later (and is not supported in Fabric OS v3.*x* or Fabric OS v2.6.x).

The HA-MIB depends on the SW-MIB. This dependency requires a management application to load the SNMP-FRAMEWORK MIB, then the SW-MIB, and finally the Entity MIB before it can load the HA-MIB.

The descriptions of each of the MIB variables in this chapter come directly from the HA-MIB itself.

The object types in HA-MIB are organized into the following groupings:

- *High-Availability Group*
- *HA-MIB Traps*

Figure 6-1 and Figure 6-2 depict the organization and structure of the HA-MIB file system.

Figure 6-1 HA-MIB Overall Tree Structure

Figure 6-2 Tree Structure for highAvailability and haMIBTraps Groups

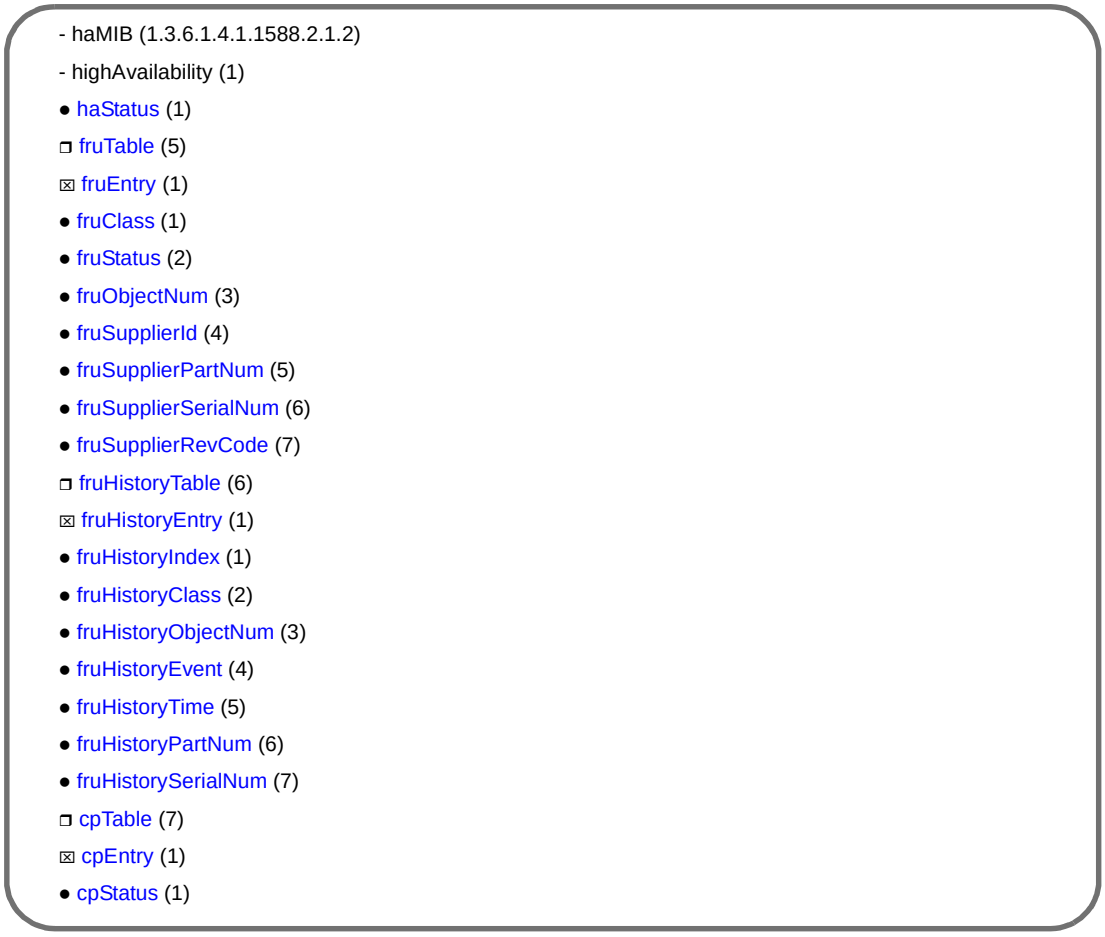


Table 6-1 lists the objects or definitions that are imported into the HA-MIB and the modules from which they are imported.

Table 6-1 Objects Imported into the HA-MIB

Object	Imported from this module
MODULE-IDENTITY	SNMPv2-SMI
OBJECT-TYPE	
NOTIFICATION-TYPE	
TimeTicks	
Integer32	
IpAddress	
mib-2	
fibrechannel	SW-MIB

Table 6-1 Objects Imported into the HA-MIB (Continued)

Object	Imported from this module
entPhysicalIndex	ENTITY-MIB
entPhysicalName	
DisplayString	SNMPv2-TC
TimeStamp	

High-Availability Group

This section describes the MIB objects in the High-Availability group.

haStatus

OID 1.3.6.1.4.1.1588.2.1.2.1.1

Description Indicates whether the system is redundant. Possible values are:

redundant (0)
nonredundant (1)

Note Redundant = Dual CP with standby CP ready to take over.

Non-redundant = Single/Dual CP system with standby CP not available to take over.

FRU Table

fruTable

OID 1.3.6.1.4.1.1588.2.1.2.1.5

Description This table inventories the field replaceable unit (FRU) slots available. This table contains an entry for each entry in the entPhysicalTable that has entPhysicalClass set to “Container (5)” and has a child entry having entPhysicalIsFRU set to “true (1)”.

Table 6-2 Valid FRU Counts for the Various SilkWorm Switches

Platform	Blades	Fans	Power Supply	WWN Card
SilkWorm 3800	NA	6 fans in 2 FRUs	2 PS	NA
SilkWorm 3900	NA	6 fans in 3 FRUs	2 PS	NA
SilkWorm 4100	NA	3 fans in 3 FRUs	2 PS	NA
SilkWorm 12000	8 port blades 2 CP blades	3 fans	4 PS	1 WWN
SilkWorm 24000	8 port blades 2 CP blades	3 fans	2 PS	1 WWN

fruEntry

OID 1.3.6.1.4.1.1588.2.1.2.1.5.1

Description An entry for FRU slot in the fruTable.

Index entPhysicalIndex

fruClass

OID 1.3.6.1.4.1.1588.2.1.2.1.5.1.1

Description The type of the FRU object that this slot can hold. Possible values are:

other (1)
unknown (2)
chassis (3)
cp (4)
other-CP (5)
switchblade (6)
wwn (7)
powerSupply (8)
fan (9)

fruStatus

OID 1.3.6.1.4.1.1588.2.1.2.1.5.1.2

Description The current status of the FRU object in the slot. Possible values are:

other (1)
unknown (2)
on (3)
off (4)
faulty (5)

fruObjectNum

OID 1.3.6.1.4.1.1588.2.1.2.1.5.1.3

Description The slot number of the blade, and the unit number for everything else.

fruSupplierId

OID 1.3.6.1.4.1.1588.2.1.2.1.5.1.4

Description The supplier ID.

fruSupplierPartNum

OID 1.3.6.1.4.1.1588.2.1.2.1.5.1.5

Description The supplier part number.

fruSupplierSerialNum

OID 1.3.6.1.4.1.1588.2.1.2.1.5.1.6

Description The supplier serial number.

fruSupplierRevCode

OID 1.3.6.1.4.1.1588.2.1.2.1.5.1.7

Description The supplier revision number.

FRU History Table

fruHistoryTable

OID 1.3.6.1.4.1.1588.2.1.2.1.6

Description This table gives the contents of the entire history log of the FRU events.

fruHistoryEntry

OID 1.3.6.1.4.1.1588.2.1.2.1.6.1

Description An entry in this table represents a particular FRU event.

Index fruHistoryIndex

fruHistoryIndex

OID 1.3.6.1.4.1.1588.2.1.2.1.6.1.1

Description Index of the FRU event in the history table.

fruHistoryClass

OID 1.3.6.1.4.1.1588.2.1.2.1.6.1.2

Description The type of the FRU object related to the event:

other (1)
unknown (2)
chassis (3)
cp (4)
other-CP (5)
switchblade (6)
wwn (7)
powerSupply (8)
fan (9)

fruHistoryObjectNum

OID 1.3.6.1.4.1.1588.2.1.2.1.6.1.3

Description The slot number of the blade and the unit number for everything else.

fruHistoryEvent

OID 1.3.6.1.4.1.1588.2.1.2.1.6.1.4

Description The type of the FRU event:

added (1)
removed (2)
invalid (3)

fruHistoryTime

OID 1.3.6.1.4.1.1588.2.1.2.1.6.1.5

Description The time at which this event happened.

fruHistoryPartNum

OID 1.3.6.1.4.1.1588.2.1.2.1.6.1.6

Description The Brocade part number of the FRU object.

fruHistorySerialNum

OID 1.3.6.1.4.1.1588.2.1.2.1.6.1.7

Description The Brocade serial number of the FRU object.

Control Processor (CP) Table

cpTable

OID 1.3.6.1.4.1.1588.2.1.2.1.7

Description This table lists all the CPs in the system.

cpEntry

OID 1.3.6.1.4.1.1588.2.1.2.1.7.1

Description An entry represents a single CP in the system.

Index entPhysicalIndex

cpStatus

OID 1.3.6.1.4.1.1588.2.1.2.1.7.1.1

Description The current status of the CP:

other (1)
unknown (2)
active (3)
standby (4)
failed (5)

cpIpAddress

OID 1.3.6.1.4.1.1588.2.1.2.1.7.1.2

Description The IP address of the Ethernet interface of this CP.

cpIpMask

OID 1.3.6.1.4.1.1588.2.1.2.1.7.1.3

Description The IP mask of the Ethernet interface of this CP.

cpIpGateway

OID 1.3.6.1.4.1.1588.2.1.2.1.7.1.4

Description The IP address of the IP gateway for this CP.

cpLastEvent

OID 1.3.6.1.4.1.1588.2.1.2.1.7.1.5

Description The last event related to this CP:

haSync (1)
haOutSync (2)
cpFaulty (3)
cpHealthy (4)
configChange (5)
failOverStart (6)
failOverDone (7)
firmwareCommit (8)
firmwareUpgrade (9)
other (10)
unknown (11)

Note haSync = HA state on both is in sync; haOutSync = HA state on both is out of sync.

HA-MIB Traps

This section lists the HA-MIB traps.

fruStatusChanged

OID	1.3.6.1.4.1.1588.2.1.2.2.0.1
Objects	entPhysicalName fruStatus
Status	Current
Description	This trap is sent when the status of any FRU object changes.

Note	Some of the triggers that will generate this trap are:
	▫ switch reboot
	▫ Add or remove a FRU component
	Sample trap output for Fabric OS v4.4.0; The following trap is generated when switch is rebooted:
	`entPhysicalName.11 = MODULE 5`
	`fruStatus.11 = off(4)`

cpStatusChanged

OID	1.3.6.1.4.1.1588.2.1.2.2.0.2
Objects	cpStatus cpLastEvent swID swSsn
Status	Current
Description	This trap is sent when the status of any CP object changes.

Note	The cpLastEvent variable provides the information about the event that occurred.
	Some of the triggers that will generate this trap are:
	▫ Reboot
	▫ firmwareDownload
	Sample trap output for Fabric OS v4.4.0:
	`cpStatus.13 = standby(4)`
	`cpLastEvent.13 = cpHealthy(6)`
	`swID.0 = 1`
	`swSsn.0 = 10:00:00:60:69:e2:03:6d`

fruHistoryTrap

OID	1.3.6.1.4.1.1588.2.1.2.2.0.3

Objects	fruHistoryClass fruHistoryObjectNum fruHistoryEvent fruHistoryTime fruHistoryPartNum fruHistorySerialNum
Status	Current
Description	This trap is sent when an FRU is added or removed.

Note	Some of the triggers that will generate this trap are:
	▫ Add or remove a FRU component
	Sample trap output for Fabric OS v4.4.0:
	`fruHistoryClass.40 = powerSupply(8)`
	`fruHistoryObjectNum.40 = 2`
	`fruHistoryEvent.40 = removed(2)`
	`fruHistoryTime.40 = Fri Aug 13 07:24:00 2004`
	`fruHistoryFactoryPartNum.40 = 23-0000006-02`
	`fruHistoryFactorySerialNum.40 = FL2L0022715`

HA-MIB Traps and Sample Triggers

The following table lists the HA-MIB traps and sample events that will trigger them.

Table 6-3 HA-MIB Traps and Example Triggers

HA-MIB Traps	Trigger
fruStatusChanged	Example events that will trigger this trap: • switch reboot • Add or remove a FRU component
cpStatusChanged	Example events that will trigger this trap: • Reboot • firmwareDownload
fruHistoryTrap	Example events that will trigger this trap: • Add or remove a FRU component

FICON MIB Objects

Chapter 7

This chapter provides descriptions and other information specific to FICON MIB (LINK-INCIDENT-MIB) object types, including the following information:

- "FICON MIB Overview" next
- "ficonRNID Group" on page 7-6
- "ficonLIRR Group" on page 7-9
- "ficonRLIR Group" on page 7-11
- "linkIncidentMIBTraps Group" on page 7-13

FICON MIB Overview

The FICON MIB module (LINK-INCIDENT-MIB) defines support for FICON in Fabric OS v4.1.2 and later. This MIB addresses link incident and link failure data for FICON hosts and devices connected to a Brocade switch.

The descriptions of each of the MIB variables in this chapter come directly from the FICON MIB itself.

The object types in the FICON MIB are organized into the following groupings:

- Request Node Identification Data (RNID)
- Link Incident Record Registration (LIRR)
- Registered Link Incident Report (RLIR)
- Traps

SNMP Traps for FICON

SNMP traps for FICON are generated when:

- a FICON device is added to the switch
- a FICON device is removed from the switch
- a new "listener" is added (once the LIRR handshake is complete)
- a "listener" entry is deleted
- a link incident occurs

FICON MIB System Organization of MIB Objects

Figure 7-1 and Figure 7-2 depict the organization and structure of the FICON MIB file system.

Figure 7-1 Overall Tree Structure for FICON MIB (linkIncidentMIB)

- iso (1)
- org (3)
- dod (6)
- internet (1)
- private (4)
- enterprises (1)
- bsci (1588)
- commDev (2)
- fibreChannel (1)
- fcSwitch (1)
- **linkIncidentMIB** (50)
- **ficonRNID** (2)
- **ficonLIRR**(3)
- **ficonRLIR** (4)
- **linkIncidentMIBTraps** (21)

Figure 7-2 Structure for linkIncidentMIB Tables and Traps

Definitions for FICON MIB

Table 7-1 lists the objects or definitions that are imported into the FICON MIB and the modules from which they are imported.

Table 7-1 Objects imported into the FICON MIB

Object	Imported from this module
MODULE-IDENTITY	SNMPv2-SMI
OBJECT-TYPE	
Integer32	
NOTIFICATION-TYPE	
TEXTUAL-CONVENTION	SNMPv2-TC
DisplayString	
fcSwitch	Brocade-REG-MIB

Textual Conventions

Table 7-2 lists the textual conventions for the FICON MIB.

Table 7-2 FICON MIB Textual Conventions

Name	Status	Description	Syntax

LIRRProtocol	Current	Represents the LIRR Protocol.	INTEGER {
			fcp (1),
			sb2 (2)
			}

FcPortID	Current	Represents Fibre Channel Address ID, a 24-bit value unique within the address space of a fabric.	OCTET STRING (SIZE (3))
RNIDModel	Current	Represents the value of Model Number.	OCTET STRING (SIZE (3))

RLIRLinkFailureType	Current	Represents the link failure type.	INTEGER {
			bitErrorRate(2),
			lossOfSignal(3),
			nOSRecognized(4),
			primitiveSequenceTimeout(5),
			invalidSeqForPortState(6),
			loopInitializationTimeout(7),
			lossOfSignalInLoopInit(8)
			}

Table 7-2 FICON MIB Textual Conventions (Continued)

Name	Status	Description	Syntax
RNIDManufacturer	Current	Represents the Manufacturer name or code.	OCTET STRING (SIZE (3))
RNIDTagType	Current	Represents the value of RNID Tag, in hexadecimal format	OCTET STRING (SIZE (2))
LinkWwn	Current	Represents the link WWN.	OCTET STRING (SIZE (8))

RegType	Current	Represents the RNID Registration Type.	INTEGER {
			conditional (1),
			unconditional (2)
			}

RNIDSequenceNumber	Current	Sequence number of the self describing node.	OCTET STRING (SIZE (12))
RNIDManufacturerPlant	Current	Represents the manufacturer plant name or code.	OCTET STRING (SIZE (2))
RNIDParams	Current	Represents the value of Param.	OCTET STRING (SIZE (3))

PortType	Current	Represents the Port Type.	INTEGER {
			n-port (1),
			nl-port (2)
			}

RNIDFlags	Current	Represents the value of RNID Flag in hexadecimal format. It indicates if the node is valid, not valid, or not current.	OCTET STRING (SIZE (1))

LinkFormat	Current	Represents the frame format.	INTEGER {
			ficon (1),
			common (2)
			}

RNIDType	Current	Represents the value of Type Number. Displays the type number of the self-describing node. It also describes the machine type.	OCTET STRING (SIZE (6))
NOTE: RNIDTagType includes DISPLAY-HINT “x”.			

ficonRNID Group

This group contains all Request Node Identification Data (RNID) group objects for FICON.

nodeRNIDTableNumEntries

OID	1.3.6.1.4.1.1588.2.1.1.50.2.1
Description	The number of entries in an RNID table.
Note	Refer to the **ficonShow** command help page for additional information on FICON MIB tables.

nodeRNIDTable

OID	1.3.6.1.4.1.1588.2.1.1.50.2.2
Description	A table that contains one entry for each FICON RNID node attached to a switch.

nodeRNIDEntry

OID	1.3.6.1.4.1.1588.2.1.1.50.2.2.1
Description	A entry containing the RNID information for a FICON node.
Index	nodeRNIDIndex

nodeRNIDIndex

OID	1.3.6.1.4.1.1588.2.1.1.50.2.2.1.1
Description	Index into the nodeRNIDTable.

nodeRNIDIncidentPortWWN

OID	1.3.6.1.4.1.1588.2.1.1.50.2.2.1.2
Description	Port WWN for Incident port. An N_Port (FICON device or host) is an incident port.

nodeRNIDPID

OID	1.3.6.1.4.1.1588.2.1.1.50.2.2.1.3
Description	PID for an Incident port.

nodeRNIDFlags

OID	1.3.6.1.4.1.1588.2.1.1.50.2.2.1.4
Description	RNID flags for an Incident port. Bits 0–2 of the flag describe the validity of bits 3–7 of the flag. Bit 3 of the flag specifies whether the node is a device-type node or a central-processor-complex-type (CPC-type) node. Bits 4–7 of the flag are reserved.

nodeRNIDType

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.5

Description Number associated with a node.

nodeRNIDModel

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.6

Description Model number of the RNID node.

nodeRNIDManufacturer

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.7

Description Identifies the manufacturer of the node.

nodeRNIDManufacturerPlant

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.8

Description Identifies the manufacturer plant of the node.

nodeRNIDSequenceNumber

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.9

Description Identifies the sequence number of the node.

nodeRNIDConnectedPortWWN

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.10

Description WWN of the connected port.

nodeRNIDPortType

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.11

Description Port type (N, NL, or virtual port) of the connected port.

nodeRNIDFormat

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.12

Description Node identification data format of the connected port.

nodeRNIDTag

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.13

Description Node identification tag of the connected port.

nodeRNIDParams

OID 1.3.6.1.4.1.1588.2.1.1.50.2.2.1.14

Description Node parameters of the connected port.

switchRNIDTableNumEntries

OID 1.3.6.1.4.1.1588.2.1.1.50.2.3

Description The number of entries in an RNID table that corresponds to the switch.

Note Refer to the **ficonShow** command help page for additional information on FICON MIB tables.

switchRNIDTable

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4

Description A table that contains RNID information for each switch FICON node.

switchRNIDEntry

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1

Description An entry containing the RNID information for the switch FICON node.

switchRNIDIndex

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.1

Description Index into switchRNIDTable.

switchRNIDSwitchWWN

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.2

Description WWN of the switch.

switchRNIDFlags

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.3

Description RNID flags for the switch.

switchRNIDType

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.4

Description Type Number associated with the switch.

switchRNIDModel

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.5

Description Model number of the RNID switch.

switchRNIDManufacturer

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.6

Description Identifies the manufacturer of the switch.

switchRNIDManufacturerPlant

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.7

Description Identifies the manufacturer plant of the switch.

switchRNIDSequenceNumber

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.8

Description Identifies the sequence number of the switch.

switchRNIDTag

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.9

Description Identification tag of the switch.

switchRNIDParams

OID 1.3.6.1.4.1.1588.2.1.1.50.2.4.1.10

Description Identifies the parameters of the switch.

ficonLIRR Group

This group contains all Link Incident Record Registration (LIRR) group objects for FICON.

LIRRTableNumEntries

OID 1.3.6.1.4.1.1588.2.1.1.50.3.1

Description The number of entries in an LIRR table.

Note Refer to the **ficonShow** command help page for additional information on FICON MIB tables.

LIRRTable

OID 1.3.6.1.4.1.1588.2.1.1.50.3.2

Description A table that contains LIRR information, one entry for each LIRR incident for an attached FICON device.

LIRREntry

OID 1.3.6.1.4.1.1588.2.1.1.50.3.2.1

Description An entry containing LIRR information.

LIRRIndex

OID 1.3.6.1.4.1.1588.2.1.1.50.3.2.1.1

Description Index into the LIRR table.

LIRRListenerPortWWN

OID 1.3.6.1.4.1.1588.2.1.1.50.3.2.1.2

Description WWN of the Listener port.

LIRRListenerPID

OID 1.3.6.1.4.1.1588.2.1.1.50.3.2.1.3

Description PID for the Listener port.

LIRRRegType

OID 1.3.6.1.4.1.1588.2.1.1.50.3.2.1.4

Description Registration type: conditional or unconditional.

LIRRProtocol

OID 1.3.6.1.4.1.1588.2.1.1.50.3.2.1.5

Description Protocol type supported.

LIRRPortType

OID 1.3.6.1.4.1.1588.2.1.1.50.3.2.1.6

Description Attached port type.

LIRRFormat

OID 1.3.6.1.4.1.1588.2.1.1.50.3.2.1.7

Description	Registration type: conditional or unconditional.

ficonRLIR Group

This group contains all Registered Link Incident Report (RLIR) group objects for FICON.

rLIRTableNumEntries

OID	1.3.6.1.4.1.1588.2.1.1.50.4.1
Description	The number of entries in a switch RLIR table.
Note	Refer to the **ficonShow** command help page for additional information on FICON MIB tables.

rLIRTable

OID	1.3.6.1.4.1.1588.2.1.1.50.4.2
Description	A table that contains RLIR information, one entry for each LIRR incident for an attached FICON device.

rLIREntry

OID	1.3.6.1.4.1.1588.2.1.1.50.4.2.1
Description	An entry containing RLIR information.

rLIRIndex

OID	1.3.6.1.4.1.1588.2.1.1.50.4.2.1.1
Description	Index into the RLIR table.

rLIRIncidentPortWwn

OID	1.3.6.1.4.1.1588.2.1.1.50.4.2.1.2
Description	Port WWN for RLIR Incident port.

rLIRIncidentNodeWwn

OID	1.3.6.1.4.1.1588.2.1.1.50.4.2.1.3
Description	Incident node WWN.

rLIRIncidentPortType

OID	1.3.6.1.4.1.1588.2.1.1.50.4.2.1.5
Description	RLIR Incident port type.

rLIRIncidentPID

OID 1.3.6.1.4.1.1588.2.1.1.50.4.2.1.6

Description RLIR Incident PID.

rLIRIncidentPortNumber

OID 1.3.6.1.4.1.1588.2.1.1.50.4.2.1.7

Description RLIR Incident port number. This is a vendor-specific port number.

rLIRConnectedPortWwn

OID 1.3.6.1.4.1.1588.2.1.1.50.4.2.1.8

Description RLIR Connected port WWN.

rLIRConnectedNodeWwn

OID 1.3.6.1.4.1.1588.2.1.1.50.4.2.1.9

Description RLIR Connected node WWN.

rLIRFabricWwn

OID 1.3.6.1.4.1.1588.2.1.1.50.4.2.1.10

Description RLIR Fabric WWN.

rLIRLinkFailureType

OID 1.3.6.1.4.1.1588.2.1.1.50.4.2.1.11

Description RLIR Link failure type.

rLIRTimeStamp

OID 1.3.6.1.4.1.1588.2.1.1.50.4.2.1.12

Description RLIR time stamp.

rLIRFormat

OID 1.3.6.1.4.1.1588.2.1.1.50.4.2.1.13

Description RLIR Format.

linkIncidentMIBTraps Group

linkIncidentMIBTrapPrefix

OID	1.3.6.1.4.1.1588.2.1.1.50.21.0
Description	The Link Incident traps.

linkRNIDDeviceRegistration

Trap#	1
OID	1.3.6.1.4.1.1588.2.1.1.50.21.0.1
Enterprise	sw
Variables	“nodeRNIDIndex”, “nodeRNIDIncidentPortWWN”, “nodeRNIDConnectedPortWWN”
Description	A device registered with the switch.

linkRNIDDeviceDeRegistration

Trap#	2
OID	1.3.6.1.4.1.1588.2.1.1.50.21.0.2
Enterprise	sw
Variables	“nodeRNIDIndex”, “nodeRNIDIncidentPortWWN”, “nodeRNIDConnectedPortWWN”
Description	A device deregistered with the switch.

linkLIRRListenerAdded

Trap#	3
OID	1.3.6.1.4.1.1588.2.1.1.50.21.0.3
Enterprise	sw
Variables	“LIRRListenerPortWWN”, “LIRRListenerPID”, “LIRRIndex”
Description	A listener for link failure incident is added.

linkLIRRListenerRemoved

Trap#	4
OID	1.3.6.1.4.1.1588.2.1.1.50.21.0.4
Enterprise	sw
Variables	“LIRRListenerPortWWN”, “LIRRListenerPID”, “LIRRIndex”
Description	A listener for link failure incident is removed.

linkRLIRFailureIncident

Trap#	5
OID	1.3.6.1.4.1.1588.2.1.1.50.21.0.5
Enterprise	sw
Variables	“nodeRNIDIndex”, “LIRRIndex”, “rLIRIncidentPortWwn”, “rLIRConnectedPortWwn”, “rLIRIndex”, “rLIRLinkFailureType”, “LIRRListenerPID”
Description	A link failure incident has occurred. The value of lIRRIndex will be -2147483647 and IIRRListenerPID will be 0, if there is no listener for incident.

FibreAlliance MIB Objects

Chapter 8

This chapter contains descriptions and other information specific to FibreAlliance MIB (FCMGMT-MIB) object types, including the following:

- "FibreAlliance MIB Overview" next
- "Connectivity Group" on page 8-6
- "Statistics Group" on page 8-32
- "Service Group" on page 8-42
- "SNMP Trap Registration Group" on page 8-44
- "Revision Number Scalar" on page 8-46
- "Unsupported Tables" on page 8-47
- "Unsupported Traps" on page 8-47

FibreAlliance MIB Overview

The descriptions of each of the MIB variables in this chapter come directly from the FCMGMT-MIB itself. The notes that follow the descriptions typically pertain to Brocade-specific information and are provided by Brocade.

The object types in FCMGMT-MIB are organized into the following groups:

- Connectivity
- Trap Registration
- Revision Number
- Statistic Set
- Service Set

FCMGMT-MIB System Organization of MIB Objects

Figure 8-1 through Figure 8-3 depict the organization and structure of FCMGMT-MIB.

Figure 8-1 FCMGMT-MIB Overall Tree Structure

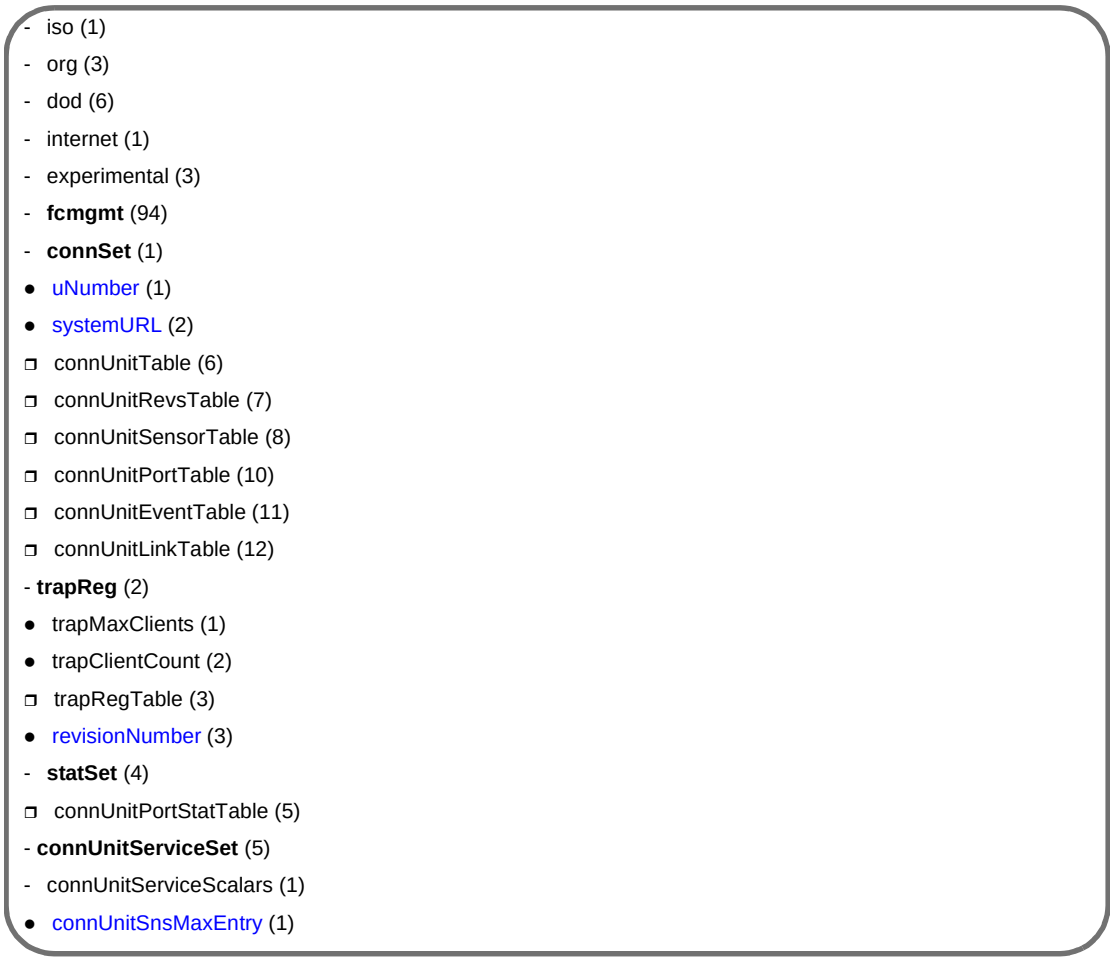


Figure 8-2 Tree Structure for connSet Tables

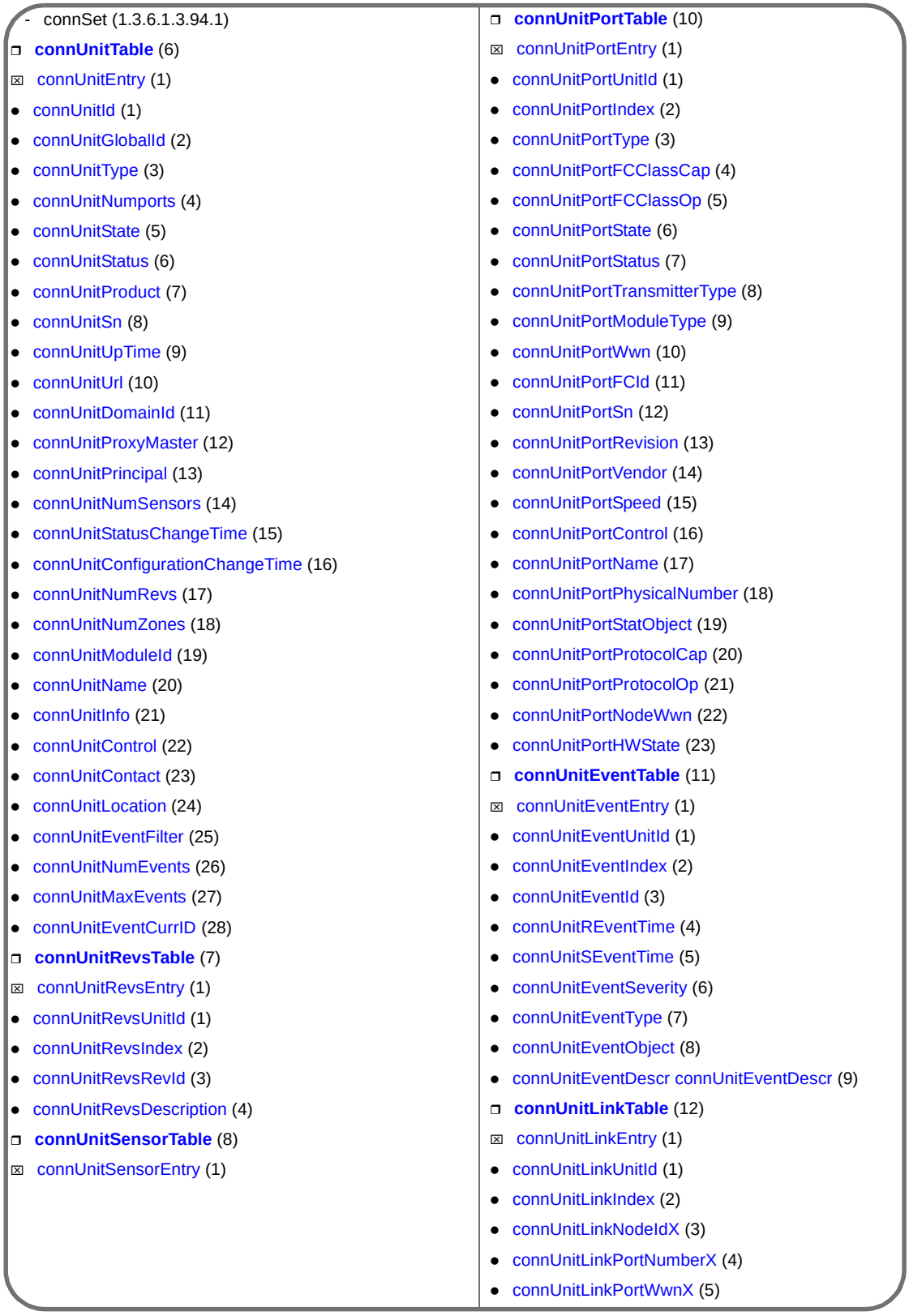
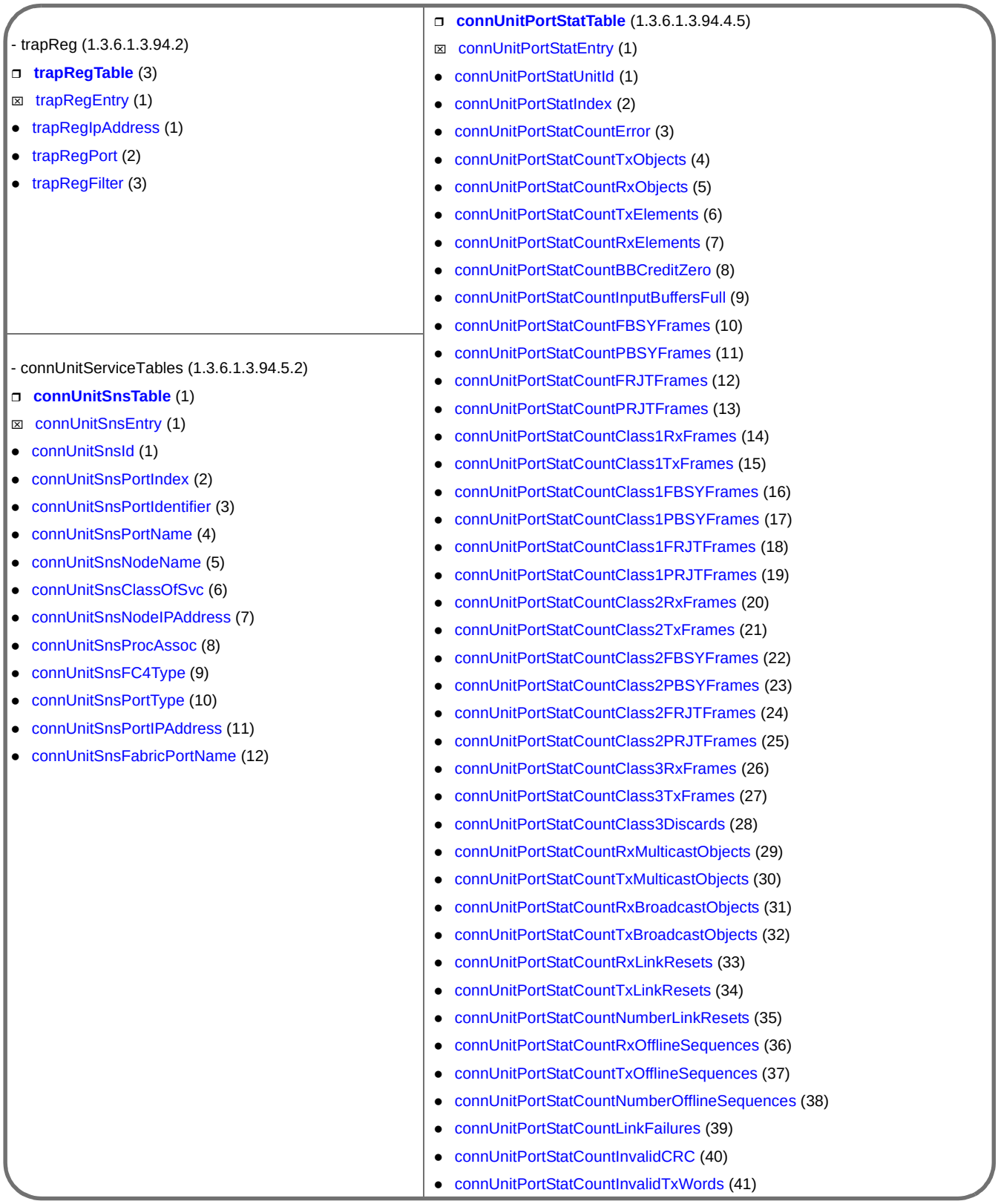


Figure 8-3 Tree Structure for trapReg, connUnitSns, and connUnitPortStat Tables



Definitions for FCMGMT-MIB

The following definitions are used for FCMGMT-MIB.

Table 8-1 FCMGMT-MIB Definitions

Type Definition	Value	Description
FcNameId	Octet String of size 8	
FcGlobalId	Octet String of size 16	
FcAddressId	Octet String of size 3	
FcEventSeverity	Integer	1 (unknown) 2 (emergency) Emergency status. 3 (alert) Alert status. 4 (critical) Critical status. 5 (error) Error status. 6 (warning) Warning status. 7 (notify) Notification status. 8 (info) Informational status. 9 (debug) Debug status. 10 (mark) All messages logged.
FcUnitType	Integer	1 (unknown) 2 (other)None of 3–14. 3 (hub)Passive connectivity unit supporting loop protocol. 4 (switch)Active connectivity unit supporting multiple protocols. 5 (gateway)Unit that not only converts the interface but also encapsulates the frame into another protocol. The assumption is that there are always two gateways connected together: for example, FC <-> ATM. 6 (converter)Unit that converts from one interface to another: for example, FC <-> SCSI. 7 (hba)Host bus adapter. 8 (proxy-agent)Software proxy agent. 9 (storage-device)Disk, CD, tape, and so on. 10 (host)Host computer. 11 (storage-subsystem)For example, RAID, library. 12 (module)Subcomponent of a system. 13 (swdriver)Software driver. 14 (storage-access-device) Provides storage management and access for heterogeneous hosts and heterogeneous devices.

Connectivity Group

Implementation of the Connectivity group is mandatory for all systems.

uNumber

OID 1.3.6.1.3.94.1.1

Description The number of connectivity units present on this system (represented by this agent). Might be a count of the boards in a chassis or the number of full boxes in a rack.

Note The connectivity unit is mapped to a switch. uNumber is always set to 1.

systemURL

OID 1.3.6.1.3.94.1.2

Description The top-level URL of the system; if it does not exist, the value is an empty string. The URL format is implementation dependant and can have keywords embedded that are preceded by a percent sign (for example, %USER).

The following are the defined keywords that are recognized and replaced with data during a launch:

USER	Replace with username
PASSWORD	Replace with password
GLOBALID	Replace with global ID
SERIALNO	Replace with serial number

Note The expected value for system URL.0 is:

http://{*a.b.c.d*}

where {*a.b.c.d*} is the IP address of the switch if a Web Tools license is available.

“” (null)

where **“”** is used when a Web Tools license is not available.

Connectivity Unit Table

connUnitTable

OID 1.3.6.1.3.94.1.6

Description A list of units under a single SNMP agent. The number of entries is given by the value of uNumber. The value is 1 for stand-alone system.

connUnitEntry

OID 1.3.6.1.3.94.1.6.1

Description A connectivity unit entry containing objects for a particular unit.

Index connUnitId

connUnitId

OID 1.3.6.1.3.94.1.6.1.1

Description The unique identification for this connectivity unit among those within this proxy domain. The value must be unique within the proxy domain because it is the index variable for connUnitTable. The value assigned to a given connectivity unit should be persistent across agent and unit resets. It should be the same as connUnitGlobalId if connUnitGlobalId is known and stable.

Note The Brocade implementation maps the switch WWN to the top 8 octets of this variable and sets the remaining lower 8 octets to 0.

To specify a particular instance of any columnar variable in the connUnitEntry (such as connUnitType), specify the instance identifier as a 16-octet value.

Example:

```
connUnitType.10.0.0.60.69.4.11.19.0.0.0.0.0.0.0.0
```

where the object instance identifier consists of 16 octets, each representing the byte value from high-byte order to low-byte order of this 128-bit integer.

connUnitGlobalId

OID 1.3.6.1.3.94.1.6.1.2

Description An optional global-scope identifier for this connectivity unit. It must be a WWN for this connectivity unit or 16 octets of value 0.

The following characteristics are required:

- WWN formats requiring fewer than 16 octets must be extended to 16 octets with trailing 0 octets.
- If a WWN is used for connUnitId, the same WWN must be used for connUnitGlobalId.

When a non-zero value is provided, the following characteristics are strongly recommended:

- It should be persistent across agent and unit resets.
- It should be globally unique.
- It should be one of these FC-PH/PH3 formats:
  - IEEE (NAA=1)
  - IEEE Extended (NAA=2)
  - IEEE Registered (NAA=5)
  - IEEE Registered extended (NAA=6)

Use of the IEEE formats allows any IEEE-registered vendor to assure global uniqueness independently. The following are some references on IEEE WWN formats:

```
http://standards.ieee.org/regauth/oui/tutorials/
fibreformat.html
```

`http://standards.ieee.org/regauth/oui/tutorials/fibrecomp_id.html`

If one or more WWNs are associated with the connUnit via other management methods, one of them should be used for connUnitGlobalId.

If a WWN is not assigned specifically to the connUnit, there is some merit to using a WWN assigned to (one of) its permanently attached FC/LAN interfaces. This cannot risk uniqueness, though.

As a counterexample, if your agent runs in a host and the host has an HBA, it is quite possible that agent, host, and HBA are all distinct connUnits, so the host and agent cannot use the WWN of the HBA.

Example:

If your hub has a built-in Ethernet port, it might be reasonable for the hub to use its LAN address (prefixed with the appropriate NAA) as its connUnitId. But if the Ethernet is a replaceable PCCard, the hub should have an independent ID.

Note — The Brocade implementation maps the switch WWN to the top 8 octets of this variable and sets the remaining lower 8 octets to 0.

Example:

If Brocade's switch WWN is 10:0:0:60:69:10:02:18, then use the SNMP GET command on

`connUnitGlobalId.10.0.0.60.69.10.02.18.0.0.0.0.0.0.0.0`

returns:

`10 00 00 60 69 10 02 18 00 00 00 00 00 00 00 00`

connUnitType

OID — 1.3.6.1.3.94.1.6.1.3

Description — The type of this connectivity unit.

Note — Set to 4 (switch).

connUnitNumports

OID — 1.3.6.1.3.94.1.6.1.4

Description — Number of physical ports (between 0 and the *maximum number of system supported ports*) in the connectivity unit (internal/embedded, external).

Note — To determine the *maximum number of system supported ports*, use the SNMP GET command on swFcPortCapacity.

The SilkWorm switches support 0 to *maximum number of system supported ports*.

For the SilkWorm 4100, this value is 32.

connUnitState

OID — 1.3.6.1.3.94.1.6.1.5

Description Overall state of the connectivity unit:

unknown (1)	
online (2)	Set the state to online.
offline (3)	Set the state to offline.

Mapped as follows:

switchState(ONLINE)	2 (online)
switchState(not ONLINE)	3 (offline, testing, faulty)

connUnitStatus

OID 1.3.6.1.3.94.1.6.1.6

Description Overall status of the connectivity unit:

- unknown (1)
- unused (2)
- ok (3)
- warning (4) - Needs attention.
- failed (5)

Note switchStatus maps directly as follows:

connUnitStatus	switchStatus
1 (unknown)	Unknown
2 (unused)	Unmonitored
3 (ok)	Healthy/ok
4 (warning)	Marginal/Warning
5 (failed)	Down/Failed

connUnitProduct

OID 1.3.6.1.3.94.1.6.1.7

Description The connectivity unit vendor's product model name.

Note This is the same as for sysDescr (set for as many as 79 bytes).

connUnitSn

OID 1.3.6.1.3.94.1.6.1.8

Description The serial number for this connectivity unit.

Note Set to the SSN (which by default is the WWN); can be changed through telnet.

connUnitUpTime

OID 1.3.6.1.3.94.1.6.1.9

Description The number of centiseconds since the last unit initialization.

Note Set when connUnitTable is initialized.

connUnitUrl

OID 1.3.6.1.3.94.1.6.1.10

Description URL to launch a management application, if applicable; otherwise an empty string. In a standalone unit, this would be the same as the top-level URL. This has the same definition as systemURL for keywords.

Note (Same as systemURL.) The expected value for connUnitURL.0 is:

"http://{a.b.c.d}"

where {a.b.c.d} is the IP address of the switch if Web Tools license is available.

"" (null)

where "" is the IP address of the switch if Web Tools license is not available.

connUnitDomainId

OID 1.3.6.1.3.94.1.6.1.11

Description 24-bit Fibre Channel address ID of this connectivity unit, right-justified with leading 0s if required. If this value is not applicable, return all bits to 1.

Note Set to the switch domain ID (as per FC-SW).

connUnitProxyMaster

OID 1.3.6.1.3.94.1.6.1.12

Description A value of "yes" means this is the proxy master unit for a set of managed units. Possible values are:

- unknown (1)
- no (2)
- yes (3)

For Example:

This could be the only unit with a management card in it for a set of units. A standalone unit should return "yes" for this object.

Note Set to 3 (yes).

connUnitPrincipal

OID 1.3.6.1.3.94.1.6.1.13

Description Indicates whether this connectivity unit is the principal unit within the group of fabric elements. If this value is not applicable, it returns "unknown." Possible values are:

- unknown (1)
- no (2)
- yes (3)

Note	If the switch is principal, this is set to 3 (yes); otherwise, it is set to 2 (no).

connUnitNumSensors

OID	1.3.6.1.3.94.1.6.1.14
Description	Number of sensors (between 0 and *maximum number of sensors*) in the connUnitSensorTable.
Note	Refer to Table 5-3 on page 5-21 for specific sensor counts on the various switches.

connUnitStatusChangeTime

OID	1.3.6.1.3.94.1.6.1.15
Description	The sysuptime time stamp (in centiseconds) at which the last status change occurred for any members of the set; this is the latest time stamp that connUnitStatus or connUnitPortStatus changed.
Note	Not supported.

connUnitConfigurationChangeTime

OID	1.3.6.1.3.94.1.6.1.16
Description	The sysuptime time stamp (in centiseconds) at which the last configuration change occurred for any members of the set. In other words, this is the latest time stamp of flash memory update. This represents a union of change information for connUnitConfigurationChangeTime
Note	Not supported.

connUnitNumRevs

OID	1.3.6.1.3.94.1.6.1.17
Description	The number of revisions in connUnitRevsTable.
Note	Set to 2.

connUnitNumZones

OID	1.3.6.1.3.94.1.6.1.18
Description	Number of zones defined in connUnitZoneTable.
Note	Not supported.

connUnitModuleId

OID	1.3.6.1.3.94.1.6.1.19

Description This is a unique ID, persistent between boots, that can be used to group a set of connUnits together into a module. The intended use would be to create a connUnit with a connUnitType of “module” to represent a physical or logical group of connectivity units. Then the value of the group would be set to the value of connUnitId for this “container” connUnit.

connUnitModuleId should be 0s if this connUnit is not part of a module.

Note Set to the WWN of the switch.

connUnitName

OID 1.3.6.1.3.94.1.6.1.20

Description A display string containing a name for this connectivity unit. This object value should be persistent between boots.

Note Set to switchName/sysName.

connUnitInfo

OID 1.3.6.1.3.94.1.6.1.21

Description A display string containing information about this connectivity unit. This object value should be persistent between boots.

Note Set to sysDescr and read-only.

connUnitControl

OID 1.3.6.1.3.94.1.6.1.22

Description Controls the addressed connUnit. Each implementation might choose not to allow any or all of these values on a SET. Possible values are:

unknown (1)

invalid (2)

resetConnUnitColdStart (3): Reboot. Performs a switch reboot.

resetConnUnitWarmStart (4): Fastboot. The addressed unit performs a Warm Start reset.

offlineConnUnit (5): Disable switch. The addressed unit puts itself into an implementation-dependant offline state. In general, if a unit is in an offline state, it cannot be used to perform meaningful Fibre Channel work.

onlineConnUnit (6): Enable switch. The addressed unit puts itself into an implementation-dependant online state. In general, if a unit is in an online state, it is capable of performing meaningful Fibre Channel work.

Cold start and warm start are as defined in MIB-II and are not meant to be a factory reset.

This is similar to swAdmStatus:

resetConnunitColdStart = reboot

resetConnunitWarmStart = fastboot

offlineConnUnit = disable switch

onlineConnUnit = enable switch

default after reboot = unknown

The declaration 1 (unknown) maps to the default value upon rebooting, and 2 (invalid) is not applicable.

Note — Declarations 3 and 4 perform the same operation—a cold boot of the switch.

connUnitContact

OID — 1.3.6.1.3.94.1.6.1.23

Description — Contact information for this connectivity unit.

Note — Displays the same value as sysContact. Changing the value in this variable causes the value in sysContact to also be changed.

connUnitLocation

OID — 1.3.6.1.3.94.1.6.1.24

Description — Location information for this connectivity unit.

Note — Displays the same value as sysLocation.

connUnitEventFilter

OID — 1.3.6.1.3.94.1.6.1.25

Description — Defines the event severity logged by this connectivity unit. All events of severity less than or equal to connUnitEventFilter are logged in connUnitEventTable.

Note — Always returns value 9 (debug).

connUnitNumEvents

OID — 1.3.6.1.3.94.1.6.1.26

Description — Number of events currently in connUnitEventTable.

Note — (v3.0 only) The value ranges from 0 to 64.

(v4.0 only) The value ranges from 0 to 255.

(v4.2 only) The value ranges from 0 to 2048.

(v4.4 only) The value ranges from 0 to 1024.

connUnitMaxEvents

OID — 1.3.6.1.3.94.1.6.1.27

Description — Maximum number of events that can be defined in connUnitEventTable.

Note	(v3.0 only) The value is 64. (v4.0 only) The value is 255. (v4.2 only) The value is 2048. (v4.4 only) The value is 1024.

connUnitEventCurrID

OID	1.3.6.1.3.94.1.6.1.28
Description	The last-used event ID (connUnitEventId).
Note	Maximum is 2147483647 (2^{31}-1).

Connectivity Unit Revisions Table

connUnitRevsTable

OID	1.3.6.1.3.94.1.7
Description	Table of the revisions supported by connectivity units managed by this agent.
Note	This table lists the versions of hardware and software elements in the switch. One entry for the hardware platform version (for SilkWorm 4100 this value is 23.1) and another entry for the Fabric OS version (for this release the value is 4.4).

connUnitRevsEntry

OID	1.3.6.1.3.94.1.7.1
Description	Table of the revisions supported by connectivity units managed by this agent.
Index	connUnitRevsUnitId connUnitRevsIndex

connUnitRevsUnitId

OID	1.3.6.1.3.94.1.7.1.1
Description	The connUnitId value for the connectivity unit that contains this revision table.

connUnitRevsIndex

OID	1.3.6.1.3.94.1.7.1.2
Description	A unique value among all connUnitRevsEntrys with the same value of connUnitRevsUnitId, in the range between 1 and connUnitNumRevs.
Note	Index 1 returns the hardware version. Index 2 returns the software version.

connUnitRevsRevId

OID 1.3.6.1.3.94.1.7.1.3

Description A vendor-specific string identifying a revision of a component of the connUnit indexed by connUnitRevsUnitId.

Note Index 1 returns the switchType from telnet command **switchShow**. Index 2 returns the Fabric OS version from telnet command **version**: for example, v2.6.

connUnitRevsDescription

OID 1.3.6.1.3.94.1.7.1.4

Description Description of a component to which the revision corresponds.

Note Index 1 returns the hardware version. Index 2 returns the software version.

Connectivity Unit Sensor Table

connUnitSensorTable

OID 1.3.6.1.3.94.1.8

Description Table of the sensors supported by each connectivity unit managed by this agent.

Note Refer to Table 5-3 on page 5-21 for specific sensor counts on the various switches.

connUnitSensorEntry

OID 1.3.6.1.3.94.1.8.1

Description Each entry contains the information for a specific sensor.

Index connUnitSensorUnitId
connUnitSensorIndex

connUnitSensorUnitId

OID 1.3.6.1.3.94.1.8.1.1

Description The connUnitId value of the connectivity unit that contains this sensor table.

Note Set to connUnitId.

connUnitSensorIndex

OID 1.3.6.1.3.94.1.8.1.2

Description A unique value among all connUnitSensorEntrys with the same value of connUnitSensorUnitId, in the range between 1 and the return value from connUnitNumSensor.

connUnitSensorName

OID 1.3.6.1.3.94.1.8.1.3

Description A textual identification of the sensor, intended primarily for operator use.

Note Each contains the name of sensor in textual format: for example, Temp #1, Fan #2, and so on.

connUnitSensorStatus

OID 1.3.6.1.3.94.1.8.1.4

Description The status indicated by the sensor:

unknown (1)	
other (2)	
ok (3)	The sensor indicates okay.
warning (4)	The sensor indicates a warning.
failed (5)	The sensor indicates failure.

Note Nominal = 3 (ok). Not nominal = 5 (failed).

connUnitSensorInfo

OID 1.3.6.1.3.94.1.8.1.5

Description Miscellaneous static information about the sensor, such as its serial number.

Note Each contains textual information about the sensor.
Returns the serial ID if this is for the power supply; otherwise, returns Null.

connUnitSensorMessage

OID 1.3.6.1.3.94.1.8.1.6

Description This describes the status of the sensor as a message. It might also provide more resolution on the sensor indication; for example, cover temperature 1503K, above nominal operating range.

Note Each contains the sensor status (and reading if applicable) in textual format.

connUnitSensorType

OID 1.3.6.1.3.94.1.8.1.7

Description The type of component being monitored by this sensor:

unknown (1)
other (2)
battery (3)
fan (4)
power-supply (5)

transmitter (6)
enclosure (7)
board (8)
receiver (9)

Note The following mapping is for each individual sensor, where applicable:

swSensorType	connUnitSensorType
1 (temperature)	8 (board)
2 (fan)	4 (fan)
3 (power supply)	5 (power supply)

connUnitSensorCharacteristic

OID 1.3.6.1.3.94.1.8.1.8

Description The characteristics being monitored by this sensor. Possible values are:

unknown (1)
other (2)
temperature (3)
pressure (4)
emf (5)
currentValue (6) Current is a keyword.
airflow (7)
frequency (8)
power (9)
door (10) (Not supported in Fabric OS v2.6.1.)

Note The following mapping is for each individual sensor, where applicable:

swSensorType	connUnitSensorCharacteristic
1 (temperature)	3 (temperature)
2 (fan)	7 (airflow)
3 (power supply)	9 (power)

Connectivity Unit Port Table

connUnitPortTable

OID 1.3.6.1.3.94.1.10

Description Generic information on ports for a specific connUnit.

connUnitPortEntry

OID 1.3.6.1.3.94.1.10.1

Description Each entry contains the information for a specific port.

Index connUnitPortUnitId
connUnitPortIndex

connUnitPortUnitId

OID 1.3.6.1.3.94.1.10.1.1

Description The connUnitId value of the connectivity unit that contains this port.

Note Same value as connUnitId.

connUnitPortIndex

OID 1.3.6.1.3.94.1.10.1.2

Description Number of physical ports between 0 and *maximum number of system supported ports* in the connectivity unit (internal/embedded, external).

Note To determine the *maximum number of system supported ports*, use the SNMP GET command on swFcPortCapacity.

The SilkWorm switches support 0 to *maximum number of system supported ports*.

connUnitPortType

OID 1.3.6.1.3.94.1.10.1.3

Description The port type:

unknown (1)	
other (2)	
not-present (3)	
hub-port (4)	
n-port (5)	End port for fabric.
l-port (6)	End port for loop.
fl-port (7)	Public loop.
f-port (8)	Fabric port.
e-port (9)	Fabric expansion port.
g-port (10)	Generic fabric port.
domain-ctl (11)	Domain controller.
hub-controller (12)	
scsi (13)	Parallel SCSI port.
escon (14)	
lan (15)	
wan (16)	
ac (17)	AC power line. (Not supported in Fabric OS v2.6.1.)
dc (18)	DC power line. (Not supported in Fabric OS v2.6.1)
ssa (19)	Serial storage architecture. (Not supported in Fabric OS v2.6.1.)

Note Mapped as:

U_Port = 10 (g-port)
F_Port = 8 (f-port)
FL_Port = 7 (fl-port)
E_Port = 9 (e-port)

connUnitPortFCClassCap

OID 1.3.6.1.3.94.1.10.1.4

Description Bit mask that specifies the classes of service capability of this port. If this is not applicable, return all bits set to 0.

The bits have the following definition:

unknown	0
class-f	1
class-one	2
class-two	4
class-three	8
class-four	16
class-five	32
class-six	64

Note For an F_Port or FL_Port, this value is 0x000C. For a G_Port or E_Port, this value is 0x000D.

connUnitPortFCClassOp

OID 1.3.6.1.3.94.1.10.1.5

Description Bit mask that specifies the classes of service that are currently operational. If this is not applicable, return all bits set to 0. This object has the same definition as connUnitPortFCClassCap.

Note For an F_Port or FL_Port, this value is 0x000C. For a G_Port or E_Port, this value is 0x000D.

connUnitPortState

OID 1.3.6.1.3.94.1.10.1.6

Description The state of the port hardware:

unavailable (1)	Do not use.
online (2)	Available for meaningful work.
offline (3)	Not available for meaningful work.
bypassed (4)	No longer used.
diagnostics (5)	Map to your testing. (Not supported in Fabric OS v2.6.1.)

Note For an E, F, or FL_Port, the value is online. For a U_Port, the value is offline (disabled, testing, faulted).

connUnitPortStatus

OID 1.3.6.1.3.94.1.10.1.7

Description An overall protocol status for the port:

unknown (1)	
unused (2)	Device cannot report this status.
ready (3)	FCAL Loop or FCPH Link reset protocol initialization has completed.
warning (4)	Do not use.
failure (5)	Do not use.
notparticipating (6)	Loop not participating and does not have a loop address.
initializing (7)	Protocol is proceeding.
bypass (8)	Do not use.
ols (9)	FCP offline status. (Not supported in Fabric OS v2.6.1.)

Note For an E, F, or FL_Port, the value is 3 (ok). For a U_Port, the value is 2 (unused) if not faulty with GBIC, 3 (warning) if not faulty but no GBIC, or 5 (failure) if faulty.

connUnitPortTransmitterType

OID 1.3.6.1.3.94.1.10.1.8

Description The technology of the port transceiver:

unknown (1)	
other (2)	
unused (3)	
shortwave (4)	
longwave (5)	
copper (6)	
scsi (7)	
longwaveNoOFC (8)	
shortwaveNoOFC (9)	
longwaveLED (10)	
ssa (11)	(Not supported in Fabric OS v2.6.1.)

Note For an external FC_Port, this value should be 9 (shortwaveNoOFC), 8 (longwaveNoOFC), or 6 (copper).

connUnitPortModuleType

OID 1.3.6.1.3.94.1.10.1.9

Description The module type of the port connector:

unknown (1)	
other (2)	
gbic (3)	
embedded (4):	Fixed (oneXnine)
glm (5)	

gbicSerialId (6)
gbicNoSerialId (7)
gbicNotInstalled (8)
smallFormFactor (9)

Note — For an external FC_Port with GBIC, this value is set to 6 (gbicSerialId) or 7 (gbicNoSerialId). For an external FC_Port without GBIC, this value is set to 8 (gbicNotInstalled).

connUnitPortWwn

OID — 1.3.6.1.3.94.1.10.1.10

Description — The World Wide Name of the port, if applicable; otherwise, an empty string.

This is in IEEE Extended format, and the extension contains the internal port number of each port.

Note — The internal port number is 1 less than the port index. For example, if the switch has WWN 10:00:00:60:69:10:02:18, then port numbers 0 and 6 have WWN 20:00:00:60:69:10:02:18 and 20:06:00:60:69:10:02:18, respectively. However, the embedded port has WWN 10:00:00:60:69:10:02:18, the same as the switch.

connUnitPortFCId

OID — 1.3.6.1.3.94.1.10.1.11

Description — This is the assigned Fibre Channel ID of this port. This value is expected to be a Big Endian value of 24 bits. If this is a loop, then it is the AL_PA that is connected. If this is an E_Port, then it contains only the domain ID, left justified, 0 filled. If this port does not have a Fibre Channel address, return all bits set to 1.

Note — For an F_Port, this is the Fibre Channel ID to which the connected N_port is assigned. For an FL_Port, this is the Fibre Channel ID of the FL_Port (alpa = 0). For a U or E_Port, this is similar to F_Port.

connUnitPortSn

OID — 1.3.6.1.3.94.1.10.1.12

Description — The serial number of the unit (for example, for a GBIC). If this is not applicable, return an empty string.

Note — If the GBIC has a serial ID, the return value is the GBIC part number; otherwise, the return value is Null.

connUnitPortRevision

OID — 1.3.6.1.3.94.1.10.1.13

Description — The port revision (for example, GBIC).

Note — If the GBIC has a serial ID, this returns the GBIC revision number; otherwise, it returns a Null value.

connUnitPortVendor

OID 1.3.6.1.3.94.1.10.1.14

Description The port vendor (for example, for a GBIC).

Note If the GBIC has a serial ID, this returns the GBIC vendor name; otherwise, it returns a Null value.

connUnitPortSpeed

OID 1.3.6.1.3.94.1.10.1.15

Description The speed of the port, in kilobytes per second.

Note For example, the valid values for Brocade switch SilkWorm 12000 and 24000: 125,000 KBps or 250,000 KBps

connUnitPortControl

OID 1.3.6.1.3.94.1.10.1.16

Description Controls the addressed connUnit's port.

Valid commands are:

resetConnUnitPort

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific reset operation. Examples of these operations are:

- The Link Reset protocol.
- The Loop Initialization protocol.
- Resynchronization occurring between the transceiver in the addressed port to the transceiver to which the port is connected.

bypassConnUnitPort

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific "bypass" operation. Examples of these operations are:

- Transitioning from online to offline.
- A request (NON-PARTICIPATING) command to the loop port state machine.
- Removal of the port from an arbitrated loop by a hub.

unbypassConnUnitPort

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific "unbypass" operation. Examples of these operations are

- The Link Failure protocol.
- A request (PARTICIPATING) command to the loop port state machine.
- Addition of the port to an arbitrated loop by a hub.

offlineConnUnitPort

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific offline operation. Examples of these operations are

- Disabling a port's transceiver.
- The Link Failure protocol.
- Request (NON-PARTICIPATING) command to the loop port state machine removal of the port from an arbitrated loop by a hub.

onlineConnUnitPort

If the addressed connUnit allows this operation to be performed to this port, the addressed port performs a vendor-specific online operation. Examples of these operations are

- Enabling a port's transceiver.
- The Link Failure protocol, request (PARTICIPATING) command to the loop port state machine.
- Addition of the port from an arbitrated loop by a hub.

Each implementation might choose not to allow any or all of these values on a SET.

If the management station uses in-band communication (FC-IP) with the switch, either of the two following actions might result in a loss of in-band communication with the switch:

- Disabling the FC port that is connected to the management station
- Disabling the embedded port

Note — Return values are:

resetConnUnitPort	portDisable (F or E_Port, loop for U_Port)
bypassConnUnitPort	portDisable (FL_Port)
unbypassConnUnitPort	portEnable (FL_Port)
offlineConnUnitPort	portDisable (E, F, FL_Port)
onlineConnUnitPort	portEnable (U)
resetConnUnitPortCounters	clear the port statistics counter. When rebooted, this defaults to 1 (unknown).

connUnitPortName

OID 1.3.6.1.3.94.1.10.1.17

Description A string describing the addressed port.

Note This object is read-only for Brocade switches.

connUnitPortPhysicalNumber

OID 1.3.6.1.3.94.1.10.1.18

Description This is the internal port number by which this port is known. In many implementations, this should be the same as connUnitPortIndex. Some implementations might have an internal port representation not compatible with the rules for table indices. In these cases, provide the internal representation of this port in this object. This value might also be used in the connUnitLinkPortNumberX or connUnitLinkPortNumberY objects of the connUnitLinkTable.

Note The internal port numbers for Brocade switch. The SilkWorm switches support 0 through *maximum number of ports*.

connUnitPortStatObject

OID 1.3.6.1.3.94.1.10.1.19

Description This contains the OID of the first object of the table that contains the statistics for this particular port. If this has a value of 0, then there are no statistics available for this port. The port type information helps identify the statistics objects found in the table. From this point, use the getnext command to get the next statistics object. When the first part of the OID changes, the end of table is reached.

Note Mapped to connUnitPortStatFabricUnitId.

connUnitPortProtocolCap

Not supported in Fabric OS v2.6.1.

OID 1.3.6.1.3.94.1.10.1.20

Description This is the bit mask that specifies the driver-level protocol capability of this port.

If this is not applicable, return all bits set to 0.

Return value = 07F

Note The bits have the following definition:

0 = unknown
1 = Loop
2 = Fabric
4 = SCSI
8 = TCP/IP
16 = VI
32 = FICON

connUnitPortProtocolOp

Not supported in Fabric OS v2.6.1.

OID 1.3.6.1.3.94.1.10.1.21

Description This is the bit mask that specifies the driver level protocol(s) that are currently operational.

Return value = 07F

Note If this is not applicable, return all bits set to zero. The bits have the following definition:

0 = unknown
1 = Loop
2 = Fabric
4 = SCSI
8 = TCP/IP
16 = VI
32 = FICON

connUnitPortNodeWwn

Not supported in Fabric OS v2.6.1.

OID 1.3.6.1.3.94.1.10.1.22

Description The node World Wide Name of the port, if applicable; otherwise, an empty string.

All related ports in within a group should have the same node WWN value. The container is defined as the largest physical entity.

Example:

All ports on HBAs on a host will have the same node WWN. All ports on the same storage subsystem will have the same node WWN.

This is in IEEE Extended format and the extension contains the internal port number of each port.

Note The internal port number is 1 less than the port index. For **example,** if the switch has WWN 10:00:00:60:69:10:02:18, then port number 0 and 6 have WWN 20:00:00:60:69:10:02:18 and 20:06:00:60:69:10:02:18, respectively. However, the embedded port has WWN 10:00:00:60:69:10:02:18, the same as the switch.

connUnitPortHWState

Not supported in Fabric OS v2.6.1.

OID 1.3.6.1.3.94.1.10.1.23

Description The state of the port as detected by the hardware. Possible values are:

unknown (1)	
failed (2)	Port failed diagnostics (port_flt_state).
bypassed (3)	FCAL bypass, loop only (not used).
active (4)	Connected to a device (light and sync are present).
loopback (5)	Port in ext loopback (loopback state).
txfault (6)	Transmitter fault (bad GBIC).
noMedia (7)	Media not installed (GBIC removed).
linkDown (8)	Waiting for activity—rx sync (light with no sync).

Connectivity Unit Event Table

connUnitEventTable

OID 1.3.6.1.3.94.1.11

Description The table of connectivity unit events. Errors, warnings, and information should be reported in this table.

Note (v3.0 only) This table contains the 64 most-recent event log entries.
(v4.0 only) This table contains the 255 most-recent event log entries.
(v4.2 only) This table contains the 2048 most-recent event log entries.
(v4.4 only) This table contains the 1024 most-recent event log entries.

Only external RAS log messages are supported. Fabric OS v4.4.0 does not have Panic or Debug level messages. All messages are documented in the *Fabric OS System Error Message Reference Manual*.

connUnitEventEntry

OID 1.3.6.1.3.94.1.11.1

Description Each entry contains information on a specific event for the given connectivity unit.

Index connUnitEventUnitId
connUnitEventIndex

connUnitEventUnitId

OID 1.3.6.1.3.94.1.11.1.1

Description The connUnitId of the connectivity unit that contains this event table.

Note Same as connUnitId.

connUnitEventIndex

OID 1.3.6.1.3.94.1.11.1.2

Description Each connectivity unit has its own event buffer. As it wraps, it might write over previous events. This object is an index into the buffer. It is recommended that this table is read using “getNext”s to retrieve the initial table. The management application should read the event table at periodic intervals and then determine if any new entries were added by comparing the last known index value with the current highest index value. The management application should then update its copy of the event table. If the read interval is too long, it is possible that there might be events that might not be contained in the agent's internal event buffer.

For Example:

An agent might read events 50-75.

At the next read interval, connUnitEventCurrID is 189. If the management application tries to read event index 76 and the agent's internal buffer is 100 entries maximum, event index 76 is no longer available.

The index value is an incrementing integer starting from 1 every time there is a table reset. On table reset, all contents are emptied and all indices are set to 0. When an event is added to the table, the event is assigned the next-higher integer value than the last item entered into the table. If the index value reaches its maximum value, the next item entered causes the index value to roll over and start at 1 again.

Note Mapped to swEventIndex.

connUnitEventId

OID 1.3.6.1.3.94.1.11.1.3

Description The internal event ID. Incriminated for each event, ranging between 0 and connUnitMaxEvents. Not used as table index to simplify the agent implementation. When this reaches the end of the range specified by connUnitMaxEvents, the ID rolls over to start at 0. This value is set back to 0 at reset. The relationship of this value to the index is that internal event ID might represent a smaller number than a 32-bit integer (for example, maximum 100 entries) and would only have a value range up to connUnitMaxEvents.

Note Same function as connUnitEventIndex.

connUnitREventTime

OID 1.3.6.1.3.94.1.11.1.4

Description This is the real time when the event occurred. It has the following format.

DDMMYYYY HHMMSS

where:

DD = day number
MM = month number
YYYY = year
HH = hours
MM = minutes
SS = seconds

If not applicable, returns a null string.

connUnitSEventTime

OID 1.3.6.1.3.94.1.11.1.5

Description This is the sysuptime time stamp when the event occurred.

connUnitEventSeverity

OID 1.3.6.1.3.94.1.11.1.6

Description The event severity level. The mapping between errorlog severity level and this variable is:

Error log	**FA-MIB**
none (0)	unknown (1)
Critical (1)	critical (4)
Error (2)	error (5)
Warning (3)	warning (6)
Informational (4)	info (8)
Debug (5)	debug (9)

Note — Refer to FcEventSeverity in Table 8-1 on page 8-5 for more information about severity.

connUnitEventType

OID — 1.3.6.1.3.94.1.11.1.7

Description — The type of this event:

- unknown (1)
- other (2)
- status (3)
- configuration (4)
- topology (5)

Note — Always set to 2 (other).

connUnitEventObject

OID — 1.3.6.1.3.94.1.11.1.8

Description — This is used with the connUnitEventType to identify to which object the event refers. It can be the OID of a connectivity unit or of another object, like connUnitPortStatus[...].

Note — Always set to null.

connUnitEventDescr

OID — 1.3.6.1.3.94.1.11.1.9

Description — The description of the event.

Note — Same as the string displayed in the system error log. The system error log can be viewed using the **errShow** or **errDump** commands.

Note — For Fabric OS v4.4.0, the format of error messages has changed. This field now uses the message title and number (for example, WEBD-1006) and the message text. Previously, this field used the task ID and all the message number and message text. For more information on error messages, refer to *Fabric OS System Error Message Reference Manual*.

Connectivity Unit Link Table

connUnitLinkTable

OID — 1.3.6.1.3.94.1.12

Description — A list of links known to this agent from this connectivity unit to other connectivity units: X is switch data and Y is other end.

Note — The link table is intended to organize and communicate any information the agent has that might assist a management application to discover the connectivity units in the framework and the topology of their interconnect: the goal is to assist the management application by mapping the elements of the framework in addition to listing them.

With this goal, the agent should include as much as it possesses about any links from its own connectivity units to others, including links among its own units.

An agent should include partial information about links if it is not able to fully define them in accord with the following structure; however, the information must include either a nonzero connUnitNodeId—or a nonzero connUnitPortWwn—for each end of the link.

If the agent is able to discover links that do not directly attach to members of its agency and its discovery algorithm gives some assurance that the links are recently valid, it might include these links.

Link information entered by administrative action might be included even if not validated directly if the link has at least one endpoint in this agency, but it should not be included otherwise.

A connectivity unit should fill the table in as best it can. One of the methods to fill this in would be to use the RNID ELS command (ANSI document 99-422v0). This command queries a port for the information needed for the link table.

This table is accessed either directly, if the management software has an index value, or using **getNext**. The values of the indexes are not required to be contiguous. Each entry created in this table is assigned an index. This relationship is kept persistent until the entry is removed from the table or the system is reset. The total number of entries is defined by the size of the table.

For an entry to be considered valid, both the X (local) and the Y (remote) values need to have one valid value.

connUnitLinkEntry

OID — 1.3.6.1.3.94.1.12.1

Description — An entry describing a particular link to another.

Index — connUnitLinkUnitId
connUnitLinkIndex

connUnitLinkUnitId

OID — 1.3.6.1.3.94.1.12.1.1

Description — The connUnitId of the connectivity unit that contains this link table.

Note — Set to WWN of the local switch.

connUnitLinkIndex

OID — 1.3.6.1.3.94.1.12.1.2

Description	This value is used to create a unique value for each entry in the link table with the same connUnitLinkUnitId. The value can only be reused if it is not currently in use and the value is the next candidate to be used. This value is allowed to wrap at the highest value represented by the number of bits. This value is reset to 0 when the system is reset and the first value to be used is 1.
Note	Indexes 1 through *maximum number of ports* is reserved for ISL. Indexes *maximum number of ports + 1* and above are reserved for end devices and are calculated based on portID of the end device(s).

connUnitLinkNodeIdX

OID	1.3.6.1.3.94.1.12.1.3
Description	The node WWN of the unit at one end of the link. If the node WWN is unknown and the node is a connUnit in the responding agent, then the value of this object must be equal to its connUnitID.
Note	WWN of the local switch.

connUnitLinkPortNumberX

OID	1.3.6.1.3.94.1.12.1.4
Description	The port number on the unit specified by connUnitLinkNodeIdX, if known; otherwise, -1. If the value is nonnegative, then it is equal to connUnitPortPhysicalNumber.
Note	ISL: Physical port number of the E_Port. Device: Physical port # to which the device is connected.

connUnitLinkPortWwnX

OID	1.3.6.1.3.94.1.12.1.5
Description	The port WWN of the unit specified by connUnitLinkNodeIdX, if known; otherwise, 16 octets of binary 0.
Note	This is the WWN of the port to which the device is connected.

connUnitLinkNodeIdY

OID	1.3.6.1.3.94.1.12.1.6
Description	The node WWN of the unit at the other end of the link. If the node WWN is unknown and the node is a connUnit in the responding SNMP agency, then the value of this object must be equal to its connUnitID.
Note	ISL: WWN of the remote switch. Device: Node name of the device.

connUnitLinkPortNumberY

OID	1.3.6.1.3.94.1.12.1.7

Description	The port number on the unit specified by connUnitLinkNodeIdY, if known; otherwise, -1. If the value is nonnegative then it is equal to connUnitPortPhysicalNumber.
Note	ISL: Physical port number of the remote port. Device: -1.

connUnitLinkPortWwnY

OID	1.3.6.1.3.94.1.12.1.8
Description	The port WWN on the unit specified by connUnitLinkNodeIdY, if known; otherwise, 16 octets of binary 0.
Note	ISL: WWN of the remote port. Device: *Port name*.

connUnitLinkAgentAddressY

OID	1.3.6.1.3.94.1.12.1.9
Description	The address of an FCMGMT MIB agent for the node identified by connUnitLinkNodeIdY, if known; otherwise, 16 octets of binary 0.
Note	ISL: IP address (IPv4). Device: 0 (Null).

connUnitLinkAgentAddressTypeY

OID	1.3.6.1.3.94.1.12.1.10
Description	If connUnitLinkAgentAddressY is nonzero, it is a protocol address. ConnUnitLinkAgentAddressTypeY is the “address family number” assigned by IANA to identify the address format (for example, 1 is Ipv4, 2 is Ipv6).
Note	ISL: Type 2. Device: 0 (Null).

connUnitLinkAgentPortY

OID	1.3.6.1.3.94.1.12.1.11
Description	The IP port number for the agent. This is provided in case the agent is at a non-standard SNMP port.
Note	ISL: IP port. Device: 0 (Null).

connUnitLinkUnitTypeY

OID	1.3.6.1.3.94.1.12.1.12

Description Type of the FC connectivity unit, as defined in connUnitType.

- ISL: Switch device.
- End devices: End device types based on an FCP Inquiry.

Brocade does not support Hubs.

Table 8-2 connUnitLinkUnitTypeY End Devices

Storage System	Storage Sub-system	Unknown	Other
Direct Access Sequential Access Write-Once CD-ROM Optical	Medium Changer Array SES	Unknown	Anything else (printer device, processor device, scanner, and so on)

connUnitLinkConnIdY

OID 1.3.6.1.3.94.1.12.1.13

Description This is the Fibre Channel ID of this port. If the connectivity unit is a switch, this is expected to be a Big Endian value of 24 bits. If this is loop, then it is the AL_PA that is connected. If this is an E_port, then it contains only the domain ID. If not any of those, unknown or cascaded loop, return all bits set to 1.

Note ISL: Port ID of the remote port.
Device: Port ID of the remote port.

connUnitLinkCurrIndex

Not supported in Fabric OS v2.6.1.

OID 1.3.6.1.3.94.1.12.1.14

Description The last-used link index.

Statistics Group

Not supported in Fabric OS v2.6.1.

Port types are aggregated into a port type class, such as all the fabric port types.

Each individual port has only one statistics table. For all objects in the statistics table, if the object is not supported by the conn unit, then the high order bit is set to 1, with all other bits set to 0 (for example, the last eight bytes of the returned value might be ...:80 00 00 00 00 00 00 00).

The high order bit is reserved to indicate whether the object is supported. All objects start at a value of 0 at hardware initialization and continue incrementing until end of 63 bits and then wrap to 0.

This is the case for all Class 1 Frames; Brocade does not support them.

connUnitPortStatTable

OID 1.3.6.1.3.94.4.5

Description A list of statistics for the fabric port types.

connUnitPortStatEntry

OID 1.3.6.1.3.94.4.5.1

Description An entry describing port statistics.

Index connUnitPortStatUnitId
connUnitPortStatIndex

connUnitPortStatUnitId

OID 1.3.6.1.3.94.4.5.1.1

Description The connUnitId of the connectivity unit that contains this port statistics table.

connUnitPortStatIndex

OID 1.3.6.1.3.94.4.5.1.2

Description A unique value among all entries in this table, between 0 and connUnitNumPort[connUnitPortUnitId].

connUnitPortStatCountError

OID 1.3.6.1.3.94.4.5.1.3

Description A count of the errors that have occurred on this port.

connUnitPortStatCountTxObjects

OID 1.3.6.1.3.94.4.5.1.4

Description The number of frames, packets, IOs, and so forth, that have been transmitted by this port.

Note A Fibre Channel frame starts with SOF and ends with EOF. FC loop devices should not count frames passed through. This value represents the sum total for all other Tx objects.

connUnitPortStatCountRxObjects

OID 1.3.6.1.3.94.4.5.1.5

Description The number of frames, packets, IOs, and so forth, that have been received by this port.

Note — A Fibre Channel frame starts with SOF and ends with EOF. FC loop devices should not count frames passed through. This value represents the sum total for all other Rx objects.

connUnitPortStatCountTxElements

OID — 1.3.6.1.3.94.4.5.1.6

Description — The number of octets or bytes that have been transmitted by this port. There is an one-second periodic polling of the port. This value is saved and compared with the next polled value to compute net throughput.

Note — For Fibre Channel, ordered sets are not included in the count.

connUnitPortStatCountRxElements

OID — 1.3.6.1.3.94.4.5.1.7

Description — The number of octets or bytes that have been received by this port. There is an one-second periodic polling of the port. This value is saved and compared with the next polled value to compute net throughput.

Note — For Fibre Channel, ordered sets are not included in the count.

connUnitPortStatCountBBCreditZero

OID — 1.3.6.1.3.94.4.5.1.8

Description — The number of transitions in/out of BB credit zero state. The other side is not providing any credit.

Note — This is a Fibre Channel statistic only.

connUnitPortStatCountInputBuffersFull

Not supported.

OID — 1.3.6.1.3.94.4.5.1.9

Description — The number of occurrences when all input buffers of a port were full and outbound buffer-to-buffer credit transitioned to 0. There is no credit to provide to other side.

Return Value: 80 0 0 0 0 0 0 0 (Not Supported)

Note — This is a Fibre Channel statistic only.

connUnitPortStatCountFBSYFrames

OID — 1.3.6.1.3.94.4.5.1.10

Description — The number of times that FBSY was returned to this port as a result of a frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. Port can only occur on SOFc1 frames (the frames that establish a connection).

Note	This is a Fibre Channel only statistic. This is the sum of all classes. If you cannot keep the by-class counters, then keep the sum counters.

connUnitPortStatCountPBSYFrames

Not supported.

OID	1.3.6.1.3.94.4.5.1.11
Description	The number of times that PBSY was returned to this port as a result of a frame that could not be delivered to the other end of the link. This occurs if the destination port is temporarily busy. PBSY can only occur on SOFc1 frames (the frames that establish a connection). Return Value: 80 0 0 0 0 0 0 0 (not supported)
Note	This is a Fibre Channel only statistic. This is the sum of all classes. If you cannot keep the by class counters, then keep the sum counters.

connUnitPortStatCountFRJTFrames

OID	1.3.6.1.3.94.4.5.1.12
Description	The number of times that FRJT was returned to this port as a result of a frame that was rejected by the fabric.
Note	This is the total for all classes and is a Fibre Channel only statistic.

connUnitPortStatCountPRJTFrames

Not supported.

OID	1.3.6.1.3.94.4.5.1.13
Description	The number of times that FRJT was returned to this port as a result of a frame that was rejected at the destination N_Port. Return Value: 80 0 0 0 0 0 0 0
Note	This is the total for all classes and is a Fibre Channel only statistic.

connUnitPortStatCountClass1RxFrames

OID	1.3.6.1.3.94.4.5.1.14
Description	The number of Class 1 Frames received at this port.
Note	This is a Fibre Channel only statistic. Brocade does not support Class 1 Frames.

connUnitPortStatCountClass1TxFrames

OID	1.3.6.1.3.94.4.5.1.15
Description	The number of Class 1 Frames transmitted out this port.

Note — This is a Fibre Channel only statistic.
Brocade does not support Class 1 Frames.

connUnitPortStatCountClass1FBSYFrames

OID — 1.3.6.1.3.94.4.5.1.16

Description — The number of times that FBSY was returned to this port as a result of a Class 1 Frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. FBSY can only occur on SOFc1 frames (the frames that establish a connection).

Note — This is a Fibre Channel only statistic.
Brocade does not support Class 1 Frames.

connUnitPortStatCountClass1PBSYFrames

OID — 1.3.6.1.3.94.4.5.1.17

Description — The number of times that PBSY was returned to this port as a result of a Class 1 Frame that could not be delivered to the other end of the link. This occurs if the destination N_Port is temporarily busy. PBSY can only occur on SOFc1 frames (the frames that establish a connection).

Note — This is a Fibre Channel only statistic.
Brocade does not support Class 1 Frames.

connUnitPortStatCountClass1FRJTFrames

OID — 1.3.6.1.3.94.4.5.1.18

Description — The number of times that FRJT was returned to this port as a result of a Class 1 Frame that was rejected by the fabric.

Note — This is a Fibre Channel only statistic.
Brocade does not support Class 1 Frames.

connUnitPortStatCountClass1PRJTFrames

OID — 1.3.6.1.3.94.4.5.1.19

Description — The number of times that FRJT was returned to this port as a result of a Class 1 Frame that was rejected at the destination N_Port.

Note — This is a Fibre Channel only statistic.
Brocade does not support Class 1 Frames.

connUnitPortStatCountClass2RxFrames

OID — 1.3.6.1.3.94.4.5.1.20

Description — The number of Class 2 Frames received at this port.

Note — This is a Fibre Channel only statistic.

connUnitPortStatCountClass2TxFrames

Not supported.

OID 1.3.6.1.3.94.4.5.1.21

Description The number of Class 2 Frames transmitted out this port.

Return value: 80 0 0 0 0 0 0 0

Note This is a Fibre Channel only statistic.

connUnitPortStatCountClass2FBSYFrames

Not supported.

OID 1.3.6.1.3.94.4.5.1.22

Description The number of times that FBSY was returned to this port as a result of a Class 2 Frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. FBSY can only occur on SOFc1 frames (the frames that establish a connection).

Return value: 80 0 0 0 0 0 0 0

Note This is a Fibre Channel only statistic.

connUnitPortStatCountClass2PBSYFrames

Not supported.

OID 1.3.6.1.3.94.4.5.1.23

Description The number of times that PBSY was returned to this port as a result of a Class 2 Frame that could not be delivered to the other end of the link. This occurs if the destination N_Port is temporarily busy. PBSY can only occur on SOFc1 frames (the frames that establish a connection).

Return value: 80 0 0 0 0 0 0 0

Note This is a Fibre Channel only statistic.

connUnitPortStatCountClass2FRJTFrames

Not supported.

OID 1.3.6.1.3.94.4.5.1.24

Description The number of times that FRJT was returned to this port as a result of a Class 2 Frame that was rejected by the fabric.

Return value: 80 0 0 0 0 0 0 0

Note This is a Fibre Channel only statistic.

connUnitPortStatCountClass2PRJTFrames

OID 1.3.6.1.3.94.4.5.1.25

Description	The number of times that FRJT was returned to this port as a result of a Class 2 Frame that was rejected at the destination N_Port. Return value: 80 0 0 0 0 0 0 0 (not supported)
Note	This is a Fibre Channel only statistic.

connUnitPortStatCountClass3RxFrames

OID	1.3.6.1.3.94.4.5.1.26
Description	The number of Class 3 Frames received at this port.
Note	This is a Fibre Channel only statistic.

connUnitPortStatCountClass3TxFrames

OID	1.3.6.1.3.94.4.5.1.27
Description	The number of Class 3 Frames transmitted out this port.
Note	This is a Fibre Channel only statistic.

connUnitPortStatCountClass3Discards

OID	1.3.6.1.3.94.4.5.1.28
Description	The number of Class 3 Frames that were discarded upon reception at this port. There is no FBSY or FRJT generated for Class 3 Frames. They are discarded if they cannot be delivered.
Note	This is a Fibre Channel only statistic.

connUnitPortStatCountRxMulticastObjects

OID	1.3.6.1.3.94.4.5.1.29
Description	The number of multicast frames or packets received at this port.

connUnitPortStatCountTxMulticastObjects

OID	1.3.6.1.3.94.4.5.1.30
Description	The number of multicast frames or packets transmitted out this port.

connUnitPortStatCountRxBroadcastObjects

OID	1.3.6.1.3.94.4.5.1.31
Description	The number of broadcast frames or packets received at this port. Return value: 80 0 0 0 0 0 0 0 (not supported)

connUnitPortStatCountTxBroadcastObjects

OID 1.3.6.1.3.94.4.5.1.32

Description The number of broadcast frames or packets transmitted out this port. On a Fibre Channel loop, count only OPNr frames generated.

Return value: 80 0 0 0 0 0 0 0 (not supported)

connUnitPortStatCountRxLinkResets

OID 1.3.6.1.3.94.4.5.1.33

Description The number of link resets. This is the number of LRs received.

Note This is a Fibre Channel only statistic.

connUnitPortStatCountTxLinkResets

OID 1.3.6.1.3.94.4.5.1.34

Description The number of link resets. This is the number LRs transmitted.

Note This is a Fibre Channel only statistic.

connUnitPortStatCountNumberLinkResets

OID 1.3.6.1.3.94.4.5.1.35

Description The number of link resets and LIPs detected at this port. The number times the reset link protocol is initiated. This is a count of the logical resets, a count of the number of primitives.

Note This is a Fibre Channel only statistic.

connUnitPortStatCountRxOfflineSequences

OID 1.3.6.1.3.94.4.5.1.36

Description The number of offline primitive OLS received at this port.

Note This is a Fibre Channel only statistic.

connUnitPortStatCountTxOfflineSequences

OID 1.3.6.1.3.94.4.5.1.37

Description The number of offline primitive OLS transmitted by this port.

Note This is a Fibre Channel only statistic.

connUnitPortStatCountNumberOfflineSequences

OID 1.3.6.1.3.94.4.5.1.38

Description The number of offline primitive sequence received at this port.

Return Value: 80 0 0 0 0 0 0 0 (not supported)

Note — This is a Fibre Channel only statistic.

connUnitPortStatCountLinkFailures

OID — 1.3.6.1.3.94.4.5.1.39

Description — The number of link failures. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8)

Note — This is a Fibre Channel only statistic.

connUnitPortStatCountInvalidCRC

OID — 1.3.6.1.3.94.4.5.1.40

Description — The number of frames received with invalid CRC. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8) Loop ports should not count CRC errors passing through when monitoring.

Note — This is a Fibre Channel only statistic.

connUnitPortStatCountInvalidTxWords

OID — 1.3.6.1.3.94.4.5.1.41

Description — The number of invalid transmission words received at this port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8)

Note — This is a Fibre Channel only statistic.

connUnitPortStatCountPrimitiveSequenceProtocolErrors

OID — 1.3.6.1.3.94.4.5.1.42

Description — The number of primitive sequence protocol errors detected at this port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8)

Note — This is a Fibre Channel only statistic.

connUnitPortStatCountLossofSignal

OID — 1.3.6.1.3.94.4.5.1.43

Description — The number of instances of signal loss detected at port.

This count is part of the Link Error Status Block (LESB).

(FC-PH 29.8)

Note — This is a Fibre Channel only statistic.

connUnitPortStatCountLossofSynchronization

OID — 1.3.6.1.3.94.4.5.1.44

Description The number of instances of synchronization loss detected at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8)

Note This is a Fibre Channel only statistic.

connUnitPortStatCountInvalidOrderedSets

OID 1.3.6.1.3.94.4.5.1.45

Description The number of invalid ordered sets received at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8).

Note This is a Fibre Channel only statistic.

connUnitPortStatCountFramesTooLong

OID 1.3.6.1.3.94.4.5.1.46

Description The number of frames received at this port where the frame length was greater than what was agreed to in FLOGI/PLOGI. This could be caused by losing the end of frame delimiter.

Note This is a Fibre Channel only statistic.

connUnitPortStatCountFramesTruncated

OID 1.3.6.1.3.94.4.5.1.47

Description The number of frames received at this port where the frame length was less than the minimum indicated by the frame header - normally 24 bytes, but it could be more if the DFCTL field indicates an optional header should have been present.

Note This is a Fibre Channel only statistic.

connUnitPortStatCountAddressErrors

OID 1.3.6.1.3.94.4.5.1.48

Description The number of frames received with unknown addressing. For example, unknown SID or DID. The SID or DID is not known to the routing algorithm.

Note This is a Fibre Channel only statistic.

connUnitPortStatCountDelimiterErrors

OID 1.3.6.1.3.94.4.5.1.49

Description The number of invalid frame delimiters received at this port. An example is a frame with a class 2 start and a class 3 at the end.

Note This is a Fibre Channel only statistic.

connUnitPortStatCountEncodingDisparityErrors

OID 1.3.6.1.3.94.4.5.1.50

Description	The number of disparity errors received at this port.
Note	This is a Fibre Channel only statistic.

Service Group

Not supported in Fabric OS v2.6.1.

Implementation of the Service group is mandatory for all systems.

The Service group contains the following subgroups:

- Connectivity Unit Service Scalers Group
- Connectivity Unit Service Tables Group

Connectivity Unit Service Scalars Group

Implementation of the Connectivity Unit Service Scalers group is mandatory for all systems.

connUnitSnsMaxEntry

OID	1.3.6.1.3.94.5.1.1
Description	The maximum number of entries in the table.

Connectivity Unit Service Tables Group

Implementation of the Connectivity Unit Service Tables group is mandatory for all systems.

connUnitSnsTable

OID	1.3.6.1.3.94.5.2.1
Description	This table contains an entry for each object registered with this port in the switch.

connUnitSnsEntry

OID	1.3.6.1.3.94.5.2.1.1
Description	The simple name server (SNS) table for the port represented by connUnitSnsPortIndex.
Index	connUnitSnsId connUnitSnsPortIndex connUnitSnsPortIdentifier

connUnitSnsId

OID 1.3.6.1.3.94.5.2.1.1.1

Description The connUnitId of the connectivity unit that contains this name server table.

connUnitSnsPortIndex

OID 1.3.6.1.3.94.5.2.1.1.2

Description The physical port number of this SNS table entry. Each physical port has an SNS table with 1-n entries indexed by connUnitSnsPortIdentifier (port address).

connUnitSnsPortIdentifier

OID 1.3.6.1.3.94.5.2.1.1.3

Description The port identifier for this entry in the SNS table.

connUnitSnsPortName

OID 1.3.6.1.3.94.5.2.1.1.4

Description The port name for this entry in the SNS table.

connUnitSnsNodeName

OID 1.3.6.1.3.94.5.2.1.1.5

Description The node name for this entry in the SNS table.

connUnitSnsClassOfSvc

OID 1.3.6.1.3.94.5.2.1.1.6

Description The Classes of Service offered by this entry in the SNS table.

connUnitSnsNodeIPAddress

OID 1.3.6.1.3.94.5.2.1.1.7

Description The IPv6 formatted address of the Node for this entry in the SNS table.

connUnitSnsProcAssoc

OID 1.3.6.1.3.94.5.2.1.1.8

Description The process associator for this entry in the SNS table.

connUnitSnsFC4Type

OID 1.3.6.1.3.94.5.2.1.1.9

Description The FC-4 types supported by this entry in the SNS table.

connUnitSnsPortType

OID 1.3.6.1.3.94.5.2.1.1.10

Description The port type of this entry in the SNS table.

connUnitSnsPortIPAddress

OID 1.3.6.1.3.94.5.2.1.1.11

Description The IPv6 formatted address of this entry in the SNS table.

connUnitSnsFabricPortName

OID 1.3.6.1.3.94.5.2.1.1.12

Description The fabric port name of this entry in the SNS table.

connUnitSnsHardAddress

OID 1.3.6.1.3.94.5.2.1.1.13

Description The hard address of this entry in the SNS table.

connUnitSnsSymbolicPortName

OID 1.3.6.1.3.94.5.2.1.1.14

Description The symbolic port name of this entry in the SNS table.

connUnitSnsSymbolicNodeName

OID 1.3.6.1.3.94.5.2.1.1.15

Description The symbolic node name of this entry in the SNS table.

SNMP Trap Registration Group

trapMaxClients

OID 1.3.6.1.3.94.2.1

Description The maximum number of SNMP trap recipients supported by the connectivity unit.

Note Set to 6.

trapClientCount

OID 1.3.6.1.3.94.2.2

Description The current number of rows in the trap table.

trapRegTable

OID 1.3.6.1.3.94.2.3

Description A table containing a row for each IP address/port number to which traps are sent.

trapRegEntry

OID 1.3.6.1.3.94.2.3.1

Description IP/port pair for a specific client.

Index trapRegIpAddress
trapRegPort

trapRegIpAddress

OID 1.3.6.1.3.94.2.3.1.1

Description The IP address of a client registered for traps.

trapRegPort

OID 1.3.6.1.3.94.2.3.1.2

Description The UDP port to send traps to for this host. Normally this would be the standard trap port (162). This object is an index and must be specified to create a row in this table.

Note Set to 162.

trapRegFilter

OID 1.3.6.1.3.94.2.3.1.3

Description This value defines the trap severity filter for this trap host. The connUnit sends traps to this host that have a severity level less than or equal to this value. The default value of this object is Warning. The mapping between errorlog severity level and this variable is:

Error log	**FA-MIB**
none (0)	unknown (1)
Critical (1)	critical (4)
Error (2)	error (5)
Warning (3)	warning (6)
Informational (4)	info (8)
Debug (5)	debug (9)

Note This severity applies to all entries. Refer to FcEventSeverity in Table 8-1 on page 8-5.

The values 1, 3, 7, and 10 are not valid for SET operations.

trapRegRowState

OID 1.3.6.1.3.94.2.3.1.4

Description Specifies the state of the row. This entry always returns rowActive and allows for read-only.

Table 8-3 TrapRegRowState for Read/Write

State	Description (Read)	Description (Write)
rowDestroy (1)	Read: Can never happen.	Write: Remove this row from the table.
rowInactive (2)	Read: Indicates that this row does exist but that traps are not enabled to be sent to the target.	Write: If the row does not exist and the agent allows writes to the trap table, then a new row is created. The values of the optional columns are set to default values. Traps are not enabled to be sent to the target. If the row already existed, then traps are disabled from being sent to the target.
rowActive (3)	Read: Indicates that this row exists and that traps are enabled to be sent to the target.	Write: If the row does not exist and the agent allows writes to the trap table, then a new row is created. The values of the optional columns are set to default values. Traps are enabled to be sent to the target. If the row already exists, then traps are enabled to be sent to the target.

Revision Number Scalar

revisionNumber

OID 1.3.6.1.3.94.3

Description This is the revision number for this MIB. The format of the revision value is as follows:

0 = High order major revision number
1 = Low order major revision number
2 = High order minor revision number
3 = Low order minor revision number

The value is stored as an ASCII value. The following is the current value of this object:

0 = 0
1 = 3
2 = 0
3 = 0

This defines a revision of 03.00.

Note Set to 0300.

Unsupported Tables

The Connectivity Unit Port Statistics Fabric Table is only supported in v2.6.1

Brocade does not support the following:

- Connectivity Unit Port Statistics Hub Table
- Connectivity Unit Port Statistics SCSI Table
- Connectivity Unit Port Statistics LAN/WAN Table

Unsupported Traps

connUnitStatusChange

Enterprise	fcmgmt
Variables	connUnitStatus, connUnitState
Description	The overall status of the connectivity unit has changed. Recommended severity level (for filtering): alert.

Note	Generated when connUnitStatus changes. Refer to connUnitStatus on page 8-9 for a description of how the value is calculated.
	Sample trap output for Fabric OS v4.4.0:
	`connUnitStatus.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.1 = warning(4)`
	`connUnitState.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.1 = offline(3)`
	Refer to the *Fabric OS Fabric Watch User's Guide* on how the switch status is determined.

connUnitDeletedTrap

Enterprise	fcmgmt
Variables	connUnitId
Description	A connUnit has been deleted from this agent. Recommended severity level (for filtering): warning.
Note	Not implemented.

connUnitEventTrap

Enterprise	fcmgmt
Variables	connUnitEventId, connUnitEventType, connUnitEventObject, connUnitEventDescr
Description	An event has been generated by the connectivity unit. Recommended severity level (for filtering): info. Sample trap output for Fabric OS v4.4.0:

```
connUnitEventId.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.0.354 = 354
connUnitEventType.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.0.354 = other(2)
connUnitEventObject.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.0.354 = null
connUnitEventDescr.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.0.354 = FW-1425 Switch
status changed from MARGINAL to HEALTHY.
```

Refer to the swEventTrap for more details.

connUnitSensorStatusChange

Enterprise fcmgmt

Variables connUnitSensorStatus

Description Overall status of the connectivity unit has changed.

Note This trap is generated whenever the status of the sensors (like fan, power supply, temperature) present in the connectivity unit changes.

Sample trap output for Fabric OS v4.4.0:

```
connUnitSensorStatus.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.7 = failed(5)
```

Refer to the *Fabric Watch User's Guide* for information on configuring thresholds that generate these traps.

connUnitPortStatusChange

Enterprise fcmgmt

Variables connUnitPortStatus, connUnitPortState

Description Overall status of the connectivity unit changed. Recommended severity level (for filtering): alert.

Note This trap sends the instance of connUnitPortName as part of the trap; the instance string is NULL, if the port name is not defined for the specified port.

Sample trap output for Fabric OS v4.4.0:

```
connUnitPortStatus.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.29 = ready(3)
connUnitPortState.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.29 = online(2)
connUnitPortName.16.0.0.96.105.144.109.136.0.0.0.0.0.0.0.29 = test
```

Refer to the **swFCportSCN** for more information.

MIB Object Groupings

Appendix

A

This appendix provides a function-based listing of MIB objects. To see the correlation of various switch objects to MIB objects, including the following:

- "Switch Variables" next
- "Sensor Variables" on page A-1
- "Port Variables" on page A-1
- "Event Variables" on page A-2
- "ISL and End Device Variables" on page A-2
- "SNMP Configuration Variables" on page A-3

Switch Variables

MIB variables that assist in monitoring or modifying the status of switches are in the following tables or groups:

- Connectivity Unit Table in *FibreAlliance MIB Objects* on page 8-6
- Connectivity Unit Revisions Table in *FibreAlliance MIB Objects* on page 8-14
- FIBRE-CHANNEL-FE-MIB Organization in *FE MIB Objects* on page 3-2
- FCFABRIC-ELEMENT-MIB Organization in *FE MIB Objects* on page 3-26
- Flash Administration in *SW-MIB Objects* on page 5-18

Sensor Variables

MIB variables that assist in monitoring or modifying the status/state of fans, power supply, and temperature are in the following tables or groups:

- Connectivity Unit Sensor Table in *FibreAlliance MIB Objects* on page 8-15
- swNumSensors in *SW-MIB Objects* on page 5-20

Port Variables

MIB variables that assist in monitoring or modifying ports are in the following tables or groups:

Variables for State and Status

- Connectivity Unit Port Table in *FibreAlliance MIB Objects* on page 8-17
- Fx_Port Table in *FE MIB Objects* on page 3-10
- Fx_Port Configuration Table in *FE MIB Objects* on page 3-34
- Fx_Port Status Table in *FE MIB Objects* on page 3-12
- Fx_Port Operation Table in *FE MIB Objects* on page 3-37
- Fx_Port Physical Level Table in *FE MIB Objects* on page 3-13 and on page 3-38
- Fx_Port Capability Table in *FE MIB Objects* on page 3-24 and on page 3-45
- Fibre Channel Port Group in *SW-MIB Objects* on page 5-29

Variables for Statistics and Measurement

- Statistics Group in *FibreAlliance MIB Objects* on page 8-32
- Fx_Port Error Table in *FE MIB Objects* on page 3-17
- Class 2 Accounting Table in *FE MIB Objects* on page 3-21
- Capability Group in *FE MIB Objects* on page 3-23 and on page 3-45

Event Variables

MIB variables that assist in monitoring or modifying events are in the following tables or groups:

- Connectivity Unit Event Table in *FibreAlliance MIB Objects* on page 8-25
- Event Group in *SW-MIB Objects* on page 5-38

ISL and End Device Variables

MIB variables that assist in monitoring or modifying ISL and end-devices are in the following tables or groups:

ISL Variables

- Connectivity Unit Link Table in *FibreAlliance MIB Objects* on page 8-28
- Fabric Group in *SW-MIB Objects* on page 5-24

End Device Variables

- Connectivity Unit Link Table in *FibreAlliance MIB Objects* on page 8-28
- Fx_Port Fabric Login Table in *FE MIB Objects* on page 3-15
- swFCPortName in *SW-MIB Objects* on page 5-35

SNMP Configuration Variables

MIB variables that assist in configuring SNMP are in the following tables or groups:

- trapRegTable in *FibreAlliance MIB Objects* on page 8-45
- SW Agent Configuration Group in *SW-MIB Objects* on page 5-28

MIB OIDs and Their Matching Object Names

Appendix B

This appendix provides a listing of the v3.1.x MIB object names and the corresponding MIB Object ID (OID) associated with each.

MIB OIDs

The following matrix allows you to identify a MIB object name according to its related OID.

Table 2-1 MIB Object Name/OID Matrix

MIB Object Name	OID	Page No.
iso	1	page 2-2
org	1.3	page 2-2
dod	1.3.6	page 2-2
internet	1.3.6.1	page 2-2
directory	1.3.6.1.1	page 2-2
mgmt	1.3.6.1.2	page 2-2
mib-2	1.3.6.1.2.1	page 2-2
fcFeMIB	1.3.6.1.2.1.75	page 3-2
fcFeMIBObjects	1.3.6.1.2.1.75.1	page 3-2
fcFeConfig	1.3.6.1.2.1.75.1.1	page 3-2
fcFeFabricName	1.3.6.1.2.1.75.1.1.1	page 3-7
fcFeElementName	1.3.6.1.2.1.75.1.1.2	page 3-8
fcFeModuleCapacity	1.3.6.1.2.1.75.1.1.3	page 3-8
fcFeModuleTable	1.3.6.1.2.1.75.1.1.4	page 3-8
fcFeModuleEntry	1.3.6.1.2.1.75.1.1.4.1	page 3-8
fcFeModuleIndex	1.3.6.1.2.1.75.1.1.4.1.1	page 3-8
fcFeModuleDescr	1.3.6.1.2.1.75.1.1.4.1.2	page 3-8
fcFeModuleObjectID	1.3.6.1.2.1.75.1.1.4.1.3	page 3-9
fcFeModuleOperStatus	1.3.6.1.2.1.75.1.1.4.1.4	page 3-9
fcFeModuleLastChange	1.3.6.1.2.1.75.1.1.4.1.5	page 3-9

Table 2-1 MIB Object Name/OID Matrix (Continued)

MIB Object Name	OID	Page No.
fcFeModuleFxPortCapacity	1.3.6.1.2.1.75.1.1.4.1.6	page 3-9
fcFeModuleName	1.3.6.1.2.1.75.1.1.4.1.7	page 3-10
fcFxPortTable	1.3.6.1.2.1.75.1.1.5	page 3-10
fcFxPortEntry	1.3.6.1.2.1.75.1.1.5.1	page 3-10
fcFxPortIndex	1.3.6.1.2.1.75.1.1.5.1.1	page 3-10
fcFxPortName	1.3.6.1.2.1.75.1.1.5.1.2	page 3-10
fcFxPortFcphVersionHigh	1.3.6.1.2.1.75.1.1.5.1.3	page 3-10
fcFxPortFcphVersionLow	1.3.6.1.2.1.75.1.1.5.1.4	page 3-11
fcFxPortBbCredit	1.3.6.1.2.1.75.1.1.5.1.5	page 3-11
fcFxPortRxBufSize	1.3.6.1.2.1.75.1.1.5.1.6	page 3-11
fcFxPortRatov	1.3.6.1.2.1.75.1.1.5.1.7	page 3-11
fcFxPortEdtov	1.3.6.1.2.1.75.1.1.5.1.8	page 3-11
fcFxPortCosSupported	1.3.6.1.2.1.75.1.1.5.1.9	page 3-11
fcFxPortIntermixSupported	1.3.6.1.2.1.75.1.1.5.1.10	page 3-12
fcFxPortStackedConnMode	1.3.6.1.2.1.75.1.1.5.1.11	page 3-12
fcFxPortClass2SeqDeliv	.3.6.1.2.1.75.1.1.5.1.12	page 3-12
fcFxPortClass3SeqDeliv	1.3.6.1.2.1.75.1.1.5.1.13	page 3-12
fcFxPortHoldTime	1.3.6.1.2.1.75.1.1.5.1.14	page 3-12
fcFeStatus	1.3.6.1.2.1.75.1.2	page 3-2
fcFxPortStatusTable	1.3.6.1.2.1.75.1.2.1	page 3-12
fcFxPortStatusEntry	1.3.6.1.2.1.75.1.2.1.1	page 3-13
fcFxPortID	1.3.6.1.2.1.75.1.2.1.1.1	page 3-13
fcFxPortBbCreditAvailable	1.3.6.1.2.1.75.1.2.1.1.2	page 3-13
fcFxPortOperMode	1.3.6.1.2.1.75.1.2.1.1.3	page 3-13
fcFxPortAdminMode	1.3.6.1.2.1.75.1.2.1.1.4	page 3-13
fcFxPortPhysTable	1.3.6.1.2.1.75.1.2.2	page 3-13
fcFxPortPhysEntry	1.3.6.1.2.1.75.1.2.2.1	page 3-14
fcFxPortPhysAdminStatus	1.3.6.1.2.1.75.1.2.2.1.1	page 3-14
fcFxPortPhysOperStatus	1.3.6.1.2.1.75.1.2.2.1.2	page 3-14
fcFxPortPhysLastChange	1.3.6.1.2.1.75.1.2.2.1.3	page 3-14
fcFxPortPhysRttov	1.3.6.1.2.1.75.1.2.2.1.4	page 3-15
fcFxLoginTable	1.3.6.1.2.1.75.1.2.3	page 3-15
fcFxLoginEntry	1.3.6.1.2.1.75.1.2.3.1	page 3-15

Table 2-1 MIB Object Name/OID Matrix (Continued)

MIB Object Name	OID	Page No.
fcFxPortNxLoginIndex	1.3.6.1.2.1.75.1.2.3.1.1	page 3-15
fcFxPortFcphVersionAgreed	1.3.6.1.2.1.75.1.2.3.1.2	page 3-15
fcFxPortNxPortBbCredit	1.3.6.1.2.1.75.1.2.3.1.3	page 3-15
fcFxPortNxPortRxDataFieldSize	1.3.6.1.2.1.75.1.2.3.1.4	page 3-16
fcFxPortCosSuppAgreed	1.3.6.1.2.1.75.1.2.3.1.5	page 3-16
fcFxPortIntermixSuppAgreed	1.3.6.1.2.1.75.1.2.3.1.6	page 3-16
fcFxPortStackedConnModeAgreed	1.3.6.1.2.1.75.1.2.3.1.7	page 3-16
fcFxPortClass2SeqDelivAgreed	1.3.6.1.2.1.75.1.2.3.1.8	page 3-16
fcFxPortClass3SeqDelivAgreed	1.3.6.1.2.1.75.1.2.3.1.9	page 3-16
fcFxPortNxPortName	1.3.6.1.2.1.75.1.2.3.1.10	page 3-17
fcFxPortConnectedNxPort	1.3.6.1.2.1.75.1.2.3.1.11	page 3-17
fcFxPortBbCreditModel	1.3.6.1.2.1.75.1.2.3.1.12	page 3-17
fcFeError	1.3.6.1.2.1.75.1.3	
fcFxPortErrorTable	1.3.6.1.2.1.75.1.3.1	page 3-18
fcFxPortErrorEntry	1.3.6.1.2.1.75.1.3.1.1	page 3-18
fcFxPortLinkFailures	1.3.6.1.2.1.75.1.3.1.1.1	page 3-18
fcFxPortSyncLosses	1.3.6.1.2.1.75.1.3.1.1.2	page 3-18
fcFxPortSigLosses	1.3.6.1.2.1.75.1.3.1.1.3	page 3-18
fcFxPortPrimSeqProtoErrors	1.3.6.1.2.1.75.1.3.1.1.4	page 3-18
fcFxPortInvalidTxWords	1.3.6.1.2.1.75.1.3.1.1.5	page 3-18
fcFxPortInvalidCrcs	1.3.6.1.2.1.75.1.3.1.1.6	page 3-18
fcFxPortDelimiterErrors	1.3.6.1.2.1.75.1.3.1.1.7	page 3-19
fcFxPortAddressIdErrors	1.3.6.1.2.1.75.1.3.1.1.8	page 3-19
fcFxPortLinkResetIns	1.3.6.1.2.1.75.1.3.1.1.9	page 3-19
fcFxPortLinkResetOuts	1.3.6.1.2.1.75.1.3.1.1.10	page 3-19
fcFxPortOlsIns	1.3.6.1.2.1.75.1.3.1.1.11	page 3-19
fcFxPortOlsOuts	1.3.6.1.2.1.75.1.3.1.1.12	page 3-19
fcFeAccounting	1.3.6.1.2.1.75.1.4	page 3-2
fcFxPortC1AccountingTable	1.3.6.1.2.1.75.1.4.1	page 3-20
fcFxPortC1AccountingEntry	1.3.6.1.2.1.75.1.4.1.1	page 3-20
fcFxPortC1InFrames	1.3.6.1.2.1.75.1.4.1.1.1	page 3-20
fcFxPortC1OutFrames	1.3.6.1.2.1.75.1.4.1.1.2	page 3-20
fcFxPortC1InOctets	1.3.6.1.2.1.75.1.4.1.1.3	page 3-20

Table 2-1 MIB Object Name/OID Matrix (Continued)

MIB Object Name	OID	Page No.
fcFxPortC1OutOctets	1.3.6.1.2.1.75.1.4.1.1.4	page 3-20
fcFxPortC1Discards	1.3.6.1.2.1.75.1.4.1.1.5	page 3-20
fcFxPortC1FbsyFrames	1.3.6.1.2.1.75.1.4.1.1.6	page 3-21
fcFxPortC1FrjtFrames	1.3.6.1.2.1.75.1.4.1.1.7	page 3-21
fcFxPortC1InConnections	1.3.6.1.2.1.75.1.4.1.1.8	page 3-21
fcFxPortC1OutConnections	1.3.6.1.2.1.75.1.4.1.1.9	page 3-21
fcFxPortC1ConnTime	1.3.6.1.2.1.75.1.4.1.1.10	page 3-21
fcFxPortC2AccountingTable	1.3.6.1.2.1.75.1.4.2	page 3-21
fcFxPortC2AccountingEntry	1.3.6.1.2.1.75.1.4.2.1	page 3-21
fcFxPortC2InFrames	1.3.6.1.2.1.75.1.4.2.1.1	page 3-22
fcFxPortC2OutFrames	1.3.6.1.2.1.75.1.4.2.1.2	page 3-22
fcFxPortC2InOctets	1.3.6.1.2.1.75.1.4.2.1.3	page 3-22
fcFxPortC2OutOctets	1.3.6.1.2.1.75.1.4.2.1.4	page 3-22
fcFxPortC2Discards	1.3.6.1.2.1.75.1.4.2.1.5	page 3-22
fcFxPortC2FbsyFrames	1.3.6.1.2.1.75.1.4.2.1.6	page 3-22
fcFxPortC2FrjtFrames	1.3.6.1.2.1.75.1.4.2.1.7	page 3-22
fcFxPortC3AccountingTable	1.3.6.1.2.1.75.1.4.3	page 3-22
fcFxPortC3AccountingEntry	1.3.6.1.2.1.75.1.4.3.1	page 3-23
fcFxPortC3InFrames	1.3.6.1.2.1.75.1.4.3.1.1	page 3-23
fcFxPortC3OutFrames	1.3.6.1.2.1.75.1.4.3.1.2	page 3-23
fcFxPortC3InOctets	1.3.6.1.2.1.75.1.4.3.1.3	page 3-23
fcFxPortC3OutOctets	1.3.6.1.2.1.75.1.4.3.1.4	page 3-23
fcFxPortC3Discards	1.3.6.1.2.1.75.1.4.3.1.5	page 3-23
fcFeCapabilities	1.3.6.1.2.1.75.1.5	page 3-2
fcFxPortCapTable	1.3.6.1.2.1.75.1.5.1	page 3-24
fcFxPortCapEntry	1.3.6.1.2.1.75.1.5.1.1	page 3-24
fcFxPortCapFcphVersionHigh	1.3.6.1.2.1.75.1.5.1.1.1	page 3-24
fcFxPortCapFcphVersionLow	1.3.6.1.2.1.75.1.5.1.1.2	page 3-24
fcFxPortCapBbCreditMax	1.3.6.1.2.1.75.1.5.1.1.3	page 3-24
fcFxPortCapBbCreditMin	1.3.6.1.2.1.75.1.5.1.1.4	page 3-24
fcFxPortCapRxDataFieldSizeMax	1.3.6.1.2.1.75.1.5.1.1.5	page 3-24
fcFxPortCapRxDataFieldSizeMin	1.3.6.1.2.1.75.1.5.1.1.6	page 3-25
fcFxPortCapCos	1.3.6.1.2.1.75.1.5.1.1.7	page 3-25

Table 2-1 MIB Object Name/OID Matrix (Continued)

MIB Object Name	OID	Page No.
fcFxPortCapIntermix	1.3.6.1.2.1.75.1.5.1.1.8	page 3-25
fcFxPortCapStackedConnMode	1.3.6.1.2.1.75.1.5.1.1.9	page 3-25
fcFxPortCapClass2SeqDeliv	1.3.6.1.2.1.75.1.5.1.1.10	page 3-25
fcFxPortCapClass3SeqDeliv	1.3.6.1.2.1.75.1.5.1.1.11	page 3-25
fcFxPortCapHoldTimeMax	1.3.6.1.2.1.75.1.5.1.1.12	page 3-25
fcFxPortCapHoldTimeMin	1.3.6.1.2.1.75.1.5.1.1.13	page 3-25
fcFeMIBConformance	1.3.6.1.2.1.75.2	page 3-2
fcFeMIBCompliances	1.3.6.1.2.1.75.2.1	page 3-2
fcFeMIBMinimumCompliance	1.3.6.1.2.1.75.2.1.1	
fcFeMIBFullCompliance	1.3.6.1.2.1.75.2.1.2	
fcFeMIBGroups	1.3.6.1.2.1.75.2.2	page 3-2
fcFeConfigGroup	1.3.6.1.2.1.75.2.2.1	
fcFeStatusGroup	1.3.6.1.2.1.75.2.2.2	
fcFeErrorGroup	1.3.6.1.2.1.75.2.2.3	
fcFeClass1AccountingGroup	1.3.6.1.2.1.75.2.2.4	
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fcFeClass3AccountingGroup	1.3.6.1.2.1.75.2.2.6	
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fcFxConfFxPortIndex	1.3.6.1.3.42.2.1.1.5.1.2	page 3-34
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fcFxPortCosSuppAgreed	1.3.6.1.3.42.2.1.2.4.1.7	page 3-41
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fcFxPortCapFxPortIndex	1.3.6.1.3.42.2.1.5.1.1.2	page 3-46
fcFxPortCapFcphVersionHigh	1.3.6.1.3.42.2.1.5.1.1.3	page 3-46
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fcFxPortCapBbCreditMin	1.3.6.1.3.42.2.1.5.1.1.6	page 3-46
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connUnitProxyMaster	1.3.6.1.3.94.1.6.1.12	page 8-10
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connUnitPortUnitId	1.3.6.1.3.94.1.10.1.1	page 8-18
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connUnitPortStatus	1.3.6.1.3.94.1.10.1.7	page 8-20
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connUnitPortNodeWwn	1.3.6.1.3.94.1.10.1.22	page 8-25
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connUnitEventIndex	1.3.6.1.3.94.1.11.1.2	page 8-26
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connUnitSEventTime	1.3.6.1.3.94.1.11.1.5	page 8-27
connUnitEventSeverity	1.3.6.1.3.94.1.11.1.6	page 8-27
connUnitEventType	1.3.6.1.3.94.1.11.1.7	page 8-28
connUnitEventObject	1.3.6.1.3.94.1.11.1.8	page 8-28
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connUnitLinkPortNumberX	1.3.6.1.3.94.1.12.1.4	page 8-30
connUnitLinkPortWwnX	1.3.6.1.3.94.1.12.1.5	page 8-30
connUnitLinkNodeIdY	1.3.6.1.3.94.1.12.1.6	page 8-30
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connUnitLinkAgentPortY	1.3.6.1.3.94.1.12.1.11	page 8-31
connUnitLinkUnitTypeY	1.3.6.1.3.94.1.12.1.12	page 8-31
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trapRegIpAddress	1.3.6.1.3.94.2.3.1.1	page 8-45
trapRegPort	1.3.6.1.3.94.2.3.1.2	page 8-45
trapRegFilter	1.3.6.1.3.94.2.3.1.3	page 8-45
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connUnitPortStatCountTxObjects	1.3.6.1.3.94.4.5.1.4	page 8-33
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connUnitPortStatCountTxElements	1.3.6.1.3.94.4.5.1.6	page 8-34
connUnitPortStatCountRxElements	1.3.6.1.3.94.4.5.1.7	page 8-34
connUnitPortStatCountBBCreditZero	1.3.6.1.3.94.4.5.1.8	page 8-34
connUnitPortStatCountInputBuffersFull	1.3.6.1.3.94.4.5.1.9	page 8-34
connUnitPortStatCountFBSYFrames	1.3.6.1.3.94.4.5.1.10	page 8-34
connUnitPortStatCountPBSYFrames	1.3.6.1.3.94.4.5.1.11	page 8-35
connUnitPortStatCountFRJTFrames	1.3.6.1.3.94.4.5.1.12	page 8-35
connUnitPortStatCountPRJTFrames	1.3.6.1.3.94.4.5.1.13	page 8-35
connUnitPortStatCountClass1RxFrames	1.3.6.1.3.94.4.5.1.14	page 8-35
connUnitPortStatCountClass1TxFrames	1.3.6.1.3.94.4.5.1.15	page 8-35
connUnitPortStatCountClass1FBSYFrames	1.3.6.1.3.94.4.5.1.16	page 8-36
connUnitPortStatCountClass1PBSYFrames	1.3.6.1.3.94.4.5.1.17	page 8-36
connUnitPortStatCountClass1FRJTFrames	1.3.6.1.3.94.4.5.1.18	page 8-36
connUnitPortStatCountClass1PRJTFrames	1.3.6.1.3.94.4.5.1.19	page 8-36
connUnitPortStatCountClass2RxFrames	1.3.6.1.3.94.4.5.1.20	page 8-36

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connUnitPortStatCountClass2FBSYFrames	1.3.6.1.3.94.4.5.1.22	page 8-37
connUnitPortStatCountClass2PBSYFrames	1.3.6.1.3.94.4.5.1.23	page 8-37
connUnitPortStatCountClass2FRJTFrames	1.3.6.1.3.94.4.5.1.24	page 8-37
connUnitPortStatCountClass2PRJTFrames	1.3.6.1.3.94.4.5.1.25	page 8-37
connUnitPortStatCountClass3RxFrames	1.3.6.1.3.94.4.5.1.26	page 8-38
connUnitPortStatCountClass3TxFrames	1.3.6.1.3.94.4.5.1.27	page 8-38
connUnitPortStatCountClass3Discards	1.3.6.1.3.94.4.5.1.28	page 8-38
connUnitPortStatCountRxMulticastObjects	1.3.6.1.3.94.4.5.1.29	page 8-38
connUnitPortStatCountTxMulticastObjects	1.3.6.1.3.94.4.5.1.30	page 8-38
connUnitPortStatCountRxBroadcastObjects	1.3.6.1.3.94.4.5.1.31	page 8-38
connUnitPortStatCountTxBroadcastObjects	1.3.6.1.3.94.4.5.1.32	page 8-39
connUnitPortStatCountRxLinkResets	1.3.6.1.3.94.4.5.1.33	page 8-39
connUnitPortStatCountTxLinkResets	1.3.6.1.3.94.4.5.1.34	page 8-39
connUnitPortStatCountNumberLinkResets	1.3.6.1.3.94.4.5.1.35	page 8-39
connUnitPortStatCountRxOfflineSequences	1.3.6.1.3.94.4.5.1.36	page 8-39
connUnitPortStatCountTxOfflineSequences	1.3.6.1.3.94.4.5.1.37	page 8-39
connUnitPortStatCountNumberOffline Sequences	1.3.6.1.3.94.4.5.1.38	page 8-39
connUnitPortStatCountLinkFailures	1.3.6.1.3.94.4.5.1.39	page 8-40
connUnitPortStatCountInvalidCRC	1.3.6.1.3.94.4.5.1.40	page 8-40
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connUnitPortStatCountLossofSynchronization	1.3.6.1.3.94.4.5.1.44	page 8-40
connUnitPortStatCountInvalidOrderedSets	1.3.6.1.3.94.4.5.1.45	page 8-41
connUnitPortStatCountFramesTooLong	1.3.6.1.3.94.4.5.1.46	page 8-41
connUnitPortStatCountFramesTruncated	1.3.6.1.3.94.4.5.1.47	page 8-41
connUnitPortStatCountAddressErrors	1.3.6.1.3.94.4.5.1.48	page 8-41
connUnitPortStatCountDelimiterErrors	1.3.6.1.3.94.4.5.1.49	page 8-41
connUnitPortStatCountEncodingDisparityErrors	1.3.6.1.3.94.4.5.1.50	page 8-41
connUnitServiceSet	1.3.6.1.3.94.5	page 8-42

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connUnitSnsMaxEntry	1.3.6.1.3.94.5.1.1	page 8-42
connUnitServiceTables	1.3.6.1.3.94.5.2	page 8-42
connUnitSnsTable	1.3.6.1.3.94.5.2.1	page 8-42
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connUnitSnsPortIndex	1.3.6.1.3.94.5.2.1.1.2	page 8-43
connUnitSnsPortIdentifier	1.3.6.1.3.94.5.2.1.1.3	page 8-43
connUnitSnsPortName	1.3.6.1.3.94.5.2.1.1.4	page 8-43
connUnitSnsNodeName	1.3.6.1.3.94.5.2.1.1.5	page 8-43
connUnitSnsClassOfSvc	1.3.6.1.3.94.5.2.1.1.6	page 8-43
connUnitSnsNodeIPAddress	1.3.6.1.3.94.5.2.1.1.7	page 8-43
connUnitSnsProcAssoc	1.3.6.1.3.94.5.2.1.1.8	page 8-43
connUnitSnsFC4Type	1.3.6.1.3.94.5.2.1.1.9	page 8-43
connUnitSnsPortType	1.3.6.1.3.94.5.2.1.1.10	page 8-44
connUnitSnsPortIPAddress	1.3.6.1.3.94.5.2.1.1.11	page 8-44
connUnitSnsFabricPortName	1.3.6.1.3.94.5.2.1.1.12	page 8-44
connUnitSnsHardAddress	1.3.6.1.3.94.5.2.1.1.13	page 8-44
connUnitSnsSymbolicPortName	1.3.6.1.3.94.5.2.1.1.14	page 8-44
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swBootDate	1.3.6.1.4.1.1588.2.1.1.1.1.2	page 5-15
swFWLastUpdated	1.3.6.1.4.1.1588.2.1.1.1.1.3	page 5-15
swFlashLastUpdated	1.3.6.1.4.1.1588.2.1.1.1.1.4	page 5-16
swBootPromLastUpdated	1.3.6.1.4.1.1588.2.1.1.1.1.5	page 5-16

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swOperStatus	1.3.6.1.4.1.1588.2.1.1.1.1.7	page 5-17
swAdmStatus	1.3.6.1.4.1.1588.2.1.1.1.1.8	page 5-17
swTelnetShellAdmStatus	1.3.6.1.4.1.1588.2.1.1.1.1.9	page 5-18
swSsn	1.3.6.1.4.1.1588.2.1.1.1.1.10	page 5-18
swFlashDLOperStatus	1.3.6.1.4.1.1588.2.1.1.1.1.11	page 5-18
swFlashDLAdmStatus	1.3.6.1.4.1.1588.2.1.1.1.1.12	page 5-19
swFlashDLHost	1.3.6.1.4.1.1588.2.1.1.1.1.13	page 5-19
swFlashDLUser	1.3.6.1.4.1.1588.2.1.1.1.1.14	page 5-19
swFlashDLFile	1.3.6.1.4.1.1588.2.1.1.1.1.15	page 5-19
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swBeaconOperStatus	1.3.6.1.4.1.1588.2.1.1.1.1.18	page 5-20
swBeaconAdmStatus	1.3.6.1.4.1.1588.2.1.1.1.1.19	page 5-20
swDiagResult	1.3.6.1.4.1.1588.2.1.1.1.1.20	page 5-20
swNumSensors	1.3.6.1.4.1.1588.2.1.1.1.1.21	page 5-20
swSensorTable	1.3.6.1.4.1.1588.2.1.1.1.1.22	page 5-20
swSensorEntry	1.3.6.1.4.1.1588.2.1.1.1.1.22.1	page 5-21
swSensorIndex	1.3.6.1.4.1.1588.2.1.1.1.1.22.1.1	page 5-21
swSensorType	1.3.6.1.4.1.1588.2.1.1.1.1.22.1.2	page 5-21
swSensorStatus	1.3.6.1.4.1.1588.2.1.1.1.1.22.1.3	page 5-21
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swSensorInfo	1.3.6.1.4.1.1588.2.1.1.1.1.22.1.5	page 5-22
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swDomainID	1.3.6.1.4.1.1588.2.1.1.1.2.1	page 5-24
swPrincipalSwitch	1.3.6.1.4.1.1588.2.1.1.1.2.2	page 5-24
swNumNbs	1.3.6.1.4.1.1588.2.1.1.1.2.8	page 5-24
swNbTable	1.3.6.1.4.1.1588.2.1.1.1.2.9	page 5-25
swNbEntry	1.3.6.1.4.1.1588.2.1.1.1.2.9.1	page 5-25
swNbIndex	1.3.6.1.4.1.1588.2.1.1.1.2.9.1.1	page 5-25
swNbMyPort	1.3.6.1.4.1.1588.2.1.1.1.2.9.1.2	page 5-25
swNbRemDomain	1.3.6.1.4.1.1588.2.1.1.1.2.9.1.3	page 5-25
swNbRemPort	1.3.6.1.4.1.1588.2.1.1.1.2.9.1.4	page 5-25

Table 2-1 MIB Object Name/OID Matrix (Continued)

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swNbIslState	1.3.6.1.4.1.1588.2.1.1.1.2.9.1.6	page 5-26
swNbIslCost	1.3.6.1.4.1.1588.2.1.1.1.2.9.1.7	page 5-26
swNbRemPortName	1.3.6.1.4.1.1588.2.1.1.1.2.9.1.8	page 5-26
swModule	1.3.6.1.4.1.1588.2.1.1.1.3	page 5-28
swAgtCfg	1.3.6.1.4.1.1588.2.1.1.1.4	page 5-28
swAgtCmtyTable	1.3.6.1.4.1.1588.2.1.1.1.4.11	page 5-28
swAgtCmtyEntry	1.3.6.1.4.1.1588.2.1.1.1.4.11.1	page 5-28
swAgtCmtyIdx	1.3.6.1.4.1.1588.2.1.1.1.4.11.1.1	page 5-28
swAgtCmtyStr	1.3.6.1.4.1.1588.2.1.1.1.4.11.1.2	page 5-28
swAgtTrapRcp	1.3.6.1.4.1.1588.2.1.1.1.4.11.1.3	page 5-28
swFCport	1.3.6.1.4.1.1588.2.1.1.1.6	page 5-29
swFCPortCapacity	1.3.6.1.4.1.1588.2.1.1.1.6.1	page 5-29
swFCPortTable	1.3.6.1.4.1.1588.2.1.1.1.6.2	page 5-30
swFCPortEntry	1.3.6.1.4.1.1588.2.1.1.1.6.2.1	page 5-30
swFCPortIndex	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.1	page 5-30
swFCPortType	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.2	page 5-30
swFCPortPhyState	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.3	page 5-30
swFCPortOpStatus	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.4	page 5-31
swFCPortAdmStatus	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.5	page 5-31
swFCPortLinkState	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.6	page 5-31
swFCPortTxType	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.7	page 5-32
swFCPortTxWords	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.11	page 5-32
swFCPortRxWords	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.12	page 5-32
swFCPortTxFrames	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.13	page 5-32
swFCPortRxFrames	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.14	page 5-32
swFCPortRxC2Frames	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.15	page 5-32
swFCPortRxC3Frames	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.16	page 5-32
swFCPortRxLCs	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.17	page 5-32
swFCPortRxMcasts	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.18	page 5-33
swFCPortTooManyRdys	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.19	page 5-33
swFCPortNoTxCredits	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.20	page 5-33
swFCPortRxEncInFrs	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.21	page 5-33

Table 2-1 MIB Object Name/OID Matrix (Continued)

MIB Object Name	OID	Page No.
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swFCPortRxTruncs	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.23	page 5-33
swFCPortRxTooLongs	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.24	page 5-33
swFCPortRxBadEofs	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.25	page 5-33
swFCPortRxEncOutFrs	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.26	page 5-33
swFCPortRxBadOs	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.27	page 5-34
swFCPortC3Discards	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.28	page 5-34
swFCPortMcastTimedOuts	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.29	page 5-34
swFCPortTxMcasts	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.30	page 5-34
swFCPortLipIns	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.31	page 5-34
swFCPortLipOuts	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.32	page 5-34
swFCPortLipLastAlpa	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.33	page 5-34
swFCPortWwn	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.34	page 5-34
swFCPortSpeed	1.3.6.1.4.1.1588.2.1.1.1.6.2.1.35	page 5-35
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swNsLocalNumEntry	1.3.6.1.4.1.1588.2.1.1.1.7.1	page 5-35
swNsLocalTable	1.3.6.1.4.1.1588.2.1.1.1.7.2	page 5-35
swNsLocalEntry	1.3.6.1.4.1.1588.2.1.1.1.7.2.1	page 5-36
swNsEntryIndex	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.1	page 5-36
swNsPortID	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.2	page 5-36
swNsPortType	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.3	page 5-36
swNsPortName	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.4	page 5-36
swNsPortSymb	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.5	page 5-36
swNsNodeName	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.6	page 5-36
swNsNodeSymb	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.7	page 5-36
swNsIPA	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.8	page 5-37
swNsIpAddress	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.9	page 5-37
swNsCos	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.10	page 5-37
swNsFc4	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.11	page 5-37
swNsIpNxPort	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.12	page 5-37
swNsWwn	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.13	page 5-37
swNsHardAddr	1.3.6.1.4.1.1588.2.1.1.1.7.2.1.14	page 5-37
swEvent	1.3.6.1.4.1.1588.2.1.1.1.8	page 5-38

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swEventNumEntries	1.3.6.1.4.1.1588.2.1.1.1.8.4	page 5-38
swEventTable	1.3.6.1.4.1.1588.2.1.1.1.8.5	page 5-38
swEventEntry	1.3.6.1.4.1.1588.2.1.1.1.8.5.1	page 5-38
swEventIndex	1.3.6.1.4.1.1588.2.1.1.1.8.5.1.1	page 5-38
swEventTimeInfo	1.3.6.1.4.1.1588.2.1.1.1.8.5.1.2	page 5-39
swEventLevel	1.3.6.1.4.1.1588.2.1.1.1.8.5.1.3	page 5-39
swEventRepeatCount	1.3.6.1.4.1.1588.2.1.1.1.8.5.1.4	page 5-39
swEventDescr	1.3.6.1.4.1.1588.2.1.1.1.8.5.1.5	page 5-39
swFwSystem	1.3.6.1.4.1.1588.2.1.1.1.10	page 5-39
swFwFabricWatchLicense	1.3.6.1.4.1.1588.2.1.1.1.10.1	page 5-40
swFwClassAreaTable	1.3.6.1.4.1.1588.2.1.1.1.10.2	page 5-40
swFwClassAreaEntry	1.3.6.1.4.1.1588.2.1.1.1.10.2.1	page 5-40
swFwClassAreaIndex	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.1	page 5-40
swFwWriteThVals	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.2	page 5-40
swFwDefaultUnit	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.3	page 5-41
swFwDefaultTimebase	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.4	page 5-41
swFwDefaultLow	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.5	page 5-41
swFwDefaultHigh	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.6	page 5-41
swFwDefaultBufSize	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.7	page 5-41
swFwCustUnit	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.8	page 5-41
swFwCustTimebase	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.9	page 5-42
swFwCustLow	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.10	page 5-42
swFwCustHigh	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.11	page 5-42
swFwCustBufSize	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.12	page 5-42
swFwThLevel	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.13	page 5-42
swFwWriteActVals	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.14	page 5-43
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swFwDefaultBelowActs	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.17	page 5-43
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swFwCustAboveActs	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.23	page 5-44
swFwCustInBetweenActs	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.24	page 5-44
swFwValidActs	1.3.6.1.4.1.1588.2.1.1.1.10.2.1.25	page 5-44
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swFwThresholdIndex	1.3.6.1.4.1.1588.2.1.1.1.10.3.1.1	page 5-45
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swFwBehaviorInt	1.3.6.1.4.1.1588.2.1.1.1.10.3.1.11	page 5-49
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swBlmPerfMnt	1.3.6.1.4.1.1588.2.1.1.1.23	page 5-52
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swFabricMemTable	1.3.6.1.1.1588.2.1.1.1.2.10	page 5-26
swFabricMemEntry	1.3.6.1.1.1588.2.1.1.1.2.10.1	page 5-26
swFabricMemWwn	1.3.6.1.1.1588.2.1.1.1.2.10.1.1	page 5-26
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swFabricMemShortVersion	1.3.6.1.1.1588.2.1.1.1.2.10.1.8	page 5-27
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swGroupIndex	1.3.6.1.4.1.1588.2.1.1.1.22.1.1.1	page 5-51
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swTrunkEntry	1.3.6.1.4.1.1588.2.1.1.1.24.2.1	page 5-55
swTrunkPortIndex	1.3.6.1.4.1.1588.2.1.1.1.24.2.1.1	page 5-56
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Glossary

A

AL_PA Arbitrated-loop physical address. A unique 8-bit value assigned during loop initialization to a port in an arbitrated loop. Alternately, “arbitrated-loop parameters.”

alias A logical grouping of elements in a fabric. An alias is a collection of port numbers and connected devices, used to simplify the entry of port numbers and WWNs when creating zones.

ARB Arbitrative primitive signal. Applies only to an arbitrated-loop topology. Transmitted as the fill word by an L_Port to indicate that the port is arbitrating access to the loop.

area number In Brocade Fabric OS v4.0 and above, ports on a switch are assigned a logical area number. Port area numbers can be viewed by entering the **switchshow** command. They are used to define the operative port for many Fabric OS commands: for example, area numbers can be used to define the ports within an alias or zone.

ASIC Application-specific integrated circuit.

authentication The process of verifying that an entity in a fabric (such as a switch) is what it claims to be. *See also* digital certificate.

autocommit A feature of the **firmwaredownload** command. Enabled by default, **autocommit** commits new firmware to both partitions of a control processor.

autoreboot Refers to the **-b** option of the **firmwaredownload** command. Enabled by default.

B

backbone fabric An optional capability that enables scalable meta-SANs by allowing the networking of multiple FC routers, which connect to the backbone fabric via EB_Port interfaces.

backup FCS switch Relates to the Brocade Secure Fabric OS feature. The backup fabric configuration server serves as a backup in case the primary FCS switch fails. *See also* FCS switch, primary FCS switch.

BB fabric A backbone fabric that connects FC Routers. The FC Routers communicate over the backbone fabric using FCRP (Fibre Channel Router Protocol).

BB_Credit Buffer-to-buffer credit. The number of frames that can be transmitted to a directly connected recipient or within an arbitrated loop. Determined by the number of receive buffers available. *See also* buffer-to-buffer flow control, EE_Credit.

beacon A tool in which all of the port LEDs on a switch are set to flash from one side of the switch to the other, to enable identification of an individual switch in a large fabric. A switch can be set to beacon by a CLI command or through Brocade Advanced Web Tools.

BISR Built-in self-repair.

BIST Built-in self-test.

broadcast The transmission of data from a single source to all devices in the fabric, regardless of zoning. *See also* multicast.

buffer-to-buffer flow control Management of the frame transmission rate in either a point-to-point topology or in an arbitrated loop. *See also* BB_Credit.

C

cascade Two or more interconnected Fibre Channel switches. Brocade SilkWorm 2000 and later switches can be cascaded up to 239 switches, with a recommended maximum of seven interswitch links (no path longer than eight switches). *See also* fabric, ISL.

CHAP Challenge-Handshake Authentication Protocol. Allows remote servers and clients to securely exchange authentication credentials. Both the server and client are configured with the same shared secret.

chassis The metal frame in which the switch and switch components are mounted.

Class 1 service The class of frame-switching service for a dedicated connection between two communicating ports (also called “connection-oriented service”). Includes acknowledgement of frame delivery or nondelivery.

Class 2 service A connectionless class of frame-switching service that includes acknowledgement of frame delivery or nondelivery.

Class 3 service A connectionless class of frame-switching service that does not include acknowledgement of frame delivery or nondelivery. Can be used to provide a multicast connection between the frame originator and recipients, with acknowledgement of frame delivery or nondelivery.

Class 4 service A connection-oriented service that allows fractional parts of the bandwidth to be used in a virtual circuit.

Class 6 service A connection-oriented multicast service geared toward video broadcasts between a central server and clients.

Class F service The class of frame-switching service for a direct connection between two switches, allowing communication of control traffic between the E_Ports. Includes acknowledgement of data delivery or nondelivery.

class of service A specified set of delivery characteristics and attributes for frame delivery.

CLI Command line interface. An interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a GUI.

client An entity that, using its common transport (CT), makes requests of a server.

community (SNMP) A relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined. *See also* SNMP.

compact flash Flash (temporary) memory that is used in a manner similar to hard disk storage. It is connected to a bridging component that connects to the PCI bus of the processor. Not visible within the processor's memory space.

configuration (1) A set of parameters that can be modified to fine-tune the operation of a switch. Use the **configshow** command to view the current configuration of your switch.

(2) In Brocade Zoning, a zoning element that contains a set of zones. The Configuration is the highest-level zoning element and is used to enable or disable a set of zones on the fabric. *See also* zone configuration.

congestion The realization of the potential of oversubscription. A congested link is one on which multiple devices are contending for bandwidth.

core PID Core switch port identifier. The core PID must be set for v3.1 and earlier switches included in a fabric of v4.1 switches. This parameter is located in the **configure** command of firmware versions v3.1 and earlier. All v4.1 switches and above use the core PID format by default; this parameter is not present in the **configure** command for these switches.

CSCN Common services connection framework.

D

defined zone configuration The set of all zone objects defined in the fabric. Can include multiple zone configurations. *See also* enabled zone configuration, zone configuration.

deskew Related to the Brocade Trunking feature. The time difference between traffic traveling over each ISL other than the shortest ISL in the group and traffic traveling over that shortest ISL. The deskew number corresponds to nanoseconds divided by 10. The firmware automatically sets the minimum deskew value of the shortest ISL to 15.

DH-CHAP Diffie-Hellman Challenge-Handshake Authentication Protocol. An implementation of CHAP using Diffie-Hellman encryption. *See also* CHAP.

digital certificate An electronic document issued by a CA (certificate authority) to an entity, containing the public key and identity of the entity. Entities in a secure fabric are authenticated based on these certificates. *See also* authentication, public key.

director A Brocade SilkWorm 12000, or 24000 switch.

domain ID A unique identifier for all switches in a fabric, used in routing frames. Usually automatically assigned by the principal switch but can be assigned manually. The domain ID for a Brocade SilkWorm switch can be any integer between between 1 and 239.

E

E_Port Expansion port. A standard Fibre Channel mechanism that enables switches to network with each other, creating an ISL. *See also* ISL.

edge fabric A Fibre Channel fabric connected to an FC router via an EX_Port (where hosts and storage are attached in a meta-SAN).

EE_Credit End-to-end credit. The number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage frame exchange across the fabric, between source and destination. *See also* BB_Credit.

EM Environmental monitor. Monitors FRUs and reports failures.

enabled zone configuration The currently enabled configuration of zones. Only one configuration can be enabled at a time. *See also* defined zone configuration, zone configuration.

error As it applies to the Fibre Channel industry, a missing or corrupted frame, timeout, loss of synchronization, or loss of signal (link errors).

Ethernet Popular protocols for LANs.

EX_Port A type of E_Port that connects an FC router to an edge fabric. EX_Ports limit the scope of fabric services scope but provide device connectivity using FC-NAT.

exchange The highest-level Fibre Channel mechanism used for communication between N_Ports. Composed of one or more related sequences, it can work in either one or both directions.

F

fabric A collection of Fibre Channel switches and devices, such as hosts and storage. Also referred to as a "switched fabric." *See also* cascade, SAN, topology.

Fabric Manager An optionally licensed Brocade software. Fabric Manager is a GUI that allows for fabric-wide administration and management. Switches can be treated as groups, and actions such as firmware downloads can be performed simultaneously.

fabric name The unique identifier assigned to a fabric and communicated during login and port discovery.

fabric port count The number of ports available for connection by nodes in a fabric.

Fabric Watch An optionally licensed Brocade software. Fabric Watch can be accessed through either the command line or Advanced Web Tools, and it provides the ability to set thresholds for monitoring fabric conditions.

failover Describes the Brocade SilkWorm 12000 and 24000 process of one CP passing active status to another CP. A failover is nondisruptive.

FC router A platform running the Brocade Fibre Channel Routing Service or FC-to-FC routing (for instance, the SilkWorm Fabric AP7420) that enables two or more fabrics to share resources (such hosts or storage devices) without merging those fabrics. The platform could simultaneously be used as an FC router and as an FCIP tunnel or iSCSI gateway.

FCIP Fibre Channel over IP.

FCS switch Relates to the Brocade Secure Fabric OS feature. One or more designated switches that store and manage security parameters and configuration data for all switches in the fabric. They also act as a set of backup switches to the primary FCS switch. *See also* backbone fabric, primary FCS switch.

FC-SW-2 The second-generation Fibre Channel Switch Fabric standard defined by ANSI. Specifies tools and algorithms for the interconnection and initialization of Fibre Channel switches to create a multiswitch Fibre Channel fabric.

FDDI Fibre Distributed Data Interface. An ANSI architecture for a metropolitan area network (MAN); a network based on the use of fiber-optic cable to transmit data at 100 Mbit/sec.

FDMI Fabric-Device Management Interface. FDMI is a database service provided by the fabric for Nx_Ports. The primary use is by HBA devices that register information about themselves and their ports.

FFFFF5 Well-known Fibre Channel address for a Class 6 multicast server.

FFFFF6 Well-known Fibre Channel address for a clock synchronization server.

FFFFF7 Well-known Fibre Channel address for a security key distribution server.

FFFFF8 Well-known Fibre Channel address for an alias server.

FFFFF9 Well-known Fibre Channel address for a QoS facilitator.

FFFFFA Well-known Fibre Channel address for a management server.

FFFFFB Well-known Fibre Channel address for a time server.

FFFFFC Well-known Fibre Channel address for a directory server.

FFFFFD Well-known Fibre Channel address for a fabric controller.

FFFFFE Well-known Fibre Channel address for a fabric F_Port.

FFFFFF Well-known Fibre Channel address for a broadcast alias ID.

Fibre Channel The primary protocol used for building SANs to transmit data between servers, switches, and storage devices. Unlike IP and Ethernet, Fibre Channel was designed to support the needs of storage devices of all types. It is a high-speed, serial, bidirectional, topology-independent, multiprotocol, and highly scalable interconnection between computers, peripherals, and networks.

Fibre Channel transport A protocol service that supports communication between Fibre Channel service providers.

FICON® A protocol used on IBM mainframes. Brocade SilkWorm switch FICON support enables a SilkWorm fabric to transmit FICON format data between FICON-capable servers and storage.

FID Fabric ID. Unique identifier of a fabric in a meta-SAN.

FIFO First in, first out. Refers to a data buffer that follows the first in, first out rule.

fill word An IDLE or ARB ordered set that is transmitted during breaks between data frames to keep the Fibre Channel link active.

firmware The basic operating system provided with the hardware.

FL_Port Fabric loop port. A port that is able to transmit under fabric protocol and also has arbitrated-loop capabilities. Can be used to connect an NL_Port to a switch. *See also* Fx_Port.

flash Programmable nonvolatile RAM (NVRAM) memory that maintains its contents without power.

FLOGI Fabric login. The process by which an N_Port determines whether a fabric is present and, if so, exchanges service parameters with it. *See also* PLOGI.

frame The Fibre Channel structure used to transmit data between ports. Consists of a start-of-frame delimiter, header, optional headers, data payload, cyclic redundancy check (CRC), and end-of-frame delimiter. There are two types of frames: link control frames (transmission acknowledgements and so forth) and data frames.

frame relay A protocol that uses logical channels, as used in X.25. Provides very little error-checking ability. Discards frames that arrive with errors. Allows a certain level of bandwidth between two locations (known as a "committed information rate": CIR) to be guaranteed by service provider. If CIR is exceeded for short periods (known as "bursts"), the network accommodates the extra data, if spare capacity is available. Frame relay is therefore known as "bandwidth on demand."

FRU Field-replaceable unit. A component that can be replaced onsite.

FSPF Fabric shortest path first. The Brocade routing protocol for Fibre Channel switches.

FSS Fabric OS state synchronization. The FSS service is related to high availability (HA). The primary function of FSS is to deliver state update messages from active components to their peer standby components. FSS determines if fabric elements are synchronized (and thus FSS "compliant").

FTP File Transfer Protocol.

full fabric The Brocade software license that allows multiple E_Ports on a switch, making it possible to create multiple ISL links.

full duplex A mode of communication that allows the same port to simultaneously transmit and receive frames. *See also* half duplex.

Fx_Port A fabric port that can operate as either an F_Port or FL_Port. *See also* FL_Port.

G

G_Port Generic port. A port that can operate as either an E_Port or an F_Port. A port is defined as a G_Port when it is not yet connected or has not yet assumed a specific function in the fabric.

gateway Hardware that connects incompatible networks by providing translation for both hardware and software. For example, an ATM gateway can be used to connect a Fibre Channel link to an ATM connection.

GBIC Gigabit interface converter. A removable serial transceiver module that allows gigabaud physical-level transport for Fibre Channel and gigabit Ethernet.

Gbit/sec Gigabits per second (1 Gbit/sec = 1,062,500,000 bits/second, 2 Gbit/sec = 2, 125,000,000 bits/seconc).

GB/sec Gigabytes per second.

GLM Gigabit Link Module. A semitransparent transceiver that incorporates serializing/deserializing functions.

GMT Greenwich Mean Time. An international time zone. Also known as "UTC."

GUI A graphic user interface, such as Brocade Advanced Web Toolsarbitrated-loop topology and Brocade Fabric Manager.

H

HA High availability. A set of features in Brocade SilkWorm switches that is designed to provide maximum reliability and nondisruptive replacement of key hardware and software modules.

half duplex A mode of communication that allows a port to either transmit or receive frames at any time except simultaneously (with the exception of link control frames, which can be transmitted at any time). *See also* full duplex.

hard address The AL_PA that an NL_Port attempts to acquire during loop initialization.

Hardware Translative Mode A method for achieving address translation. There are two hardware translative modes available to a QuickLoop enabled switch: Standard Translative Mode and QuickLoop Mode.

HBA Host bus adapter. The interface card between a server or workstation bus and the Fibre Channel network.

hop count The number of ISLs a frame must traverse to get from its source to its destination.

host A computer system that provides end users with services like computation and storage access.

hot swappable A hot swappable component can be replaced while the power is on.

HTTP Hypertext Transfer Protocol. The standard TCP/IP transfer protocol used on the World Wide Web.

hub A Fibre Channel wiring concentrator that collapses a loop topology into a physical star topology. Nodes are automatically added to the loop when active and removed when inactive.

I

ICT Intracircuit test.

ID_ID Insistent domain ID. A parameter of the **configure** command in the Brocade Fabric OS.

Insistent Domain ID Mode Sets the domain ID of a switch as insistent, so that it remains the same over reboots, power cycles, failovers, and fabric reconfigurations. This mode is required to support FICON® traffic.

integrated fabric The fabric created by a Brocade SilkWorm 6400, consisting of six SilkWorm 2250 switches cabled together and configured to handle traffic seamlessly as a group.

IOCTL I/O control.

iSCSI Internet Small Computer Systems Interface. A protocol that defines the processes for transferring block storage applications over TCP/IP networks by encapsulating SCSI commands into TCP and transporting them over the network via IP.

iSCSI Gateway Service The Brocade multiprotocol SAN routing service that maps the FCP protocol to the IP transport. This service projects iSCSI hosts onto the backbone fabric of a gateway switch.

ISL Interswitch link. A Fibre Channel link from the E_Port of one switch to the E_Port of another. *See also* cascade, E_Port.

ISP Internet service provider.

J

JBOD "Just a bunch of disks." Indicates a number of disks connected in a single chassis to one or more controllers. *See also* RAID.

jitter A deviation in timing for a bit stream as it flows through a physical medium.

K

key A string of data (usually a numeric value) shared between two entities and used to control a cryptographic algorithm. Usually selected from a large pool of possible keys to make unauthorized identification of the key difficult. *See also* key pair.

key pair In public key cryptography, a pair of keys consisting of an entity's public and private key. The public key can be publicized, but the private key must be kept secret.

L

L_Port Loop port. A node port (NL_Port) or fabric port (FL_Port) that has arbitrated-loop capabilities. An L_Port can be in either Fabric Mode or Loop Mode.

LAN Local area network. A network in which transmissions typically take place over fewer than 5 kilometers (3.4 miles).

latency The time required to transmit a frame. Together, latency and bandwidth define the speed and capacity of a link or system.

LED Light-emitting diode. Used to indicate the status of elements on a switch.

login server The unit that responds to login requests.

Loop Mode One of two possible modes for an L_Port, in which the L_Port is in an arbitrated loop, using loop protocol. An L_Port in Loop Mode can also be in Participating Mode or Nonparticipating Mode.

LSAN Logical storage area network. An LSAN enables device and storage connectivity that spans two or more fabrics. The path between devices in an LSAN can be local to a fabric or cross one or more FC routers and one or more backbone fabrics.

LSAN zone The mechanism by which LSANs are administered. An FC router attached to two fabrics will "listen" for the creation of matching LSAN zones on both fabrics. If this occurs, it will create phantom domains and FC-NAT entries as appropriate, and insert entries for them into the name servers on the fabrics. LSAN zones are compatible with all standard zoning mechanisms.

M

MALLOC Memory allocation. Usually relates to buffer credits.

meta-SAN The collection of all devices, switches, edge and backbone fabrics, LSANs, and FC routers that make up a physically connected but logically partitioned storage network. LSANs span between edge fabrics using FC routers. In a data network, this would simply be called "the network." However, an additional term is required to specify the difference between a single-fabric network ("SAN"), a multifabric network without cross-fabric connectivity ("dual-redundant fabric SAN"), and a multifabric network with connectivity ("meta-SAN").

MIB Management Information Base. An SNMP structure to help with device management, providing configuration and device information.

MS Management Server. The Management Server allows a storage area network (SAN) management application to retrieve information and administer the fabric and interconnected elements, such as switches, servers, and storage devices. The MS is located at the Fibre Channel well-known address FFFFFAh.

MTBF Mean time between failures. An expression of time, indicating the longevity of a device.

multicast The transmission of data from a single source to multiple specified N_Ports (as opposed to all the ports on the network). *See also* broadcast.

multimode A fiber optic cabling specification that allows up to 500 meters between devices.

N

N_Port Node port. A port on a node that can connect to a Fibre Channel port or to another N_Port in a point-to-point connection. *See also* NL_Port, Nx_Port.

Name Server Simple Name Server (SNS). A switch service that stores names, addresses, and attributes for up to 15 minutes and provides them as required to other devices in the fabric. SNS is defined by Fibre Channel standards and exists at a well-known address. Also referred to as "directory service."

NAS Network-attached storage. A disk array connected to a controller that gives access via a LAN.

NIC Network interconnect card.

NL_Port Node loop port. A node port that has arbitrated-loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL_Port. *See also* N_Port, Nx_Port.

node A Fibre Channel device that contains an N_Port or NL_Port.

node count The number of nodes attached to a fabric.

node name The unique identifier for a node, communicated during login and port discovery.

NR_Port A normal E_Port used to connect an FC Router to a backbone fabric.

NS Name Server. The service provided by a fabric switch that stores names, addresses, and attributes related to Fibre Channel objects. Can cache information for up to 15 minutes. Also known as "Simple Name Server" or as a "directory service." *See also* Simple Name Server (SNS).

Nx_Port A node port that can operate as either an N_Port or NL_Port.

O

oversub-scription A situation in which more nodes could potentially contend for a resource than the resource could simultaneously support (typically an ISL). Oversubscription could be a desirable attribute in fabric topology, as long as it does not produce unacceptable levels of congestion.

OX_ID Originator ID or exchange ID. Refers to the exchange ID assigned by the originator port.

P

payload A Fibre Channel frame has a header and a payload. The payload contains the information being transported by the frame; it is determined by the higher-level service or FC_4 upper-level protocol. There are many different payload formats, based on protocol.

PBC Port bypass circuit. A circuit in hubs or a disk enclosure to open or close a loop to add or remove nodes.

PCBA Printed circuit board assembly.

PCM Pulse-code modulation. A standard method of encoding analog audio signals in digital form.

Performance Monitoring A Brocade SilkWorm switch feature that monitors port traffic and includes frame counters, SCSI read monitors, SCSI write monitors, and other types of monitors.

phantom device A device that is not physically in an arbitrated-loop but is logically included through the use of a phantom address.

phantom domain *See* xlate domain.

PID Port identifier. *See also* core PID.

PKI Public key infrastructure. An infrastructure that is based on public key cryptography and CA (certificate authority) and that uses digital certificates. *See also* digital certificate.

PKI certification utility Public key infrastructure certification utility. A utility that makes it possible to collect certificate requests from switches and to load certificates to switches. *See also* digital certificate, PKI.

PLOGI Port login. The port-to-port login process by which initiators establish sessions with targets. *See also* FLOGI.

port In a Brocade SilkWorm switch environment, an SFP or GBIC receptacle on a switch to which an optic cable for another device is attached.

port address In Fibre Channel technology, the port address is defined in hexadecimal. In the Brocade Fabric OS, a port address can be defined by a domain and port number combination or by area number. In an ESCON Director, an address used to specify port connectivity parameters and to assign link addresses for attached channels and control units.

port name A user-defined alphanumeric name for a port.

port swapping Port swapping is the ability to redirect a failed port to another port. This feature is available in Fabric OS v4.1.0 and higher.

port_name The unique identifier assigned to a Fibre Channel port. Communicated during login and port discovery.

POST Power-on self-test. A series of tests run by a switch after it is turned on.

primary FCS switch Relates to the Brocade Secure Fabric OS feature. The primary fabric configuration server switch actively manages security and configurations for all switches in the fabric. *See also* backbone fabric, FCS switch.

principal switch The first switch to boot up in a fabric. Ensures unique domain IDs among roles.

private device A device that supports arbitrated-loop protocol and can interpret 8-bit addresses but cannot log in to the fabric.

private key The secret half of a key pair. *See also* key, key pair.

private loop An arbitrated loop that does not include a participating FL_Port.

private loop device A device that supports a loop and can understand 8-bit addresses but does not log in to the fabric.

private NL_Port An NL_Port that communicates only with other private NL_Ports in the same loop and does not log in to the fabric.

protocol A defined method and set of standards for communication. Determines the type of error-checking, the data-compression method, how sending devices indicate an end of message, and how receiving devices indicate receipt of a message.

pstate Port State Machine.

public device A device that supports arbitrated-loop protocol, can interpret 8-bit addresses, and can log in to the fabric.

public key The public half of a key pair. *See also* key, key pair.

Q

queue A mechanism for each AL_PA address that allows for collecting frames prior to sending them to the loop.

QuickLoop A Brocade software product that allows multiple ports on a switch to create a logical loop. Devices connected via QuickLoop appear to each other as if they are on the same arbitrated loop.

QuickLoop Mode Allows initiator devices to communicate with private or public devices that are not in the same loop.

R

R_RDY Receiver ready. A primitive signal indicating that the port is ready to receive a frame.

radius The greatest "distance" between any edge switch and the center of a fabric. A low-radius network is better than a high-radius network.

RAID Redundant array of independent disks. A collection of disk drives that appear as a single volume to the server and are fault tolerant through mirroring or parity checking. *See also* JBOD.

RCS Reliable Commit Service. Refers to Brocade-specific ILS command code.

RCS_SFC RCS Stage Fabric Config. Refers to Brocade-specific ILS command code.

RLS Read Link Status.

route As it applies to a fabric, the communication path between two switches. Might also apply to the specific path taken by an individual frame, from source to destination. *See also* FSPF.

routing The assignment of frames to specific switch ports, according to frame destination.

RR_TOV Resource recovery timeout value. The minimum time a target device in a loop waits after an LIP before logging out an SCSI initiator.

RSCN Registered state change notification. A switch function that allows notification of fabric changes to be sent from the switch to specified nodes. The fabric controller issues RSCN requests to N_Ports and NL_Ports, but only if they have registered to be notified of state changes in other N_Ports and NL_Ports. This registration is performed via the State Change Registration (SCR) Extended Link Service. An N_Port or NL_Port can issue an RSCN to the fabric controller without having completed SCR with the fabric controller.

RTWR Reliable transport with response. Might appear as a task in **portlogdump** command output.

RW Read/write. Refers to access rights.

RX Receiving frames.

S

SAN Storage area network. A network of systems and storage devices that communicate using Fibre Channel protocols. *See also* fabric.

SCC SC connector. An SC connector is a fiber-optic cable connector that uses a push-pull latching mechanism similar to common audio and video cables. For bidirectional transmissions, two fiber cables and two SC connectors (dual SC) are generally used. SC is specified by the TIA as FOCIS-3.

SCN State change notification. Used for internal state change notifications, not external changes. This is the switch logging that the port is online or is an Fx_Port, not what is sent from the switch to the Nx_Ports.

SCR State change registration. Extended Link Service (ELS) requests the fabric controller to add the N_Port or NL_Port to the list of N_Ports and NL_Ports registered to receive the Registered State Change Notification (RSCN) Extended Link Service.

SCSI Small Computer Systems Interface. A parallel bus architecture and a protocol for transmitting large data blocks to a distance of 15 to 25 meters.

SCSI-2 An updated version of the SCSI bus architecture.

SCSI-3 An SCSI standard that defines transmission of SCSI protocol data over different kinds of links.

SDRAM The main memory for a switch.

sectelnet A protocol similar to telnet but with encrypted passwords for increased security.

Secure Fabric OS An optionally licensed Brocade feature that provides advanced, centralized security for a fabric.

security policy Rules that determine how security is implemented in a fabric. Security policies can be customized through Brocade Secure Fabric OS or Brocade Fabric Manager.

server A computer that processes end-user applications or requests.

SES SCSI Enclosure Services. A subset of the SCSI protocol used to monitor temperature, power, and fan status for enclosed devices.

SFP Small-form-factor pluggable. A transceiver used on 2 Gbit/sec switches that replaces the GBIC.

SilkWorm The brand name for the Brocade family of switches.

Simple Name Server (SNS) A switch service that stores names, addresses, and attributes for up to 15 minutes and provides them as required to other devices in the fabric. SNS is defined by Fibre Channel standards and exists at a well-known address. Also referred to as “directory service” or “name server.”

SLAP Switch Link Authentication Protocol.

SLP Service Location Protocol.

SNMP Simple Network Management Protocol. An Internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols. *See also* community (SNMP).

SNS Simple Name Server.

SOF Start of frame. A group of ordered sets that marks the beginning of a frame and indicates the class of service the frame will use.

soft zone A zone consisting of zone members that are made visible to each other through client service requests. Typically, soft zones contain zone members that are visible to devices using Name Server exposure of zone members. The fabric does not enforce a soft zone. Note that well-known addresses are implicitly included in every zone.

SSH Secure shell. Used starting in Brocade Fabric OS v4.1 to support encrypted telnet sessions to the switch. SSH encrypts all messages, including the client sending the password at login.

SSL Secure sockets layer.

Standard Translative Mode Allows public devices to communicate with private devices that are directly connected to the fabric.

striping A RAID technique for writing a file to multiple disks on a block-by-block basis, with or without parity.

switch A fabric device providing bandwidth and high-speed routing of data via link-level addressing.

switch name The arbitrary name assigned to a switch.

switch port A port on a switch. Switch ports can be E_Ports, F_Ports, or FL_Ports.

syslog Syslog daemon. Used to forward error messages.

T

target A storage device on a Fibre Channel network.

TC Track changes.

TCP/IP Transmission Control Protocol Internet Protocol.

telnet A virtual terminal emulation used with TCP/IP. “Telnet” is sometimes used as a synonym for the Brocade Fabric OS CLI.

throughput The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second or b/sec). *See also* BB fabric.

Time Server A Fibre Channel service that allows for the management of all timers.

topology As it applies to Fibre Channel technology, the configuration of the Fibre Channel network and the resulting communication paths allowed. There are three possible topologies:

Point to point. A direct link between two communication ports.

Switched fabric. Multiple N_Ports linked to a switch by F_Ports.

Arbitrated loop. Multiple NL_Ports connected in a loop.

track changes A Brocade Fabric OS feature that can be enabled to report specific activities (for example, logins, logouts, and configuration task changes). The output from the track-changes feature is dumped to the error log for the switch.

transceiver A device that converts one form of signaling to another for transmission and reception; in fiber optics, optical to electrical.

translate domain *See* xlate domain.

Translative Mode A mode in which private devices can communicate with public devices across the fabric.

transmission character A 10-bit character encoded according to the rules of the 8b/10b algorithm.

transmission word A group of four transmission characters.

trap (SNMP) The message sent by an SNMP agent to inform the SNMP management station of a critical error. *See also* SNMP.

trunking In Fibre Channel technology, a feature that enables distribution of traffic over the combined bandwidth of up to four ISLs between adjacent switches, while preserving in-order delivery.

trunking group A set of up to four trunked ISLs in Bloom-based platforms or up to 8 in Condor-based platforms.

trunking ports The ports in a set of trunked ISLs.

TS Time Server.

tunneling A technique for enabling two networks to communicate when the source and destination hosts are both on the same type of network but are connected by a different type of network.

TX Transmit.

U

U_Port Universal port. A switch port that can operate as a G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not connected or has not yet assumed a specific function in the fabric.

V

W

WAN Wide area network.

WAN_TOV Wide area network timeout value.

well-known address As it pertains to Fibre Channel technology, a logical address defined by Fibre Channel standards as assigned to a specific function and stored on the switch.

workstation A computer used to access and manage the fabric. Also referred to as a "management station" or "host."

WWN World Wide Name. An identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

X

xlate domain Translate domain. A router virtual domain that represents an entire fabric. Device connectivity can be achieved from one fabric to another, over the router and through this virtual domain, without merging the two fabrics. Also known as "phantom domains."

Y

Z

zone A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access to others in the zone but are not visible to any outside the zone.

zone configuration A specified set of zones. Enabling a configuration enables all zones in that configuration. *See also* defined zone configuration, enabled zone configuration.

zoning A feature in fabric switches or hubs that allows segmentation of a node by physical port, name, or address.

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