StorageWorks by Compaq

MIB
Reference Guide

Part Number: AA-RQ6HA-TE

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This guide provides detailed descriptions about MIB objects: MIB-II Object Types, Fibre Alliance MIB Object Types, FCFabric Element MIB Object Types, FE-MIB object types, and FCSwitch MIB Object Types.

COMPAQ

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MIB Reference Guide
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Contents

4 FCSwitch MIB Object Types

Tables

About this Guide

This Reference Guide provides information to help you look up and use the following MIB Object types:

- MIB-II Objects
- FA-MIB Objects
- FE-MIB Objects
- FCSwitch MIB Objects

This section also contains information about how to contact technical support for additional assistance.

Intended Audience

This book is intended for use by System Administrators who are experienced with the following:

- *StorageWorks*™ Fibre Channel SAN switches by Compaq.
- Fabric Operating System V3.0 or later.

Related Documentation

In addition to this guide, Compaq provides corresponding information:

- Fabric Operating System Reference Guide—AA-RQ6FA-TE
- Fabric Watch User Guide—AA-RR7YA-TE
- Zoning User guide—AA-RQ6YA-TE
- Fabric Operating System Procedures User Guide—AA-RQ6EA-TE
- ISL Trunking User Guide—AA-RR82A-TE
- Web Tools User Guide—AA-RQ6GA-TE
- Quickloop User Guide—AA-RR7LA-TE

- Extended Fabric User Guide—AA-RR7QA-TE
- Advanced Performance Monitor User Guide—AA-RR7UA-TE

Prerequisites

Before you look up and use the MIB Object Types found in this reference guide, make sure you consider the items in the Document Conventions section that follows.

Document Conventions

The conventions included in Table 1 apply in most cases.

Table 1: Document Conventions

Element	Convention
Key names, menu items, buttons, and dialog box titles	**Bold**
File names and application names	*Italics*
User input, command names, system responses (output and messages)	`Monospace font` `COMMAND NAMES` are uppercase unless they are case sensitive
Variables	*`Monospace, italic font`*
Website addresses	Sans serif font (http://www.compaq.com)

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

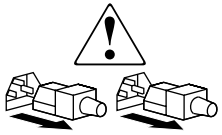
WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.



Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Rack Stability

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- **The leveling jacks are extended to the floor.**
- **The full weight of the rack rests on the leveling jacks.**
- **In single rack installations, the stabilizing feet are attached to the rack.**
- **In multiple rack installations, the racks are coupled.**
- **Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.**

Getting Help

If you still have a question after reading this guide, contact service representatives or visit our website.

Compaq Technical Support

In North America, call Compaq technical support at 1-800-OK-COMPAQ, available 24 hours a day, 7 days a week.

NOTE: For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call Compaq technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the Compaq website: http://www.compaq.com.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers

- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

Compaq Website

The Compaq website has the latest information on this product, as well as the latest drivers. Access the Compaq website at: http://www.compaq.com/storage. From this website, select the appropriate product or solution.

Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

1

MIB-II Object Types

Overview

This chapter provides descriptions and other information specific to MIB-II object types, including the following information regarding the groupings of the MIB-II object types:

NOTE: The tables within this document often contain a column labeled “Description.” This column contains information about those MIB objects that are modified or in some way require explanation beyond the scope of the standard explanation.

If no information is present in the Description column for a particular MIB object, the standard return values apply.

MIB-II File System Organization

The following graphics depict the organization and structure of the MIB-II file system.

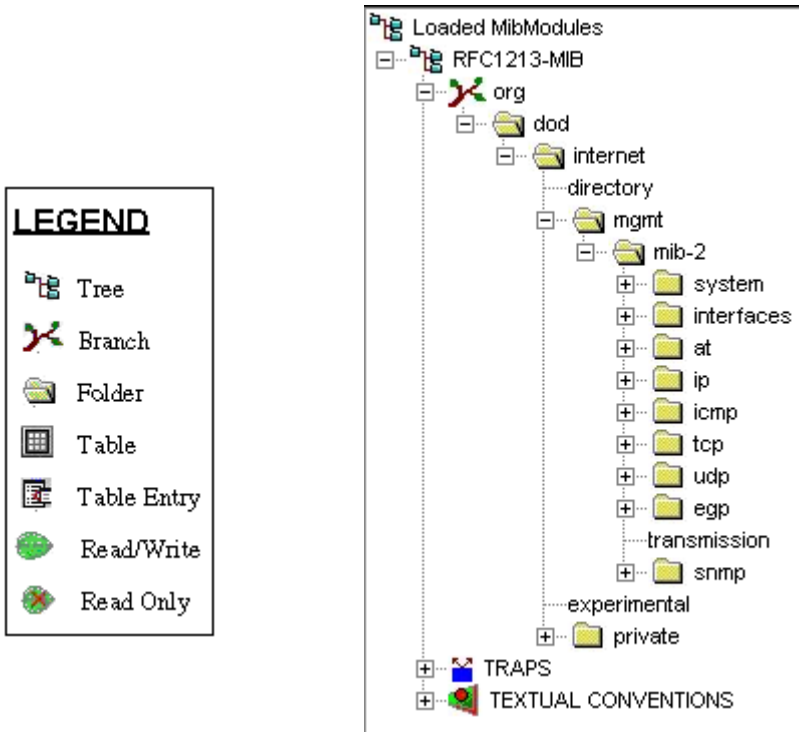


Figure 1–1: MIB-II Overall Tree Structure

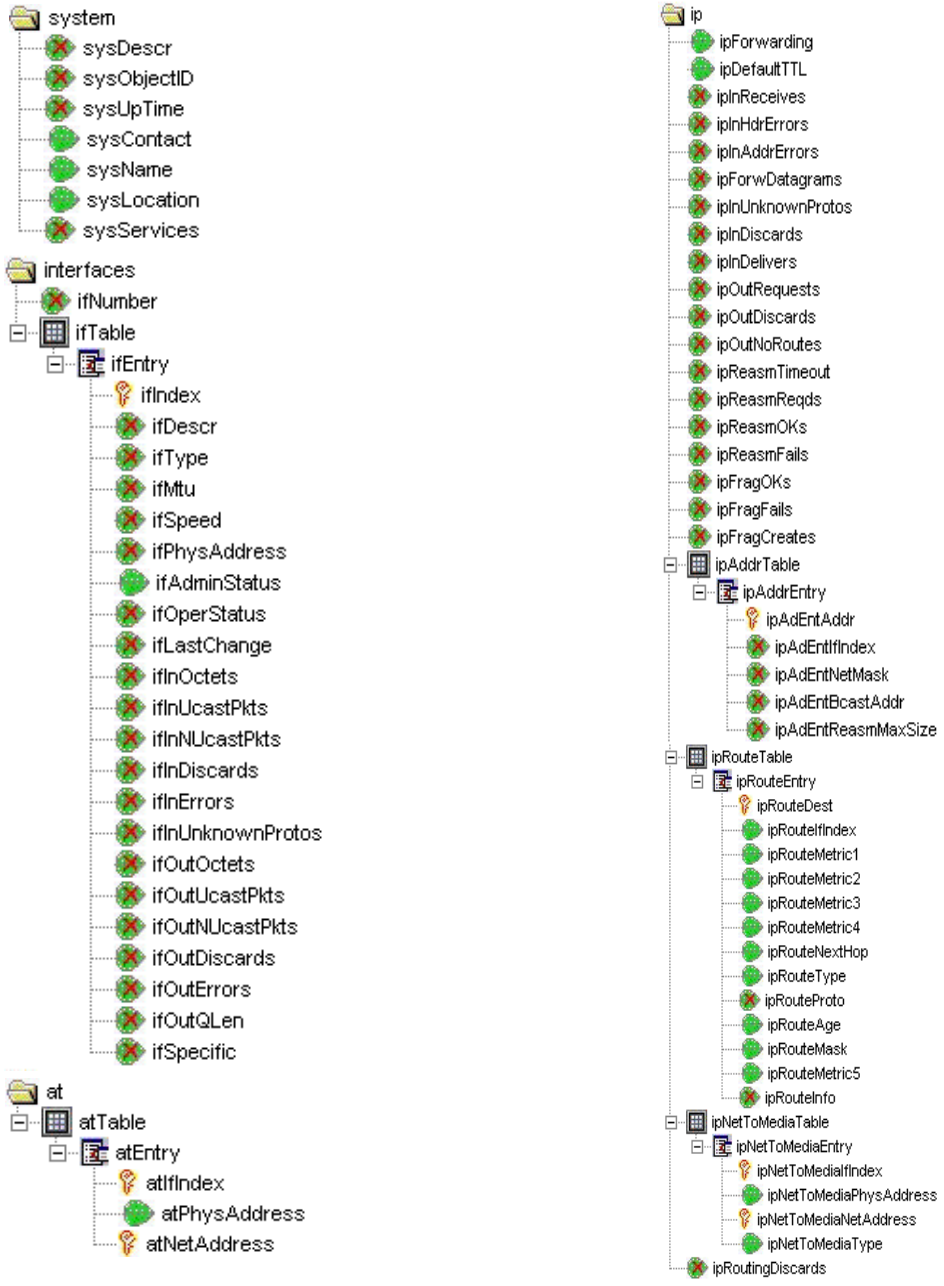


Figure 1–2: Tree Structure for MIB-II System, Interfaces, AT, and IP groups.

Figure 1–3: Tree Structure for MIB-II ICMP, TCP, UDP, and EGP Groups.

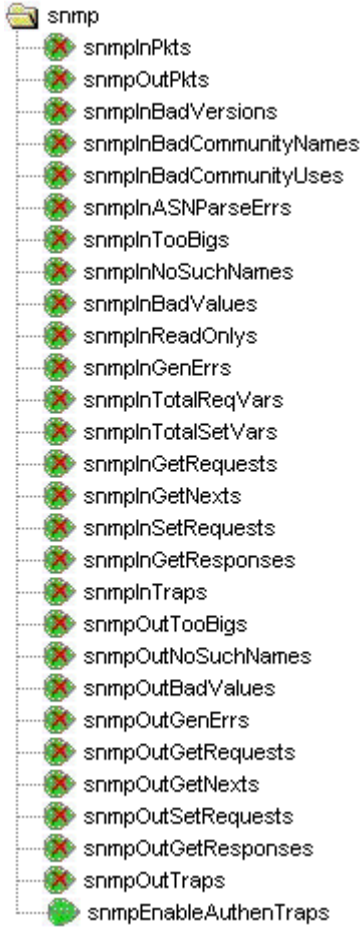


Figure 1–4: Tree Structure for MIB-II SNMP group.

Definitions for MIB-II

The definitions shown in Table 1–1 are used for MIB-II object types.

Table 1–1: MIB-II Conventions

Type Definition	Value	Declaration	Description
Display String	Octet String of size 0 to 255		
PhysAddress	Octet String		

Imports

The following objects are imported from RFC1155-SMI:

- mgmt
- NetworkAddress
- IpAddress
- Counter
- Gauge
- TimeTicks

Object Identifiers

The following object identifiers apply to MIB-II:

- mgmt = { iso org(3) dod(6) internet(1) mgmt(2) }
- directory = { internet 1 }
- experimental = { internet 3 }
- private = { internet 4 }
- enterprises = { private 1 }
- mib-2 = { mgmt 1 }

The System Group

Implementation of the System group is mandatory for all systems. If an agent is not configured to have a value for any of the System Group variables, a string of length 0 is returned.

The system group consists of the following objects:

- sysDescr on page 1-8
- sysObjectID on page 1-9
- sysUpTime on page 1-10
- sysContact on page 1-11
- sysName on page 1-12
- sysLocation on page 1-13
- sysServices on page 1-14

sysDescr

Syntax

Display String of size 0 to 255

Access

Read-only

Status

Mandatory

Description

A textual description of the entity.

This value should include the full name and version identification of the system hardware type, software operating system, and networking software. It is mandatory that this only contain printable ASCII characters.

NOTE: Default Value = Fibre Channel Switch. This value can be set using the `agtcfgSet` telnet command.

sysObjectID

Syntax

Object Identifier

Access

Read-only

Status

Mandatory

Description

The vendor's authoritative identification of the network management subsystem contained in the entity.

This value is allocated within the SMI enterprise subtree (1.3.6.1.4.1) and provides an easy and unambiguous means for determining what kind of box is being managed. For example, if vendor “Compaq” 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 “Starbase Router”.

NOTE: Default value = iso.org.dod.internet.private.enterprises.bcsi.commDev.fibrechannel.fcSwitch.sw

sysUpTime

Syntax

TimeTicks

Access

Read-only

Status

Mandatory

Description

The time (in hundredths of a second) since the network management portion of the system was last re-initialized.

sysContact

Syntax

Display String of size 0 to 255

Access

Read-write

Status

Mandatory

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*. This value can be set using the `agtcfgSet` telnet command.

sysName

Syntax

Display String of size 0 to 255

Access

Read-write

Status

Mandatory

Description

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

NOTE: Default value = *pre-assigned name of the switch.*

sysLocation

Syntax

Display String of size 0 to 255

Access

Read-write

Status

Mandatory

Description

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

Default value = *End User Premise*.

NOTE: This value can be set using the `agtcfgSet` telnet command.

sysServices

Syntax

Integer of size 0 to 127

Access

Read-only

Status

Mandatory

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 zero. 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 ($2^{4-1} + 2^{7-1}$).

In the context of the Internet suite of protocols, values should be calculated according to the following 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 may also be counted. The return value is always 79.

The Interfaces Group

Implementation of the Interfaces group is mandatory for all systems.

The interfaces group consists of the following objects:

ifNumber

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The number of network interfaces (regardless of their current state) present on this system.

NOTE: When running FCIP, the return value is always 3. If not running FCIP, the value is 2.

ifTable

Syntax

Sequence of `IfEntry`

Access

Not accessible

Status

Mandatory

Description

A list of interface entries. The number of entries is given by the value of `ifNumber`. 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.

ifEntry [ifTable]

Syntax

`IfEntry`

Access

Not accessible

Status

Mandatory

Description

An interface entry containing objects at the subnetwork layer and below, for a particular interface.

Index

Table 1–2 contains the list of `ifEntry` objects and object types.

Table 1–2: IfEntry Objects and Object Types

Object Name	Description
`ifIndex` on page 1–20	Integer
`ifDescr` on page 1–21	Display String
`ifType` on page 1–22	Integer
`ifMtu` on page 1–24	Integer
`ifSpeed` on page 1–25	Gauge
`ifPhysAddress` on page 1–26	PhysAddress
`ifAdminStatus` on page 1–27	Integer
`ifOperStatus` on page 1–28	Integer
`ifLastChange` on page 1–29	TimeTicks
`ifInOctets` on page 1–30	Counter
`ifInUcastPkts` on page 1–31	Counter

Table 1–2: IfEntry Objects and Object Types (Continued)

Object Name	Description
`ifInNUcastPkts` on page 1–32	Counter
`ifInDiscards` on page 1–33	Counter
`ifInErrors` on page 1–34	Counter
`ifInUnknownProtos` on page 1–35	Counter
`ifOutOctets` on page 1–36	Counter
`ifOutUcastPkts` on page 1–37	Counter
`ifOutNUcastPkts` on page 1–38	Counter
`ifOutDiscards` on page 1–39	Counter
`ifOutErrors` on page 1–40	Counter
`ifOutQLen` on page 1–41	Gauge
`ifSpecific` on page 1–42	Object Identifier

ifIndex [ifTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

A unique value for each interface.

The values range between 1 and the value of `ifNumber`. The value for each interface must remain constant at least from one re-initialization of the entity's network management system to the next re-initialization.

The number of entries inside the switch for Compaq StorageWorks Fibre Channel SAN Switches: 1 to 3 for FCIP, otherwise the value is 1 or 2.

ifDescr
[ifTable]

Syntax

Display String of size 0 to 255

Access

Read-only

Status

Mandatory

Description

A textual string containing information about the interface. This string should include the name of the manufacturer, the product name and the version of the hardware interface.

```
ISL32: fei0, lo0, fc0
```

ifType [ifTable]

Syntax

Syntax described in Table 1–3.

Table 1–3: ifType Table Syntax

Value	Declaration	Description
integer	1 (other)	None of the following
	2 (regular1822)	
	3 (hdh1822)	
	4 (ddn-x25)	
	5 (rfc877-x25)	
	6 (ethernet-csmacd)	
	7 (iso88023-csmacd)	
	8 (iso88024-tokenBus)	
	9 (iso88025-tokenRing)	
	10 (iso88026-man)	
	11 (starLan)	
	12 (proteon-10Mbit)	
	13 (proteon-80Mbit)	
	14 (hyperchannel)	
	15 (fddi)	
	16 (lapb)	
	17 (sdlc)	
	18 (ds1)	T-1
	19 (e1)	European equivalent of T-1
	20 (basicISDN)	
	21 (primaryISDN)	Proprietary serial
	22 (propPointToPointSerial)	

Table 1–3: ifType Table Syntax (Continued)

Value	Declaration	Description
	23 (ppp)	
	24 (softwareLoopback)	
	25 (eon)	CLNP over IP [11]
	26 (ethernet-3Mbit)	
	27 (nsip)	XNS over IP
	28 (slip)	Generic SLIP
	29 (ultra)	T-3
	30 (ds3)	SMDS
	31 (sip)	
	32 (frame-relay)	

Access

Read-only

Status

Mandatory

Description

The type of interface, as designated by the physical/link protocols immediately below the network layer in the protocol stack.

- fei0 maps to 6 (ethernet-csmacd)
- lo0 maps to 24 (softwareLoopback)
- fc0 maps to 56.

ifMtu [ifTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The size (in octets) of the largest datagram that can be sent/received on the interface.

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.

- fei0 returns 1500
- lo0 returns 4096
- fc0 returns 1500

ifSpeed [ifTable]

Syntax

Gauge

Access

Read-only

Status

Mandatory

Description

An estimate (in bits per second) of the interface's current bandwidth.

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.

- fei0 returns 10^7
- lo0 returns 0
- fc0 returns 10^9

ifPhysAddress [ifTable]

Syntax

PhysAddress

Access

Read-only

Status

Mandatory

Description

The interface address at the protocol layer immediately below the network layer in the protocol stack.

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 Ethernet.

ifAdminStatus [ifTable]

Syntax

Syntax described in Table 1–4.

Table 1–4: ifAdminStatus Syntax

Value	Declaration	Description
Integer	1 (up)	Ready to pass packets.
	2 (down)	Not ready to pass packets.
	3 (testing)	In some test mode.

Access

Read-write

Status

Mandatory

Description

The desired state of the interface.

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

ifOperStatus [ifTable]

Syntax

Syntax described in Table 1–5.

Table 1–5: IfOperStatus Syntax

Value	Declaration	Description
Integer	1 (up)	Ready to pass packets.
	2 (down)	Not ready to pass packets.
	3 (testing)	In some test mode.

Access

Read-only

Status

Mandatory

Description

The current operational state of the interface.

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

ifLastChange [ifTable]

Syntax

TimeTicks

Access

Read-only

Status

Mandatory

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 [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ifInUcastPkts [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ifInNUcastPkts [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ifInDiscards [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.

ifInErrors [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ifInUnknownProtos [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ifOutOctets [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ifOutUcastPkts [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

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 [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ifOutDiscards [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

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 up buffer space.

ifOutErrors [ifTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ifOutQLen [ifTable]

Syntax

Gauge

Access

Read-only

Status

Mandatory

Description

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

ifSpecific [ifTable]

Syntax

Object Identifier

Access

Read-only

Status

Mandatory

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.

- fei0 returns null OID
- lo0 returns null OID
- fc0 returns null OID.

The Address Translation Group

Implementation of the Address Translation group is mandatory for all systems. Note however that this group is deprecated by MIB-II. That is, it is being included solely for compatibility with MIB-I nodes, and will most likely be excluded from MIB-III nodes. From MIB-II and onwards, each network protocol group contains its own address translation tables.

The address translation group consists of the following objects in the Address TranslationTable:

Address Translation Table

The Address Translation group contains one table which is the union across all interfaces of the translation tables for converting a NetworkAddress (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.

Examples of such translation tables are: for broadcast media where ARP is in use, the translation table is equivalent to the ARP cache; or, on an X.25 network where non-algorithmic translation to X.121 addresses is required, the translation table contains the NetworkAddress to X.121 address equivalences.

atTable

Syntax

Sequence of AtEntry

Access

Not accessible

Status

Deprecated

Description

The Address Translation tables contain the NetworkAddress 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, and therefore has zero entries.

atEntry

Syntax

At Entry

Access

Not accessible

Status

Deprecated

Description

Each entry contains one NetworkAddress to physical address equivalence.

Index

Table 1–6 contains the atEntry objects and object types.

Table 1–6: atEntry Objects and Object Types

Objects	Description
`atIfIndex` on page 1–46	Integer
`atPhysAddress` on page 1–47	PhysAddress
`atNetAddress` on page 1–48	NetworkAddress

atIfIndex

Syntax

Integer

Access

Read-write

Status

Deprecated

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

Syntax

PhysAddress

Access

Read-write

Status

Deprecated

Description

The media-dependent physical address. Setting this object to a null string (one of zero length) has the effect of invalidating the corresponding entry in the at Table object. That is, it effectively disassociates the interface identified with said entry from the mapping 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 at `PhysAddress` object.

atNetAddress

Syntax

NetworkAddress

Access

Read-write

Status

Deprecated

Description

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

The IP Group

Implementation of the IP group is mandatory for all systems.

The IP group consists of the following objects:

- IP Objects Group on page 1-49
- IPAddress Table on page 1-69
- IP Routing Table on page 1-76
- IP Address Translation Table on page 1-92

IP Objects Group

IP Objects Group consist of the following:

- ipForwarding on page 1-50
- ipDefaultTTL on page 1-51
- ipInReceives on page 1-52
- ipInHdrErrors on page 1-53
- ipInAddrErrors on page 1-54
- ipForwDatagrams on page 1-55
- ipInUnknownProtos on page 1-56
- ipInDiscards on page 1-57
- ipOutRequests on page 1-59
- ipOutDiscards on page 1-60
- ipReasmTimeout on page 1-62
- ipReasmReqds on page 1-63
- ipReasmOKs on page 1-64
- ipReasmFails on page 1-65
- ipFragOKs on page 1-66
- ipFragFails on page 1-67
- ipFragCreates on page 1-68

ipForwarding

Syntax

Syntax described in Table 1–7.

Table 1–7: ipForwarding Syntax

Value	Declaration	Description
Integer	1 = Forwarding	Acting as a gateway.
	2 = Not forwarding	Not acting as a gateway.

Access

Read-write

Status

Mandatory

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 via the host).

For some managed nodes, this object may take on only a subset of the values possible. Accordingly, it is appropriate for an agent to return a “badValue” response if a management station attempts to change this object to an inappropriate value.

ipDefaultTTL

Syntax

Integer

Access

Read-write

Status

Mandatory

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

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ipInHdrErrors

Syntax

Counter

Access

Read-only

Status

Mandatory

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

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of input datagrams discarded because the IP address in the IP header 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 which 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

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of input datagrams for which this entity was not their 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 which do not act as IP Gateways, this counter will include only those packets which were Source-Routed via this entity, and the Source-Route option processing was successful.

ipInUnknownProtos

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ipInDiscards

Syntax

Counter

Access

Read-only

Status

Mandatory

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 re-assembly.

ipInDelivers

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ipOutRequests

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number of IP datagrams which local IP user-protocols (including ICMP) supplied to IP in requests for transmission.

NOTE: This counter does not include any datagrams counted in `ipForwDatagrams`.

ipOutDiscards

Syntax

Counter

Access

Read-only

Status

Mandatory

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

Syntax

Counter

Access

Read-only

Status

Mandatory

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` which meet this "no-route" criterion. Note that this includes any datagrams which a host cannot route because all of its default gateways are down.

ipReasmTimeout

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

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

ipReasmReqds

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ipReasmOKs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of IP datagrams successfully re-assembled.

ipReasmFails

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of failures detected by the IP re-assembly algorithm (for whatever reason, timed out, errors, and so on).

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

ipFragOKs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

ipFragFails

Syntax

Counter

Access

Read-only

Status

Mandatory

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 the Don't Fragment flag was set).

ipFragCreates

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

IPAddress Table

The IPAddress Table consists of:

ipAddrTable

Syntax

Sequence of `IpAddrEntry`

Access

Not accessible

Status

Mandatory

Description

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

ipAddrEntry

Syntax

`IpAddrEntry`

Access

Not accessible

Status

Mandatory

Description

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

Index

Table 1–8 contains the `ipAddrEntry` objects and object types.

Table 1–8: IpAddrEntry Objects and Object Types

Object	Description
`ipAdEntAddr` on page 1–71	IpAddress
`ipAdEntIfIndex` on page 1–72	Integer
`ipAdEntNetMask` on page 1–73	IpAddress
`ipAdEntBcastAddr` on page 1–74	Integer
`ipAdEntReasmMaxSize` on page 1–75	Integer of size 0 to 65535

ipAdEntAddr

Syntax

`IpAddress`

Access

Read-only

Status

Mandatory

Description

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

ipAdEntIfIndex

Syntax

Integer

Access

Read-only

Status

Mandatory

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

Syntax

`IpAddress`

Access

Read-only

Status

Mandatory

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 the host bits set to 0.

ipAdEntBcastAddr

Syntax

Integer

Access

Read-only

Status

Mandatory

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 broadcast addresses used by the entity on this (logical) interface.

ipAdEntReasmMaxSize

Syntax

Integer of size 0 to 65535

Access

Read-only

Status

Mandatory

Description

The size of the largest IP datagram which this entity can re-assemble from incoming IP fragmented datagrams received on this interface.

IP Routing Table

The IP Routing Table consists of the following:

ipRouteTable

Syntax

Sequence of `IpRouteEntry`

Access

Not accessible

Status

Mandatory

Description

This entity's IP Routing table. The IP routing table contains an entry for each route presently known to this entity

ipRouteEntry

Syntax

IpRouteEntry

Access

Not accessible

Status

Mandatory

Description

A route to a particular destination.

Index

Table 1–9 contains the ipRouteEntry objects and object types.

Table 1–9: IpRouteEntry Objects and Object Types

Object	Description
ipRouteDest on page 1–79	IpAddress
ipRouteIfIndex on page 1–80	Integer
ipRouteMetric1 on page 1–81	Integer
ipRouteMetric2 on page 1–82	Integer
ipRouteMetric3 on page 1–83	Integer
ipRouteMetric4 on page 1–84	Integer
ipRouteNextHop on page 1–85	IpAddress
ipRouteType on page 1–86	Integer
ipRouteProto on page 1–87	Integer
ipRouteAge on page 1–88	Integer
ipRouteMask on page 1–89	IpAddress
ipRouteMetric5 on page 1–90	Integer
ipRouteInfo on page 1–91	Object Identifier

ipRouteDest

Syntax

IpAddress

Access

Read-write

Status

Mandatory

Description

The destination IP address of this route.

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

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

The index value which uniquely identifies the local interface through which the next hop of this route should be reached.

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

ipRouteMetric1

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

The primary routing metric for this route.

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

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

An alternate routing metric for this route.

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

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

An alternate routing metric for this route.

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

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

An alternate routing metric for this route.

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

Syntax

`IpAddress`

Access

Read-write

Status

Mandatory

Description

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

ipRouteType

Syntax

Syntax described in Table 1–10.

Table 1–10: ipRouteType Syntax

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

Access

Read-write

Status

Mandatory

Description

The type of route.

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

Setting this object to the value invalid (2) has the effect of invalidating the corresponding entry in the `ipRouteTable` object. That is, it effectively disassociates 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.

ipRouteProto

Syntax

Syntax described in Table 1–11.

Table 1–11: ipRouteProto Syntax

Value	Declaration	Description
Integer	1 (other)	None of the following non-protocol information. For example: “manually configured.”
	2 (local)	localEntries set via a network.
	3 (netmgmt)	netmgmtManagement protocol obtained using ICMP.
	4 (icmp)	For example, Redirect the remaining values are all gateway routing protocols.
	5 (egp)	
	6 (ggp)	
	7 (hello)	
	8 (rip)	
	9 (is-is)	
	10 (es-is)	
	11 (ciscoIgrp)	
	12 (bbnSpfIgp)	
	13 (ospf)	
	14 (bgp)	

Access

Read-only

Status

Mandatory

Description

The routing mechanism which this route was learned. Inclusion of values for gateway routing protocols is not intended to imply that hosts should support those protocols.

ipRouteAge

Syntax

Integer

Access

Read-write

Status

Mandatory

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

Syntax

IpAddress

Access

Read-write

Status

Mandatory

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:

- masknetwork
- 255.0.0.0class-A
- 255.255.0.0class-B
- 255.255.255.0class-C

If the value of the `ipRouteDest` is 0.0.0.0 (a default route), then the mask value is also 0.0.0.0. It should be noted that all IP routing subsystems implicitly use this mechanism.

ipRouteMetric5

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

An alternate routing metric for this route. 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

Syntax

Object Identifier

Access

Read-only

Status

Mandatory

Description

A reference to MIB definitions specific to the particular routing protocol which 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, and 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 consists of:

ipNetToMediaTable

Syntax

Sequence of `IpNetToMediaEntry`

Access

Not accessible

Status

Mandatory

Description

The IP Address Translation table used for mapping from IP addresses to physical addresses. The IP address translation table contains the IP 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, and therefore has zero entries.

ipNetToMediaEntry

Syntax

IpNetToMediaEntry

Access

Not accessible

Status

Mandatory

Description

Each entry contains one IpAddress to physical address equivalence.

Index

Table 1–12 contains the ipNetToMediaEntry objects and object types.

Table 1–12: IpNetToMediaEntry Objects and Object Types

Object	Description
ipNetToMediaIfIndex on page 1–95	Integer
ipNetToMediaPhysAddress on page 1–96	PhysAddress
ipNetToMediaNetAddress on page 1–97	IpAddress
ipNetToMediaType on page 1–98	Integer

ipNetToMediaIfIndex

Syntax

Integer

Access

Read-write

Status

Mandatory

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 as identified by the same value of `ifIndex`.

ipNetToMediaPhysAddress

Syntax

PhysAddress

Access

Read-write

Status

Mandatory

Description

The media-dependent physical address.

ipNetToMediaNetAddress

Syntax

IpAddress

Access

Read-write

Status

Mandatory

Description

The IpAddress corresponding to the media-dependent physical address.

ipNetToMediaType

Syntax

Syntax described in Table 1–13.

Table 1–13: ipNetToMediaType Syntax

Value	Declaration	Description
Integer	1 (other) 2 (invalid) 3 (dynamic) 4 (static)	None of the following An invalidated mapping

Access

Read-write

Status

Mandatory

Description

The type of mapping. Setting this object to the value invalid (2) has the effect of invalidating the corresponding entry in the `ipNetToMediaTable`.

That is, it effectively disassociates the interface identified with said entry from the mapping 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 `ipNetToMediaType` object.

ipRoutingDiscards

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of routing entries that were chosen to be discarded even though they are valid. One possible reason for discarding such an entry could be to make buffer space available for other routing entries.

The ICMP Group

Implementation of the ICMP group is mandatory for all systems.

The ICMP group consists of the following commands:

icmpInMsgs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number of ICMP messages which the entity received.

NOTE: This counter includes all ICMP messages counted by `icmpInErrors`.

icmpInErrors

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP messages which the entity received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, and so on.).

icmpInDestUnreachs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Destination Unreachable messages received.

icmpInTimeExcds

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Time Exceeded messages received.

icmpInParmProbs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Parameter Problem messages received.

icmpInSrcQuenchs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Source Quench messages received.

icmpInRedirects

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Redirect messages received.

icmpInEchos

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Echo (request) messages received.

icmpInEchoReps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Echo Reply messages received.

icmpInTimestamps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Timestamp (request) messages received.

icmpInTimestampReps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Timestamp Reply messages received.

icmpInAddrMasks

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Address Mask Request messages received.

icmpInAddrMaskReps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Address Mask Reply messages received.

icmpOutMsgs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

NOTE: This counter includes all those counted by `icmpOutErrors`.

icmpOutErrors

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP messages which 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 may be no types of error which contribute to this counter's value.

icmpOutDestUnreachs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Destination Unreachable messages sent.

icmpOutTimeExcds

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Time Exceeded messages sent.

icmpOutParmProbs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Parameter Problem messages sent.

icmpOutSrcQuenchs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Source Quench messages sent.

icmpOutRedirects

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Redirect messages sent. For a host, this object will always be zero, since hosts do not send redirects.

icmpOutEchos

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Echo (request) messages sent.

icmpOutEchoReps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Echo Reply messages sent.

icmpOutTimestamps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Timestamp (request) messages sent.

icmpOutTimestampReps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Timestamp Reply messages sent.

icmpOutAddrMasks

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Address Mask Request messages sent.

icmpOutAddrMaskReps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of ICMP Address Mask Reply messages sent.

The TCP Group

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

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

The TCP group consists of the following objects:

TCP Objects

TCP Objects consist of the following:

tcpRtoAlgorithm

Syntax

Syntax described in Table 1–14.

Table 1–14: tcpRtoAlgorithm Syntax

Value	Declaration	Description
Integer	1 (other)	None of the following
	2 (constant)	A constant rto
	3 (rsre)	MIL-STD-1778, Appendix B
	4 (rsre)	Van Jacobson's algorithm [10]

Access

Read-only

Status

Mandatory

Description

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

tcpRtoMin

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The minimum value permitted by a TCP implementation for the retransmission time-out, measured in milliseconds. 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 rsre (3), an object of this type has the semantics of the LBOUND quantity described in RFC 793.

tcpRtoMax

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The maximum value permitted by a TCP implementation for the retransmission time-out, measured in milliseconds. 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 rsre (3), an object of this type has the semantics of the UBOUND quantity described in RFC 793.

tcpMaxConn

Syntax

Integer

Access

Read-only

Status

Mandatory

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

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

tcpPassiveOpens

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

tcpAttemptFails

Syntax

Counter

Access

Read-only

Status

Mandatory

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

Syntax

Counter

Access

Read-only

Status

Mandatory

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

Syntax

Gauge

Access

Read-only

Status

Mandatory

Description

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

tcpInSegs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

tcpOutSegs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

tcpRetransSegs

Syntax

Counter

Access

Read-only

Status

Mandatory

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 consists of the following:

tcpConnTable

Syntax

Sequence of `TcpConnEntry`

Access

Not accessible

Status

Mandatory

Description

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

tcpConnEntry

Syntax

`TcpConnEntry`

Access

Not accessible

Status

Mandatory

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

Table 1–15 contains the `TcpConnEntry` objects and object types.

Table 1–15: TcpConnEntry Objects and Object Types

Object	Description
`tcpConnState` on page 1–143	Integer
`tcpConnLocalAddress` on page 1–144	IpAddress
`tcpConnLocalPort` on page 1–145	Integer of size 0 to 65535
`tcpConnRemAddress` on page 1–146	IpAddress
`tcpConnRemPort` on page 1–147	Integer of size 0 to 65535

tcpConnState

Syntax

Syntax described in Table 1–16.

Table 1–16: tcpConnState Syntax

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

Access

Read-write

Status

Mandatory

Description

The state of this TCP connection. The only value which may be set by a management station is deleteTCB(12). 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 deleteTCB(12), 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 may be sent from the managed node to the other TCP endpoint (note however that RST segments are not sent reliably).

tcpConnLocalAddress

Syntax

IpAddress

Access

Read-only

Status

Mandatory

Description

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

tcpConnLocalPort

Syntax

Integer of size 0 to 65535

Access

Read-only

Status

Mandatory

Description

The local port number for this TCP connection.

tcpConnRemAddress

Syntax

IpAddress

Access

Read-only

Status

Mandatory

Description

The remote IP address for this TCP connection.

tcpConnRemPort

Syntax

Integer of size 0 to 65535

Access

Read-only

Status

Mandatory

Description

The remote port number for this TCP connection.

tcpInErrs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

tcpOutRsts

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of TCP segments sent containing the RST flag.

The UDP Group

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

The UDP group consists of the following commands:

udpInDatagrams

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number of UDP datagrams delivered to UDP users.

udpNoPorts

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

udpInErrors

Syntax

Counter

Access

Read-only

Status

Mandatory

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

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number of UDP datagrams sent from this entity.

udpTable

Syntax

Sequence of `UdpEntry`

Access

Not accessible

Status

Mandatory

Description

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

udpEntry

Syntax

`UdpEntry`

Access

Not accessible

Status

Mandatory

Description

Information about a particular current UDP listener.

Index

Table 1–17 contains the `UdpEntry` objects and object types.

Table 1–17: UdpEntry Objects and Object Types

Object	Description
`udpLocalAddress` on page 1–157	IpAddress
`udpLocalPort` on page 1–158	Integer of size 0 to 65535

udpLocalAddress

Syntax

`IpAddress`

Access

Read-only

Status

Mandatory

Description

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

udpLocalPort

Syntax

Integer of size 0 to 65535

Access

Read-only

Status

Mandatory

Description

The local port number for this UDP listener.

The EGP Group

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

The EGP group consists of the following objects:

- EGP Objects on page 1-159
- EGP Neighbor Table on page 1-164

EGP Objects

EGP Objects consist of the following:

- egpInMsgs on page 1-160
- egpInErrors on page 1-161
- egpOutMsgs on page 1-162
- egpOutErrors on page 1-163

egpInMsgs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of EGP messages received without error.

egpInErrors

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of EGP messages received that proved to be in error.

egpOutMsgs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number of locally generated EGP messages.

egpOutErrors

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of locally generated EGP messages not sent due to resource limitations within an EGP entity.

EGP Neighbor Table

The EGP Neighbor table consists of:

egpNeighTable

Syntax

Sequence of `EgpNeighEntry`

Access

Not accessible

Status

Mandatory

Description

The EGP neighbor table contains information about this entity's EGP neighbors.

egpNeighEntry

Syntax

EgpNeighEntry

Access

Not accessible

Status

Mandatory

Description

Information about this entity's relationship with a particular EGP neighbor.

Index

Table 1–18 contains the EgpNeighEntry object and object types.

Table 1–18: EgpNeighEntry Object and Object Types

Object	Description
egpNeighState on page 1–167	Integer
egpNeighAddr on page 1–168	IpAddress
egpNeighAs on page 1–169	Integer
egpNeighInMsgs on page 1–170	Counter
egpNeighInErrs on page 1–171	Counter
egpNeighOutMsgs on page 1–172	Counter
egpNeighOutErrs on page 1–173	Counter
egpNeighInErrMsgs on page 1–174	Counter
egpNeighOutErrMsgs on page 1–175	Counter
egpNeighStateUps on page 1–176	Counter
egpNeighStateDowns on page 1–177	Counter
egpNeighIntervalHello on page 1–178	Integer
egpNeighIntervalPoll on page 1–179	Integer
egpNeighMode on page 1–180	Integer
egpNeighEventTrigger on page 1–181	Integer

egpNeighState

Syntax

Syntax described in Table 1–19.

Table 1–19: egpNeighState Syntax

Value	Declaration	Description
Integer	1 (idle 2 (acquisition) 3 (down) 4 (up) 5 (cease)	

Access

Read-only

Status

Mandatory

Description

The EGP state of the local system with respect to this entry's EGP neighbor. Each EGP state is represented by a value that is one greater than the numerical value associated with said state in RFC 904.

egpNeighAddr

Syntax

IpAddress

Access

Read-only

Status

Mandatory

Description

The IP address of this entry's EGP neighbor.

egpNeighAs

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The autonomous system of this EGP peer. Zero should be specified if the autonomous system number of the neighbor is not yet known.

egpNeighInMsgs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of EGP messages received without error from this EGP peer.

egpNeighInErrs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of EGP messages received from this EGP peer that proved to be in error (for example, bad EGP checksum).

egpNeighOutMsgs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of locally generated EGP messages to this EGP peer.

egpNeighOutErrs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of locally generated EGP messages not sent to this EGP peer due to resource limitations within an EGP entity.

egpNeighInErrMsgs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of EGP-defined error messages received from this EGP peer.

egpNeighOutErrMsgs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of EGP-defined error messages sent to this EGP peer.

egpNeighStateUps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of EGP state transitions to the UP state with this EGP peer.

egpNeighStateDowns

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of EGP state transitions from the UP state to any other state with this EGP peer.

egpNeighIntervalHello

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The interval between EGP Hello command retransmissions (in hundredths of a second). This represents the t1 timer as defined in RFC 904.

egpNeighIntervalPoll

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The interval between EGP poll command retransmissions (in hundredths of a second). This represents the t3 timer as defined in RFC 904.

egpNeighMode

Syntax

Syntax described in Table 1–20.

Table 1–20: egpNeighMOde Syntax

Value	Declaration	Description
Integer	1 (active) 2 (passive)	

Access

Read-only

Status

Mandatory

Description

The polling mode of this EGP entity, either passive or active.

egpNeighEventTrigger

Syntax

Syntax described in Table 1–21.

Table 1–21: egpNeighEventTrigger Syntax

Value	Declaration	Description
Integer	1 (start) 2 (stop)	

Access

Read-write

Status

Mandatory

Description

A control variable used to trigger operator-initiated Start and Stop events. When read, this variable always returns the most recent value that `egpNeighEventTrigger` was set to. If it has not been set since the last initialization of the network management subsystem on the node, it returns a value of stop.

When set, this variable causes a Start or Stop event on the specified neighbor, as specified in the RFC 904, pages 8-10.

Briefly, a Start event causes an Idle peer to begin neighbor acquisition and a non-Idle peer to re-initiate neighbor acquisition. A stop event causes a non-Idle peer to return to the Idle state until a Start event occurs, either via `egpNeighEventTrigger` or otherwise.

egpNeighborLoss

Enterprise

snmp

Variables

egpNeighAddr

Description

An egpNeighborLoss trap signifies that an EGP neighbor for whom the sending protocol entity was an EGP peer has been marked down and the peer relationship no longer pertains.

egpAs

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The autonomous system number of this EGP entity.

The 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 }
```

where “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.

The SNMP Group

Implementation of the SNMP group is mandatory for all systems which support an SNMP protocol entity. Some of the objects defined below will be 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 below refer to an SNMP entity, and there may be several SNMP entities residing on a managed node (for example, if the node is acting as a management station).

The SNMP group consists of the following commands:

- snmpInPkts on page 1-186
- snmpOutPkts on page 1-187
- snmpInBadVersions on page 1-188
- snmpInBadCommunityNames on page 1-189
- snmpInBadCommunityUses on page 1-190
- snmpInASNParseErrs on page 1-191
- snmpInTooBigs on page 1-192
- snmpInNoSuchNames on page 1-193
- snmpInBadValues on page 1-194
- snmpInReadOnlys on page 1-195

snmpInPkts

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutPkts

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number of SNMP Messages which were passed from the SNMP protocol entity to the transport service.

snmpInBadVersions

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number of SNMP Messages which were delivered to the SNMP protocol entity and were for an unsupported SNMP version.

snmpInBadCommunityNames

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number of SNMP Messages delivered to the SNMP protocol entity which used a SNMP community name not known to said entity.

snmpInBadCommunityUses

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number of SNMP Messages delivered to the SNMP protocol entity which represented an SNMP operation which was not allowed by the SNMP community named in the Message.

snmpInASNParseErrs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

NOTE: snmp 7 is not used.

snmpInTooBigs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInNoSuchNames

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInBadValues

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInReadOnlys

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The total number valid SNMP PDUs which were delivered to the SNMP protocol entity and for which the value of the error-status field is read only.

NOTE: It should be noted that it is a protocol error to generate an SNMP PDU which 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

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInTotalReqVars

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInTotalSetVars

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInGetRequests

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInGetNexts

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInSetRequests

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInGetResponses

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpInTraps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutTooBigs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutNoSuchNames

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutBadValues

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutGenErrs

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutGetRequests

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutGetNexts

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutSetRequests

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutGetResponses

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpOutTraps

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

snmpEnableAuthenTraps

Syntax

Syntax described in Table 1–22.

Table 1–22: snmpEnableAuthentraps Syntax

Value	Declaration	Description
Integer	1 (enabled) 2 (disabled)	

Access

Read-write

Status

Mandatory

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 may be disabled.

NOTE: It is strongly recommended that this object be stored in non-volatile memory so that it remains constant between re-initializations of the network management system.

2

Fibre Alliance MIB Object Types

Overview

This chapter contains descriptions and other information that is specific to Fibre Alliance MIB (FA-MIB) object types. These object types are divided into the following groupings:

- The Connectivity Group on page 2-7
- The Statistics Group on page 2-144
- The Service Group on page 2-179
- The SNMP Trap Registration Group on page 2-199
- The Hub Statistics Group on page 2-209

In addition, this section contains information regarding the following topics:

- FA-MIB File System Organization on page 2-1
- Definitions for FA-MIB Object Types on page 2-5

FA-MIB File System Organization

Figure 2–1, Figure 2–2, and Figure 2–3 depict the organization and structure of FA-MIB.

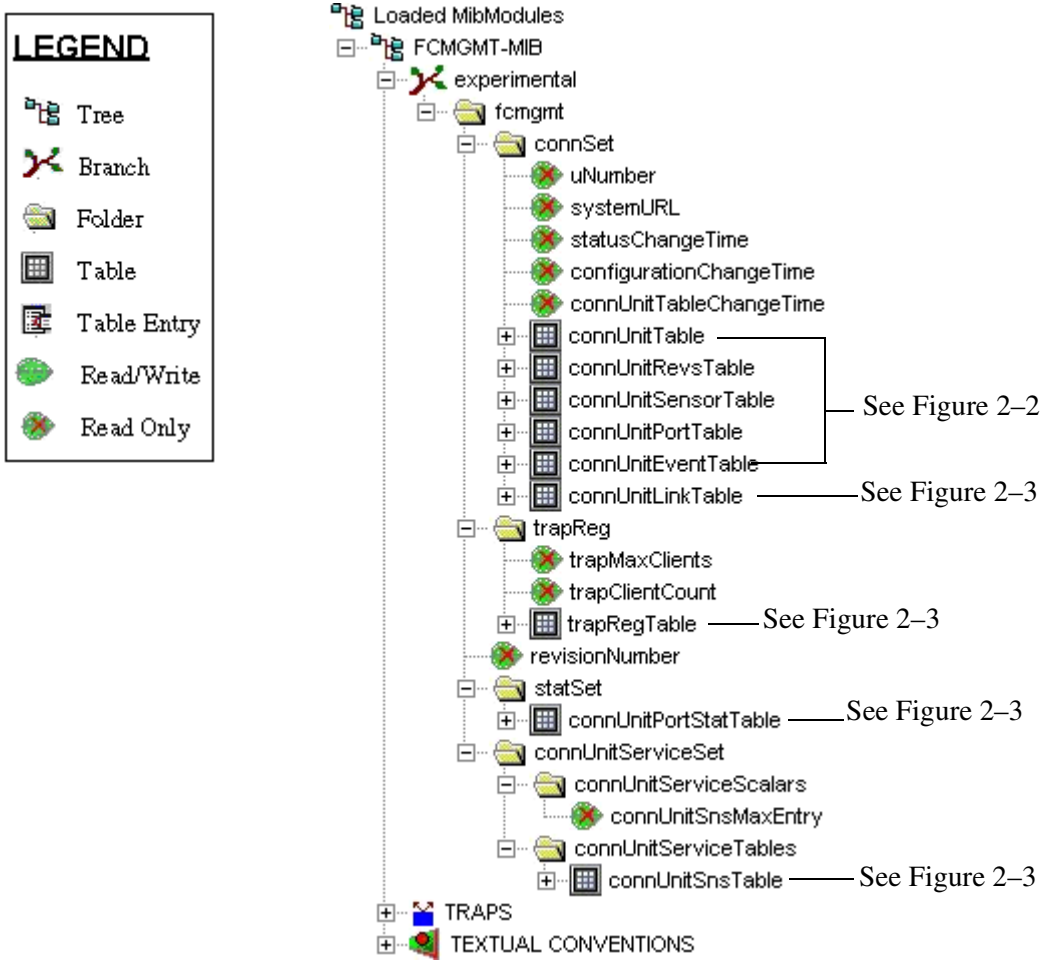


Figure 2–1: FA-MIB Overall Tree Structure

Figure 2–2: Tree Structure for connSet Tables

Figure 2–3: Tree Structure for connSet, trapReg, statSet, and sensorSetTables

Definitions for FA-MIB Object Types

The definitions shown in Table 2–1 are used for FA-MIB object types.

Table 2–1: FA-MIB Definitions

Type Definition	Value	Declaration	Description
FcNameId	Octet String of size 8		
FcGlobalId	Octet String of size 16		
FcEventSeverity	Integer	1 (unknown) 2 (emergency) 3 (alert) 4 (critical) 5 (error) 6 (warning) 7 (notify) 8 (info) 9 (debug) 10 (mark)	 Emergency status Alert status. Critical status. Error status. Warning status. Notification status Informational status Debug status All messages logged
FcUnitType	Integer	1 (unknown)	

Table 2–1: FA-MIB Definitions (Continued)

Type Definition	Value	Declaration	Description
		2 (other)	None of the following.
		3 (hub)	Passive connectivity unit supporting loop protocol.
		4 (switch)	Active connectivity unit supporting multiple protocols.
		5 (gateway)	Unit that converts not only the interface but also encapsulates the frame into another protocol. The assumption is that there is 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)	Raid, library, and so on.
FcUnitType	Integer	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.

The Connectivity Group

Implementation of the Connectivity group is mandatory for all systems.

The connectivity group consists of the following objects:

Connectivity Objects

Connectivity Objects consist of:

uNumber

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The number of connectivity units present on this system (represented by this agent). May be a count of the boards in a chassis or the number of full boxes in a rack. The connectivity unit is mapped to a switch. `uNumber` is always set to 1.

systemURL

Syntax

Display String

Access

Read-only

Status

Mandatory

Description

The top-level URL of the system. If it does not exist the value is 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
- GLOBALI—Replace with globalid
- SERIALNO—Replace with serial number
- DEFVAL—{“”}

NOTE: The expected value for systemURL.0 is: “http://{a.b.c.d}”
where {a.b.c.d} is the IP address of the switch if Webtool license is available
“” (null)

statusChangeTime

Syntax

TimeTicks

Access

Read-only

Status

Deprecated

Description

The sysuptime timestamp (in centiseconds) at which the last status change occurred for any members of the set. In other words, this is the latest timestamp that `connUnitStatus` or `connUnitPortStatus` changed.

configurationChangeTime

Syntax

TimeTicks

Access

Read-only

Status

Deprecated

Description

The sysuptime timestamp (in centiseconds) at which the last configuration change occurred for any members of the set. In other words, this is the latest timestamp of flash memory update. This represents a union of change information for `connUnitConfigurationChangeTime`.

connUnitTableChangeTime

Syntax

TimeTicks

Access

Read-only

Status

Deprecated

Description

The sysuptime timestamp (in centiseconds) at which the `connUnitTable` was updated (an entry was either added or deleted). The time is set at initialization of the connectivity table (`connUnitTable`).

NOTE: The Connectivity table contains general information on the system's units.

Connectivity Unit Table

The Connectivity Unit Table consists of:

connUnitTable

Syntax

Sequence of `connUnitEntry`

Access

Not accessible

Status

Mandatory

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.

NOTE: The valid value for Compaq StorageWorks Fibre Channel SAN Switch: 1.

connUnitEntry [connUnitTable]

Syntax

connUnitEntry

Access

Not accessible

Status

Mandatory

Description

A connectivity unit entry containing objects for a particular unit.

Index

Table 2–2 contains the connUnitEntry objects and object types.

Table 2–2: connUnitEntry Objects and Object Types

Object	Description
connUnitId on page 2–17	Octet String
connUnitGlobalId on page 2–18	FcGlobalId
connUnitType on page 2–20	FcUnitType
connUnitNumports on page 2–21	Integer
connUnitState on page 2–22	Integer
connUnitStatus on page 2–23	Integer
connUnitProduct on page 2–24	Display String
connUnitSn on page 2–25	Display String
connUnitUpTime on page 2–26	TimeTicks
connUnitUrl on page 2–27	Display String
connUnitDomainId on page 2–28	Octet String

Table 2–2: connUnitEntry Objects and Object Types (Continued)

connUnitProxyMaster on page 2–29	Integer
connUnitPrincipal on page 2–30	Integer
connUnitNumSensors on page 2–31	Integer
connUnitStatusChangeTime on page 2–32	TimeTicks
connUnitConfigurationChangeTime on page 2–33	TimeTicks
connUnitNumRevs on page 2–34	Integer
connUnitNumZones on page 2–35	Integer
connUnitModuleId on page 2–36	Octet String
connUnitName on page 2–37	Display String
connUnitInfo on page 2–38	Display String
connUnitControl on page 2–39	Integer
connUnitContact on page 2–41	Display String
connUnitLocation on page 2–42	Display String,
connUnitEventFilter on page 2–43	FcEventSeverity
connUnitNumEvents on page 2–44	Integer
connUnitMaxEvents on page 2–45	Integer
connUnitEventCurrID on page 2–46	Integer

connUnitId [connUnitTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

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.

This ID is treated as a very large (128-bit) integer, starting from 1. Therefore, in order to specify a particular instance of any columnar variable in the `connUnitEntry` (such as `connUnitType`), specify the instance identifier as a 16-octet value. For example:

```
connUnitType.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.1
```

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.

NOTE: Compaq maps to WWN

connUnitGlobalId [connUnitTable]

Syntax

`FcGlobalId`

Access

Read-only

Status

Mandatory

Description

An optional global-scope identifier for this connectivity unit. It MUST be a WWN for this connectivity unit or 16 octets of value zero. The following characteristics are required:

- WWN formats requiring fewer than 16 octets MUST be extended to 16 octets with trailing zero octets.
- If a WWN is used for connUnitId, the same WWN MUST be used for connUnitGlobalId.

The following characteristics are strongly recommended:

NOTE: When a non-zero value is provided, 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.

Refer to the following for 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 there is not a WWN assigned specifically to the connUnit, there is some merit, though not a requirement, to using a WWN assigned to (one of) its permanently attached FC/LAN interface(s). This can not 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 can not use the WWN of the HBA.

Another 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 were a replaceable PC Card, the hub should have an independent ID.

NOTE: The implementation maps the switch WWN to the top 8 bytes of this variable and sets the remaining lower 8 bytes to 0. For example, if the switch WWN is 10:00:00:60:69:10:02:18, then SNMP-GET connUnitGlobalId.0.0.0.0.0.0.0.0.0.0.0.0.0.0.1 returns
10 00 00 60 69 10 02 18 00 00 00 00 00 00 00 00

connUnitType [connUnitTable]

Syntax

`FcUnitType`

Access

Read-only

Status

Mandatory

Description

The type of this connectivity unit.

NOTE: Set to 4 (switch).

connUnitNumports [connUnitTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Number of physical ports in the connectivity unit (internal/embedded, external).

Compaq StorageWorks Fibre Channel SAN Switch: 16.

connUnitState [connUnitTable]

Syntax

Syntax described in Table 2–3.

Table 2–3: connUnitState Syntax

Value	Declaration	Description
Integer	1 (unknown)	
	2 (online)	Set the state to online
	3 (offline)	Set the state to offline

Access

Read-only

Status

Mandatory

Description

Overall state of the connectivity unit.

NOTE: Mapped as follows:

```
switchState(ONLINE)2 (online)
switchState(not ONLINE)3 (offline)
```

(*offline, testing, faulty*)

connUnitStatus [connUnitTable]

Syntax

Syntax described in Table 2–4.

Table 2–4: connUnitStatus Syntax

Value	Declaration	Description
Integer	1 (unknown)	
	2 (unused)	
	3 (ok)	
	4 (warning)	Needs attention
	5 (failed)	

Access

Read-only

Status

Mandatory

Description

Overall status of the connectivity unit.

NOTE: switchStatus maps directly as shown in the following table:

connUnitStatus	switchStatus
1—unknown	Unknown
2—unused	Unmonitored
3—ok	Healthy/ok
4—warning	Marginal/Warning
5—failed	Down/Failed

connUnitProduct [connUnitTable]

Syntax

Display String of size 0 to 79

Access

Read-only

Status

Mandatory

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 [connUnitTable]

Syntax

Display String of size 0 to 79

Access

Read-only

Status

Mandatory

Description

The serial number for this connectivity unit.

NOTE: Set to the SSN (which by default is the WWN), but is changeable through telnet.

connUnitUpTime [connUnitTable]

Syntax

TimeTicks

Access

Read-only

Status

Mandatory

Description

The number of centiseconds since the last unit initialization.

NOTE: Set when `connUnitTable` is initialized.

connUnitUrl [connUnitTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

Description

URL to launch a management application, if applicable. Otherwise 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 Webtool license is available.

"" `(null)`

connUnitDomainId [connUnitTable]

Syntax

Octet String of size 3

Access

Read-only

Status

Mandatory

Description

24-bit Fibre Channel address ID of this connectivity unit, right justified with leading zeros if required. If this value is not applicable, return all bits set to one.

NOTE: Set to the switch domain ID (as per FC-SW).

connUnitProxyMaster [connUnitTable]

Syntax

Syntax described in Table 2–5

Table 2–5: connUnitProxyMaster Syntax

Value	Declaration	Description
Integer	1 (unknown) 2 (no) 3 (yes)	

Access

Read-only

Status

Mandatory

Description

A value of “yes” means this is the proxy master unit for a set of managed units. 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 2 (no).

connUnitPrincipal [connUnitTable]

Syntax

Syntax described in Table 2–6.

Table 2–6: connUnitPrincipal Syntax

Value	Declaration	Description
Integer	1 (unknown) 2 (no) 3 (yes)	

Access

Read-only

Status

Mandatory

Description

Whether this connectivity unit is the principal unit within the group of fabric elements. If this value is not applicable, return unknown.

NOTE: If the switch is principal, this is set to 3 (yes), otherwise, it is set to 2 (no).

connUnitNumSensors [connUnitTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Number of sensors in the `connUnitSensorTable`

NOTE: The number of sensors for the Compaq StorageWorks Fibre Channel SAN Switch: 13 (5 temp + 6 fans + 2 power supplies).

connUnitStatusChangeTime [connUnitTable]

Syntax

TimeTicks

Access

Read-only

Status

Deprecated

Description

The sysuptime timestamp (in centiseconds) at which the last status change occurred for any members of the set. In other words, this is the latest timestamp that `connUnitStatus` or `connUnitPortStatus` changed.

NOTE: This is the same as `statusChangeTime`.

connUnitConfigurationChangeTime [connUnitTable]

Syntax

TimeTicks

Access

Read-only

Status

Deprecated

Description

The sysuptime timestamp (in centiseconds) at which the last configuration change occurred for any members of the set. In other words, this is the latest timestamp of flash memory update.This represents a union of change information for `connUnitConfigurationChangeTime`

NOTE: This is the same as `configurationChangeTime`.

connUnitNumRevs [connUnitTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The number of revisions in the `connUnitRevsTable`.

NOTE: Set to 2.

connUnitNumZones [connUnitTable]

Syntax

Integer

Access

Read-only

Status

Deprecated

Description

Number of zones defined in `connUnitZoneTable`.

NOTE: Set to 0 because the zone table is not supported.

connUnitModuleId [connUnitTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

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 zeros if this connUnit is not part of a module.

NOTE: Set to WWN.

connUnitName [connUnitTable]

Syntax

Display String of size 0 to 79

Access

Read-write

Status

Mandatory

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

Syntax

Display String

Access

Read-write

Status

Mandatory

Description

A display string containing information about this connectivity unit. This object value should be persistent between boots.

NOTE: Set to null and Read-only.

connUnitControl [connUnitTable]

Syntax

Syntax described in Table 2–7.

Table 2–7: connUnitControl Syntax

Value	Declaration	Description
Integer	1 (unknown)	
	2 (invalid)	
	3 (resetConnUnitColdStart)	Reboot; the addressed unit performs a Cold Start reset.
	4 (resetConnUnitWarmStart)	Fastboot; the addressed unit performs a Warm Start reset.
	5 (offlineConnUnit)	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.
	6 (onlineConnUnit)	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.

Access

Read-write

Status

Mandatory

Description

Controls the addressed connUnit. Each implementation may chose not to allow any or all of these values on a SET.

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.

connUnitContact [connUnitTable]

Syntax

Display String of size 0 to 79

Access

Read-write

Status

Mandatory

Description

Contact information for this connectivity unit.

NOTE: Set to `sysContact`.

connUnitLocation [connUnitTable]

Syntax

Display String of size 0 to 79

Access

Read-write

Status

Mandatory

Description

Location information for this connectivity unit.

NOTE: Set to `sysLocation`.

connUnitEventFilter [connUnitTable]

Syntax

`FcEventSeverity`

Access

Read-only

Status

Mandatory

Description

This value defines the event severity that is logged by this connectivity unit. All events of severity less than or equal to `connUnitEventFilter` are logged in `connUnitEventTable`.

NOTE: Returns (debug).

connUnitNumEvents

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Number of events currently in the `connUnitEventTable`.

NOTE: Returns the number of events that are currently in buffer.

connUnitMaxEvents [connUnitTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Max number of events that can be defined in `connUnitEventTable`.

NOTE: Max buffer is 2147483647 (2^{31}-1).

connUnitEventCurrID [connUnitTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The last used event ID (`connUnitEventId`).

NOTE: Same as `connUnitNumEvents`.

Connectivity Unit Table of Revisions for Hardware/Software Elements

The Connectivity Unit table of revisions for Hardware and Software Elements consists of:

connUnitRevsTable

Syntax

Sequence of `ConnUnitRevsEntry`

Access

Not accessible

Status

Mandatory

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.

connUnitRevsEntry [ConnUnitRevsTable]

Syntax

ConnUnitRevsEntry

Access

Not accessible

Status

Mandatory

Description

Table of the revisions supported by connectivity units managed by this agent.

Index

Table 2–8 contains the connUnitRevsEntry object and object types.

Table 2–8: connUnitRevsEntry Objects and Object Types

Object	Description
connUnitRevsUnitId on page 2–49	Octet String
connUnitRevsIndex on page 2–50	Integer
connUnitRevsRevId on page 2–51	Display String
connUnitRevsDescription on page 2–52	Display String

connUnitRevsUnitId [ConnUnitRevsTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

Description

The `connUnitId` of the connectivity unit that contains this revision table.

connUnitRevsIndex [ConnUnitRevsTable]

Syntax

Integer of size 1 to 2147483647

Access

Read-only

Status

Mandatory

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 [ConnUnitRevsTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

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 Operating System version from telnet command version, for example, v2.2.

connUnitRevsDescription [ConnUnitRevsTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

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

The Connectivity Unit Sensor Table consists of:

connUnitSensorTable

Syntax

Sequence of `connUnitSensorEntry`

Access

Not accessible

Status

Mandatory

Description

Table of the sensors supported by each connectivity unit managed by this agent.

connUnitSensorEntry [connUnitSensorTable]

Syntax

ConnUnitSensorEntry

Access

Not accessible

Status

Mandatory

Description

Each entry contains the information for a specific sensor.

Index

Table 2–9 contains the connUnitSensorEntry objects and object types.

Table 2–9: connUnitSensorEntry Objects and Object Types

Object	Description
connUnitSensorUnitId on page 2–55	Octet String
connUnitSensorIndex on page 2–56	Integer of size 1 to 2147483647
connUnitSensorName on page 2–57	Display String
connUnitSensorStatus on page 2–58	Integer
connUnitSensorInfo on page 2–59	Display String
connUnitSensorMessage on page 2–60	Display String
connUnitSensorType on page 2–61	Integer
connUnitSensorCharacteristic on page 2–62	Integer

connUnitSensorUnitId [connUnitSensorTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

Description

The `connUnitId` of the connectivity unit that contains this sensor table.

NOTE: Set to `connUnitId`.

connUnitSensorIndex [connUnitSensorTable]

Syntax

Integer of size 1 to 2147483647

Access

Read-only

Status

Mandatory

Description

A unique value among all `connUnitSensorEntrys` with the same value of `connUnitSensorUnitId`, in the range between 1 and `connUnitNumSensor`.

NOTE: The valid values for Compaq StorageWorks Fibre Channel SAN Switches = 13.

connUnitSensorName [connUnitSensorTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

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 [connUnitSensorTable]

Syntax

Syntax described in Table 2–10.

Table 2–10: connUnitSensorStatus Syntax

Value	Declaration	Description
Integer	1 (unknown	
	2 (other)	
	3 (ok)	The sensor indicates ok.
	4 (warning)	The sensor indicates a warning.
	5 (failed)	The sensor indicates failure.

Access

Read-only

Status

Mandatory

Description

The status indicated by the sensor.

NOTE: Nominal =3 (ok). Not nominal = 5 (failed).

connUnitSensorInfo [connUnitSensorTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

Description

Miscellaneous static info about the sensor such as its serial number.

NOTE: Each contains textual information about the sensor name.
Returns the serial ID if this is for the power supply. Otherwise, it returns Null.

connUnitSensorMessage [connUnitSensorTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

Description

This describes the status of the sensor as a message. It may 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 [connUnitSensorTable]

Syntax

Syntax described in Table 2–11.

Table 2–11: connUnitSensorType Syntax

Value	Declaration	Description
Integer	1 (unknown) 2 (other) 3 (battery) 4 (fan) 5 (power-supply) 6 (transmitter) 7 (enclosure) 8 (board) 9 (receiver)	

Access

Read-only

Status

Mandatory

Description

The type of component being monitored by this sensor.

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 [connUnitSensorTable]

Syntax

Syntax described in Table 2–12.

Table 2–12: connUnitSensorCharacteristic Syntax

Value	Declaration	Description
Integer	1 (unknown)	
	2 (other)	
	3 (temperature)	
	4 (pressure)	
	5 (emf)	
	6 (currentValue)	Current is a keyword
	7 (airflow)	
	8 (frequency)	
	9 (power)	

Access

Read-only

Status

Mandatory

Description

The characteristics being monitored by this sensor.

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

The Connectivity Unit Port Table consists of the following:

connUnitPortTable

Syntax

Sequence of `ConnUnitPortEntry`

Access

Not accessible

Status

Mandatory

Description

Generic information on ports for a specific connUnit.

NOTE: Valid values for the Compaq StorageWorks Fibre Channel SAN Switch: 16 entries. (16 external FC ports.)

connUnitPortEntry [connUnitPortTable]

Syntax

`ConnUnitPortEntry`

Access

Not accessible

Status

Mandatory

Description

Each entry contains the information for a specific port.

Index

Table 2–13 contains the `connUnitPortEntry` objects and object types.

Table 2–13: connUnitPortEntry Objects and Object Types

Object	Description
`connUnitPortUnitId` on page 2–67	Octet String
`connUnitPortIndex` on page 2–68	Integer
`connUnitPortType` on page 2–69	Integer
`connUnitPortFCClassCap` on page 2–71	Octet String
`connUnitPortFCClassOp` on page 2–72	Octet String
`connUnitPortState` on page 2–73	Integer
`connUnitPortStatus` on page 2–74	Integer
`connUnitPortTransmitterType` on page 2–75	Integer
`connUnitPortModuleType` on page 2–76	Integer
`connUnitPortWwn` on page 2–77	FcNameId

Table 2–13: connUnitPortEntry Objects and Object Types (Continued)

connUnitPortFCId on page 2–78	Octet String
connUnitPortSn on page 2–79	Display String
connUnitPortRevision on page 2–80	Display String
connUnitPortVendor on page 2–81	Display String
connUnitPortSpeed on page 2–82	Integer
connUnitPortControl on page 2–83	Integer
connUnitPortName on page 2–86	Display String
connUnitPortPhysicalNumber on page 2–87	Integer
connUnitPortStatObject on page 2–88	Object Identifier
connUnitPortProtocolCap on page 2–89	Octet String
connUnitPortProtocolOp on page 2–90	Octet String
connUnitPortNodeWwn on page 2–91	FcNameId
connUnitPortHwState on page 2–92	Integer

connUnitPortUnitId [connUnitPortTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

Description

The `connUnitId` of the connectivity unit that contains this port.

NOTE: Same value as `connUnitId`.

connUnitPortIndex [connUnitPortTable]

Syntax

Integer of size 1 to 2147483647

Access

Read-only

Status

Mandatory

Description

A unique value among all `connUnitPortEntrys` on this connectivity unit, between 0 and `connUnitNumPort`.

NOTE: The valid values for a Compaq StorageWorks Fibre Channel SAN Switch (external FC ports only) = 1 through 16.

connUnitPortType [connUnitPortTable]

Syntax

Syntax described in Table 2–14.

Table 2–14: connUnitPortType Syntax

Value	Declaration	Description
Integer	1 (unknown)	
	2 (other)	
	3 (not-present)	
	4 (hub-port)	
	5 (n-port)	End port for fabric
	6 (l-port)	End port for loop
	7 (fl-port)	Public loop
	8 (f-port)	Fabric port
	9 (e-port)	Fabric expansion port
	10 (g-port 1)	Generic fabric port
	11 (domain-ctl)	Domain controller
	12 (hub-controller)	
	13 (scsi)	Parallel SCSI port
	14 (escon)	
	15 (lan)	
	16 (wan)	

Access

Read-only

Status

Mandatory

Description

The port type.

NOTE: Mapped as:

```
U_port 10 (g-port)
F_port 8 (f-port)
FL_port 7 (fl-port)
E_port 9 (e-port)
```

connUnitPortFCClassCap [connUnitPortTable]

Syntax

Octet String of size 2

Access

Read-only

Status

Mandatory

Description

Bit mask that specifies the classes of service capability of this port. If this is not applicable, return all bits set to zero.

The bits have the following definition:

Table 2–15: connUnitPortFCClassCap Bit Mask

Value	Declaration	Description
Integer	0 (unknown)	
	1 (class-f)	
	2 (class-one)	
	4 (class-two)	
	8 (class-three)	
	16 (class-four)	"Current" is a keyword
	32 (class-five)	
	64 (class-six)	

NOTE: For an F or FL_port, this value is 0x000C. For a G or E_port, this value is 0x000D.

connUnitPortFCClassOp [connUnitPortTable]

Syntax

Octet String of size 2

Access

Read-only

Status

Mandatory

Description

Bit mask that specifies the classes of service that are currently operational. If this is not applicable, return all bits set to zero. This object has the same definition as `connUnitPortFCClassCap`.

NOTE: For an F or FL_port, this value is 0x000C. For a G or E_port, this value is 0x000D.

connUnitPortState [connUnitPortTable]

Syntax

Syntax described in Table 2–16.

Table 2–16: connUnitPortState Syntax

Value	Declaration	Description
Integer	1 (unavailable)	Do not use.
	2 (online)	Available for meaningful work.
	3 (offline)	Not available for meaningful work.
	4 (bypassed)	No longer used.
	5 (diagnostics)	Map to your testing.

Access

Read-only

Status

Mandatory

Description

The state of the port hardware.

NOTE: For an E, F, or FL_port, the value is online. For a U_port, the value is offline (disabled, testing, faulted).

connUnitPortStatus [connUnitPortTable]

Syntax

Syntax described in Table 2–17.

Table 2–17: connUnitPortStatus Syntax

Value	Declaration	Description
Integer	1 (unknown)	
	2 (unused)	Device cannot report this status.
	3 (ready)	FCAL Loop or FCPH Link reset protocol initialization has completed.
	4 (warning)	Do not use.
	5 (failure)	Do not use.
	6 (not participating)	Loop not participating and does not have a loop address.
	7 (initializing)	Protocol is proceeding.
	8 (bypass)	Do not use.
	9 (OLS)	FCP offline status.

Access

Read-only

Status

Mandatory

Description

An overall protocol status for the port.

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 [connUnitPortTable]

Syntax

Syntax described in Table 2–18.

Table 2–18: connUnitPortTransmitterType Syntax

Value	Declaration	Description
Integer	1 (unknown) 2 (other) 3 (unused) 4 (shortwave) 5 (longwave) 6 (copper) 7 (scsi) 8 (longwaveNoOFC) 9 (shortwaveNoOFC) 10 (longwaveLED)	

Access

Read-only

Status

Mandatory

Description

The technology of the port transceiver.

NOTE: For an external FC_port, this value should be 9 (shortwaveNoOFC), 8 (longwaveNoOFC), or 6 (copper).

connUnitPortModuleType [connUnitPortTable]

Syntax

Syntax described in Table 2–19.

Table 2–19: connUnitPortModuleType Syntax

Value	Declaration	Description
Integer	1 (unknown)	
	2 (other)	
	3 (GBIC)	
	4 (embedded)	Fixed. (oneXnine)
	5 (glm)	
	6 (gbicSerialId)	
	7 (gbicNoSerialId)	
	8 (gbicNotInstalled)	
	9 (smallFormFactor)	

Access

Read-only

Status

Mandatory

Description

The module type of the port connector.

NOTE: For an external FC_port with GBIC, this value should be 6 (gbicSerialId) or 7 (gbicNoSerialId).
For an external FC_port without GBIC, this value is set to 8 (gbicNotInstalled).

connUnitPortWwn [connUnitPortTable]

Syntax

`FcNameId`

Access

Read-only

Status

Mandatory

Description

The World Wide Name of the port if applicable, otherwise empty string. This is in IEEE Extended format and the extension contains the internal port number of each port.

The internal port number is 1 less than the port index.

For example, the switch has a WWN of 10:00:00:60:69:10:02:18,
then port number 0 = WWN 20:00:00:60:69:10:02:18
and port number 6 = 20:06:00:60:69:10:02:18.

However, the embedded port has a WWN of 10:00:00:60:69:10:02:18, the same as the switch.

connUnitPortFCId [connUnitPortTable]

Syntax

Octet String of size 3

Access

Read-only

Status

Mandatory

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 loop, then it is the ALPA that is connected. If this is an E_port, then it contains only the domain ID left justified, zero 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 [connUnitPortTable]

Syntax

Display String of size 0 to 79

Access

Read-only

Status

Mandatory

Description

The serial number of the unit (for example, for a GBIC). If this is not applicable, return empty string. If GBIC is the serial ID, this returns the GBIC part number. Otherwise it returns a Null value.

connUnitPortRevision [connUnitPortTable]

Syntax

Display String of size 0 to 79

Access

Read-only

Status

Mandatory

Description

The port revision (for example, GBIC). If GBIC is the serial ID, this returns the GBIC revision number. Otherwise it returns a Null value.

connUnitPortVendor [connUnitPortTable]

Syntax

Display String of size 0 to 79

Access

Read-only

Status

Mandatory

Description

The port vendor (for example, for a GBIC). If GBIC is the serial ID, this returns the GBIC vendor name. Otherwise it returns a Null value.

connUnitPortSpeed [connUnitPortTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The speed of the port in kilobytes per second. The valid values for Compaq StorageWorks Fibre Channel SAN Switches is 10^5, 20^5.

connUnitPortControl [connUnitPortTable]

Syntax

Syntax described in Table 2–20.

Table 2–20: connUnitPortControl Syntax

Value	Declaration	Description
Integer	1 (unknown)	
	2 (invalid)	
	3 (resetConnUnitPort)	portDisable (F or E_port, loop for U_port)
	4 (bypassConnUnitPort)	portDisable (FL_port)
	5 (unbypassConnUnitPort)	portEnable (FL_port)
	6 (offlineConnUnitPort)	portDisable (E, F, FL_port)
	7 (onlineConnUnitPort)	portEnable (U)
	8 (resetConnUnitPortCounters)	Clear the port stats counter when rebooted, defaults to 1 (unknown)

Access

Read-write (or maybe write-only)

Status

Mandatory

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.
  - Re-synchronization occurring between the transceiver in the addressed port to the transceiver that the port is connected to.

- `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 may 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 action may 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 as follows:

```
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 stats counter. When
rebooted, this defaults to 1 (unknown)
```

connUnitPortName [connUnitPortTable]

Syntax

Display String

Access

Read-write

Status

Mandatory

Description

A string describing the addressed port. For an external FC port, this enables the port for the embedded port, thus enabling the switch. Each implementation may chose not to allow any or all of the following values on a SET.

If the Management Station uses in-band communication (FC-IP) with the switch, either of the two following actions may not be possible in-band:

- Enabling the FC port that is connected to the Management Station,
- Enabling the embedded port.

This returns Null and is read-only.

connUnitPortPhysicalNumber [connUnitPortTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

This is the internal port number this port is known by. In many implementations, this should be the same as `connUnitPortIndex`. Some implementations may have an internal port representation not compatible with the rules for table indices. In that case, provide the internal representation of this port in this object. This value may also be used in the `connUnitLinkPortNumberX` or `connUnitLinkPortNumberY` objects of the `connUnitLinkTable`.

NOTE: The internal port numbers for Compaq StorageWorks Fibre Channel SAN Switches = 0 through 15

connUnitPortStatObject [connUnitPortTable]

Syntax

Object Identifier

Access

Read-only

Status

Mandatory

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 zero, then there are no statistics available for this port. The port type information helps identify the statistics objects that are found in the table. From this point, one would do a getnext 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 [connUnitPortTable]

Syntax

Octet String of size 2

Access

Read-only

Status

Mandatory

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 zero. The bits have the following definition:

0—unknown

1—Loop

2—Fabric

4—SCSI

8—TCP/IP

16—VI

32—FICON

connUnitPortProtocolOp [connUnitPortTable]

Syntax

Octet String of size 2

Access

Read-only

Status

Mandatory

Description

This is the bit mask that specifies the driver level protocol(s) that are currently operational. 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 [connUnitPortTable]

Syntax

`FcNameId`

Access

Read-only

Status

Mandatory

Description

The node World Wide Name of the port if applicable, otherwise 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. For 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.

The internal port number is 1 less than the port index.

For example, if the switch has a WWN of 10:00:00:60:69:10:02:18, then
port number 0 has a WWN of 20:00:00:60:69:10:02:18 and
port number 6 has a WWN of 20:06:00:60:69:10:02:18.

However, the embedded port has WWN 10:00:00:60:69:10:02:18, the same as the switch.

connUnitPortHWState [connUnitPortTable]

Syntax

Syntax described inTable 2–21.

Table 2–21: connUnitPortHWState Syntax

Value	Declaration	Description
Integer	1 (unknown)	
	2 (failed)	Port failed diagnostics (port_flt state)
	3 (bypassed)	FCAL bypass, loop only (not used)
	4 (active)	Connected to a device (light and sync are present)
	5 (loopback)	Port in ext loopback (loopback state)
	6 (txfault)	Transmitter fault (bad GBIC)
	7 (noMedia)	Media not installed (GBIC removed)
	8 (linkDown)	Waiting for activity - rx sync (light with no sync)

Access

Read-only

Status

Mandatory

Description

The state of the port as detected by the hardware.

Connectivity Unit Event Table

The Connectivity Unit Event Table consists of:

connUnitEventTable

Syntax

Sequence of `ConnUnitEventEntry`

Access

Not accessible

Status

Mandatory

Description

The table of connectivity unit events. Errors, warnings, and information should be reported in this table.

connUnitEventEntry [connUnitEventTable]

Syntax

ConnUnitEventEntry

Access

Not accessible

Status

Mandatory

Description

Each entry contains information on a specific event for the given connectivity unit.

Index

Table 2–22 contains the connUnitEventEntry objects and object types.

Table 2–22: connUnitEventEntry Objects and Object Types

Object	Description
connUnitEventUnitId on page 2–95	Octet String
connUnitEventIndex on page 2–96	Integer of size 1 to 2147483647
connUnitEventId on page 2–97	Integer
connUnitREventTime on page 2–98	Display String
connUnitSEventTime on page 2–99	TimeTicks
connUnitEventSeverity on page 2–100	FcEventSeverity
connUnitEventType on page 2–101	Integer
connUnitEventObject on page 2–102	Object Identifier
connUnitEventDescr on page 2–103	Display String

connUnitEventUnitId [connUnitEventTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

Description

The `connUnitId` of the connectivity unit that contains this event table.

NOTE: Same as `connUnitId`.

connUnitEventIndex [connUnitEventTable]

Syntax

Integer of size 1 to 2147483647

Access

Read-only

Status

Mandatory

Description

Each connectivity unit has its own event buffer. As it wraps, it may write over previous events. This object is an index into the buffer. It is recommended that this table be read by using a “getNext” 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 may be events that may not be contained in the agent's internal event buffer.

For example, an agent may read events 50-75.

At the next read interval, `connUnitEventCurrID` is 189. If the management app tries to read event index 76, and the agent's internal buffer is 100 entries max, event index 76 is no longer available.

The index value is an incrementing integer starting from one (1) every time there is a table reset. On table reset, all contents are emptied and all indices are set to zero (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 one (1) again.

NOTE: Mapped to `swEventIndex`.

connUnitEventId [connUnitEventTable]

Syntax

Integer

Access

Read-only

Status

Deprecated

Description

The internal event ID. Incremented 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 zero. This value is set back to zero at reset. The relationship of this value to the index is that internal event ID may represent a smaller number than a 32 bit integer (for example, max 100 entries) and would only have a value range up to `connUnitMaxEvents`.

NOTE: Same as `connUnitEventIndex`.

connUnitREventTime [connUnitEventTable]

Syntax

Display String of size 15

Access

Read-only

Status

Mandatory

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 number

HH=hour number

MM=minute number

SS=seconds number

If not applicable, return a NULL string.

connUnitSEventTime [connUnitEventTable]

Syntax

TimeTicks

Access

Read-only

Status

Mandatory

Description

This is the sysuptime timestamp when the event occurred.

connUnitEventSeverity [connUnitEventTable]

Syntax

`FcEventSeverity`

Access

Read-only

Status

Mandatory

Description

The event severity level.

NOTE: Severity is explained in the front of this chapter. See `FcEventSeverity` in Table 2–1,FA-MIB Definitions.

connUnitEventType [connUnitEventTable]

Syntax

Syntax described in Table 2–23.

Table 2–23: connUnitEventType Syntax

Value	Declaration	Description
Integer	1 (unknown) 2 (other) 3 (status) 4 (configuration) 5 (topology)	

Access

Read-only

Status

Mandatory

Description

The type of this event.

NOTE: Always set to 2 (other).

connUnitEventObject [connUnitEventTable]

Syntax

Object Identifier

Access

Read-only

Status

Mandatory

Description

This is used with the `connUnitEventType` to identify which object the event refers to. It can be the OID of a connectivity unit or of another object, like `connUnitPortStatus[...]`.

NOTE: Always set to Null.

connUnitEventDescr [connUnitEventTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

Description

The description of the event. 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.

That is, 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 which do not directly attach to members of its agency and its discovery algorithm gives some assurance the links are recently valid, it MAY include these links.

Link information entered by administrative action MAY be included even if not validated directly if the link has at least one endpoint in this agency, but 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 (ANSI document 99-422v0). This allows one to

query 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 value 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 are defined by the size of the table

For an entry to be considered to be valid, both the X (local) and the Y (remote) need to have one valid value.

Same as the string shown in the telnet command `errShow`.

Connectivity Unit Link Table

The Connectivity Unit Link Table consists of:

connUnitLinkTable

Syntax

Sequence of `ConnUnitLinkEntry`

Access

Not accessible

Status

Mandatory

Description

A list of links know to this agent from this connectivity unit to other connectivity units.

NOTE: X = switch data, Y = other end.

connUnitLinkEntry [connUnitLinkTable]

Syntax

ConnUnitLinkEntry

Access

Not accessible

Status

Mandatory

Description

An entry describing a particular link to another.

Index

Table 2–1 contains the connUnitLinkTable objects and object types.

Table 2–24: connUnitLinkTable Objects and Object Types

Object	Description
connUnitLinkUnitId on page 2–109	Octet String
connUnitLinkIndex on page 2–110	Integer
connUnitLinkNodeIdX on page 2–111	Octet String
connUnitLinkPortNumberX on page 2–112	Integer
connUnitLinkPortWwnX on page 2–113	Octet String
connUnitLinkNodeIdY on page 2–114	Octet String
connUnitLinkPortNumberY on page 2–115	Integer
connUnitLinkPortWwnY on page 2–116	Octet String
connUnitLinkAgentAddressY on page 2–117	Octet String
connUnitLinkAgentAddressTypeY on page 2–117	Integer
connUnitLinkAgentPortY on page 2–119	Integer

Table 2–24: connUnitLinkTable Objects and Object Types (Continued)

connUnitLinkUnitTypeY on page 2–120	FcUnitType
connUnitLinkConnIdY on page 2–121	Octet String
connUnitLinkCurrIndex on page 2–122	Integer

connUnitLinkUnitId [connUnitLinkTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

Description

The `connUnitId` of the connectivity unit that contains this link table.

NOTE: Set to the WWN of the local switch.

connUnitLinkIndex [connUnitLinkTable]

Syntax

Integer of size 0 to 2147483647

Access

Read-only

Status

Mandatory

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 zero when the system is reset and the first value to be used is one.

Indexes 1 through 16 are reserved for ISL; Indexes 17 and above are reserved for end devices, and are calculated based on portID of the end device(s).

connUnitLinkNodeIdX [connUnitLinkTable]

Syntax

Octet String of size 64

Access

Read-only

Status

Mandatory

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 [connUnitLinkTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

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 # of the e-port.

Device: Physical port # to which the device is connected.

connUnitLinkPortWwnX [connUnitLinkTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

Description

The port WWN of the unit specified by `connUnitLinkNodeIdX` if known, otherwise 16 octets of binary 0.

NOTE: WWN of the port to which the device is connected.

connUnitLinkNodeIdY [connUnitLinkTable]

Syntax

Octet String of size 64

Access

Read-only

Status

Mandatory

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 [connUnitLinkTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

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 # of the remote port.

Device: -1.

connUnitLinkPortWwnY [connUnitLinkTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

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 [connUnitLinkTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

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 (v6).

Device: 0 (Null).

connUnitLinkAgentAddressTypeY [connUnitLinkTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

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 [connUnitLinkTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

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 [connUnitLinkTable]

Syntax

FcUnitType

Access

Read-only

Status

Mandatory

Description

Type of the FC connectivity unit as defined in connUnitType.

ISL: Switch device.

End devices: (End device types based on an FCP Inquiry:)

Table 2–25: connUnitLinkUnitType FC Connectivity

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)

NOTE: This system does not support hubs.

connUnitLinkConnIdY [connUnitLinkTable]

Syntax

Octet String of size 3

Access

Read-only

Status

Mandatory

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 ALPA 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 [connUnitLinkTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The last used link index.

Connectivity Unit Port Stat Table

The Connectivity Unit Port Stat Table consists of:

connUnitPortStatTable

Syntax

Sequence of `ConnUnitPortStatEntry`

Access

Not accessible

Status

Mandatory

Description

A list of statistics for the fabric port types. There is one and only one statistics table for each individual port. For all objects in 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 zero. 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 if the object if supported or not. All objects start at a value of zero at hardware initialization and continue incrementing till end of 63 bits and then wrap to zero.

This is the case for all Class 1 Frames, and Compaq does not support them.

connUnitPortStatEntry [connUnitPortStatTable]

Syntax

ConnUnitPortStatEntry

Access

Not accessible

Status

Mandatory

Description

An entry describing port statistics.

Index

Table 2–26 contains the connUnitPortStatTable objects and object types.

Table 2–26: connUnitPortStatTable Objects and Object Types

Object	Description
connUnitPortStatUnitId on page 2–128	FcGlobalId
connUnitPortStatIndex on page 2–129	Integer
connUnitPortStatCountError on page 2–130	Octet String
connUnitPortStatCountTxObjects on page 2–131	Octet String
connUnitPortStatCountRxObjects on page 2–132	Octet String
connUnitPortStatCountTxElements on page 2–133	Octet String
connUnitPortStatCountRxElements on page 2–134	Octet String
connUnitPortStatCountBBCreditZero on page 2–135	Octet String
connUnitPortStatCountInputBuffersFull on page 2–136	Octet String
connUnitPortStatCountFBSYFrames on page 2–137	Octet String
connUnitPortStatCountPBSYFrames on page 2–145	Octet String

Table 2–26: connUnitPortStatTable Objects and Object Types (Continued)

Object	Description
connUnitPortStatCountFRJTFrames on page 2–139	Octet String
connUnitPortStatCountPRJTFrames on page 2–140	Octet String
connUnitPortStatCountClass1RxFrames on page 2–141	Octet String
connUnitPortStatCountClass1TxFrames on page 2–142	Octet String
connUnitPortStatCountClass1FBSYFrames on page 2–143	Octet String
connUnitPortStatCountClass1PBSYFrames on page 2–145	Octet String
connUnitPortStatCountClass1FRJTFrames on page 2–146	Octet String
connUnitPortStatCountClass1PRJTFrames on page 2–147	Octet String
connUnitPortStatCountClass2RxFrames on page 2–148	Octet String
connUnitPortStatCountClass2TxFrames on page 2–149	Octet String
connUnitPortStatCountClass2FBSYFrames on page 2–150	Octet String
connUnitPortStatCountClass2PBSYFrames on page 2–151	Octet String
connUnitPortStatCountClass2FRJTFrames on page 2–152	Octet String
connUnitPortStatCountClass2PRJTFrames on page 2–153	Octet String
connUnitPortStatCountClass3RxFrames on page 2–154	Octet String
connUnitPortStatCountClass3TxFrames on page 2–155	Octet String
connUnitPortStatCountClass3Discards on page 2–156	Octet String
connUnitPortStatCountRxMulticastObjects on page 2–157	Octet String
connUnitPortStatCountTxMulticastObjects on page 2–158	Octet String
connUnitPortStatCountRxBroadcastObjects on page 2–159	Octet String
connUnitPortStatCountTxBroadcastObjects on page 2–160	Octet String
connUnitPortStatCountRxLinkResets on page 2–161	Octet String
connUnitPortStatCountTxLinkResets on page 2–162	Octet String
connUnitPortStatCountNumberLinkResets on page 2–163	Octet String
connUnitPortStatCountRxOfflineSequences on page 2–164	Octet String
connUnitPortStatCountTxOfflineSequences on page 2–165	Octet String
connUnitPortStatCountNumberOfflineSequences on page 2–166	Octet String
connUnitPortStatCountLinkFailures on page 2–167	Octet String

Table 2–26: connUnitPortStatTable Objects and Object Types (Continued)

Object	Description
connUnitPortStatCountInvalidCRC on page 2–168	Octet String
connUnitPortStatCountInvalidTxWords on page 2–169	Octet String
connUnitPortStatCountPrimitiveSequenceProtocolErrors on page 2–170	Octet String
connUnitPortStatCountLossofSignal on page 2–171	Octet String
connUnitPortStatCountLossofSynchronization on page 2–172	Octet String
connUnitPortStatCountInvalidOrderedSets on page 2–173	Octet String
connUnitPortStatCountFramesTooLong on page 2–174	Octet String
connUnitPortStatCountFramesTruncated on page 2–175	Octet String
connUnitPortStatCountAddressErrors on page 2–176	Octet String
connUnitPortStatCountDelimiterErrors on page 2–177	Octet String
connUnitPortStatCountEncodingDisparityErrors on page 2–178	Octet String

connUnitPortStatUnitId [connUnitPortStatTable]

Syntax

`FcGlobalId`

Access

Read-only

Status

Mandatory

Description

The `connUnitId` of the connectivity unit that contains this port stat table.

connUnitPortStatIndex [connUnitPortStatTable]

Syntax

Integer (0..2147483647)

Access

Read-only

Status

Mandatory

Description

A unique value among all entries in this table, between 0 and `connUnitNumPort[connUnitPortUnitId]`.

connUnitPortStatCountError [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

A count of the errors that have occurred on this port.

connUnitPortStatCountTxObjects [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of frames/packets/IOs/etc 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 [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of frames/packets/IOs/etc 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 [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of octets or bytes that have been transmitted by this port. 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 [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of octets or bytes that have been received. by this port. 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 [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of transitions in/out of BBcredit zero state. The other side is not providing any credit.

NOTE: This is a Fibre Channel stat only.

connUnitPortStatCountInputBuffersFull [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of occurrences when all input buffers of a port were full and outbound buffer-to-buffer credit transitioned to zero. There is no credit to provide to other side.

NOTE: This is a Fibre Channel stat only.

connUnitPortStatCountFBSYFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat. This is the sum of all classes. If you cannot keep the by class counters, then keep the sum counters.

connUnitPortStatCountPBSYFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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).

NOTE: This is a Fibre Channel only stat.This is the sum of all classes. If you cannot keep the by class counters, then keep the sum counters.

connUnitPortStatCountFRJTFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountPRJTFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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.

NOTE: This is the total for all classes and is a Fibre Channel only stat.

connUnitPortStatCountClass1RxFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Class 1 Frames received at this port.

NOTE: This is a Fibre Channel only stat.
Compaq does not support Class 1 Frames.

connUnitPortStatCountClass1TxFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Class 1 Frames transmitted out this port.

NOTE: This is a Fibre Channel only stat. Compaq does not support Class 1 Frames.

connUnitPortStatCountClass1FBSYFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat. Compaq does not support Class 1 Frames.

The Statistics Group

The statistics group contains the following commands:

- connUnitPortStatCountLossofSignal on page 2-171
- connUnitPortStatCountLossofSynchronization on page 2-172
- connUnitPortStatCountInvalidOrderedSets on page 2-173
- connUnitPortStatCountFramesTooLong on page 2-174
- connUnitPortStatCountFramesTruncated on page 2-175
- connUnitPortStatCountAddressErrors on page 2-176
- connUnitPortStatCountDelimiterErrors on page 2-177
- connUnitPortStatCountEncodingDisparityErrors on page 2-178

connUnitPortStatCountClass1PBSYFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat. Compaq does not support Class 1 Frames.

connUnitPortStatCountClass1FRJTFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat. Compaq does not support Class 1 Frames.

connUnitPortStatCountClass1PRJTFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat. Compaq does not support Class 1 Frames.

connUnitPortStatCountClass2RxFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Class 2 Frames received at this port.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountClass2TxFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Class 2 Frames transmitted out this port.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountClass2FBSYFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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).

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountClass2PBSYFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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).

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountClass2FRJTFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountClass2PRJTFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountClass3RxFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Class 3 Frames received at this port.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountClass3TxFrames [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Class 3 Frames transmitted out this port.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountClass3Discards [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 simply discarded if they cannot be delivered.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountRxMulticastObjects [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Multicast Frames or Packets received at this port.

connUnitPortStatCountTxMulticastObjects [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Multicast Frames or Packets transmitted out this port.

connUnitPortStatCountRxBroadcastObjects [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Broadcast Frames or Packets received at this port.

connUnitPortStatCountTxBroadcastObjects [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Broadcast Frames or Packets transmitted out this port. On a Fibre Channel loop, count only OPNr frames generated.

connUnitPortStatCountRxLinkResets [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Link resets. This is the number of LRs received.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountTxLinkResets [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Link resets. This is the number LRs transmitted.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountNumberLinkResets [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Link resets and LIPs detected at this port. The number times the reset link protocol is initiated. These are the count of the logical resets, a count of the number of primitives.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountRxOfflineSequences [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Offline Primitive OLS received at this port.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountTxOfflineSequences [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Offline Primitive OLS transmitted by this port.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountNumberOfflineSequences [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of Offline Primitive sequence received at this port.

NOTE: This is a Fibre Channel only stat.

connUnitPortStatCountLinkFailures [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountInvalidCRC [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountInvalidTxWords [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountPrimitiveSequenceProtocolErrors [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountLossofSignal [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountLossofSynchronization [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountInvalidOrderedSets [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountFramesTooLong [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountFramesTruncated [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountAddressErrors [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat

connUnitPortStatCountDelimiterErrors [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

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 stat.

connUnitPortStatCountEncodingDisparityErrors [connUnitPortStatTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The number of disparity errors received at this port.

NOTE: This is a Fibre Channel only stat.

The Service Group

Implementation of the Service group is mandatory for all systems.

The Service group contains two subgroups which are mandatory for all systems. The Service group contains the following objects:

- Connectivity Unit Service Scalers Group on page 2-179
- Connectivity Unit Service Tables Group on page 2-180

Connectivity Unit Service Scalers Group

connUnitSnsMaxEntry

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The maximum number of entries in the table.

Connectivity Unit Service Tables Group

The Connectivity Unit Service Table Group consists of the Connectivity Unit Simple Name Server Table:

Connectivity Unit Simple Name Server Table

connUnitSnsTable

Syntax

Sequence of `ConnUnitSnsEntry`

Access

Not accessible

Status

Mandatory

Description

This table contains an entry for each object registered with this port in the switch.

connUnitSnsEntry [connUnitSnsTable]

Syntax

ConnUnitSnsEntry

Access

Not accessible

Status

Mandatory

Description

The Simple Name Server table for the port represented by connUnitSnsPortIndex.

Index

Table 2–27 contains the connUnitSnsTable objects and object types.

Table 2–27: connUnitSnsTable Objects and Object Types

Object	Description
connUnitSnsId on page 2–184	Octet String
connUnitSnsPortIndex on page 2–185	Integer
connUnitSnsPortIdentifier on page 2–186	FcAddressId
connUnitSnsPortName on page 2–187	FcNameId
connUnitSnsNodeName on page 2–188	FcNameId
connUnitSnsClassOfSvc on page 2–189	Octet String
connUnitSnsNodeIPAddress on page 2–190	Octet String
connUnitSnsProcAssoc on page 2–191	Octet String
connUnitSnsFC4Type on page 2–192	Octet String
connUnitSnsPortType on page 2–193	Octet String
connUnitSnsPortIPAddress on page 2–194	Octet String

Table 2–27: connUnitSnsTable Objects and Object Types (Continued)

Object	Description
connUnitSnsFabricPortName on page 2–195	FcNameId
connUnitSnsHardAddress on page 2–196	FcAddressId
connUnitSnsSymbolicPortName on page 2–197	Display String
connUnitSnsSymbolicNodeName on page 2–198	Display String

connUnitSnsId [connUnitSnsTable]

Syntax

`FcGlobalId`

Access

Read-only

Status

Mandatory

Description

The `connUnitId` of the connectivity unit that contains this Name Server table.

connUnitSnsPortIndex [connUnitSnsTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

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 [connUnitSnsTable]

Syntax

`FcAddressId`

Access

Read-only

Status

Mandatory

Description

The port identifier for this entry in the SNS table.

connUnitSnsPortName [connUnitSnsTable]

Syntax

`FcNameId`

Access

Read-only

Status

Mandatory

Description

The port name for this entry in the SNS table.

connUnitSnsNodeName [connUnitSnsTable]

Syntax

FcNameId

Access

Read-only

Status

Mandatory

Description

The Node Name for this entry in the SNS table.

connUnitSnsClassOfSvc [connUnitSnsTable]

Syntax

Octet String of size 1

Access

Read-only

Status

Mandatory

Description

The Classes of Service offered by this entry in the SNS table.

connUnitSnsNodeIPAddress [connUnitSnsTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

Description

The IPv6 formatted address of the Node for this entry in the SNS table.

connUnitSnsProcAssoc [connUnitSnsTable]

Syntax

Octet String of size 1

Access

Read-only

Status

Mandatory

Description

The Process Associator for this entry in the SNS table.

connUnitSnsFC4Type [connUnitSnsTable]

Syntax

Octet String of size 1

Access

Read-only

Status

Mandatory

Description

The FC-4 Types supported by this entry in the SNS table.

connUnitSnsPortType [connUnitSnsTable]

Syntax

Octet String of size 1

Access

Read-only

Status

Mandatory

Description

The port type of this entry in the SNS table.

connUnitSnsPortIPAddress [connUnitSnsTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

Description

The IPv6 formatted address of this entry in the SNS table.

connUnitSnsFabricPortName [connUnitSnsTable]

Syntax

`FcNameId`

Access

Read-only

Status

Mandatory

Description

The fabric port name of this entry in the SNS table.

connUnitSnsHardAddress [connUnitSnsTable]

Syntax

`FcAddressId`

Access

Read-only

Status

Mandatory

Description

The Hard Address of this entry in the SNS table.

connUnitSnsSymbolicPortName [connUnitSnsTable]

Syntax

Display String of size 0..79

Access

Read-only

Status

Mandatory

Description

The symbolic port name of this entry in the SNS table.

connUnitSnsSymbolicNodeName [connUnitSnsTable]

Syntax

Display String of size 0..79

Access

Read-only

Status

Mandatory

Description

The Symbolic Node Name of this entry in the SNS table.

The SNMP Trap Registration Group

The SNMP trap registration group consists of the following commands:

- Traps on page 2-199
- SNMP Trap Registration Table on page 2-201

Traps

Traps consist of the following objects:

- trapMaxClients on page 2-199
- trapClientCount on page 2-200

trapMaxClients

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The maximum number of SNMP trap recipients supported by the connectivity unit.

NOTE: Set to 6.

trapClientCount

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The current number of rows in the trap table.

SNMP Trap Registration Table

The Trap Registration Table consists of:

- trapRegTable on page 2-201
- trapRegEntry on page 2-202
- trapRegIpAddress on page 2-203
- trapRegPort on page 2-204
- trapRegFilter on page 2-205
- trapRegRowState on page 2-206

trapRegTable

Syntax

Sequence of `TrapRegEntry`

Access

Not accessible

Status

Mandatory

Description

A table containing a row for each IP address/port number to which traps are sent.

trapRegEntry [trapRegTable]

Syntax

`TrapRegEntry`

Access

Not accessible

Status

Mandatory

Description

Ip/Port pair for a specific client.

Index

Table 2–28 contains the `trapRegEntry` objects and object types.

Table 2–28: trapRegEntry Objects and Object Types

Object	Description
`trapRegIpAddress` on page 2–203	IpAddress
`trapRegPort` on page 2–204	Integer of size 1 to 2147483647
`trapRegFilter` on page 2–205	FcEventSeverity
`trapRegRowState` on page 2–206	Integer

trapRegIpAddress [trapRegTable]

Syntax

IpAddress

Access

Read-only

Status

Mandatory

Description

The IP address of a client registered for traps.

trapRegPort [trapRegTable]

Syntax

Integer of size 1 to 2147483647

Access

Read-only

Status

Mandatory

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 [trapRegTable]

Syntax

`FcEventSeverity`

Access

Read-write

Status

Mandatory

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”.

NOTE: This severity applies to all entries. See `FcEventSeverity` in Table 2–1, FA-MIB Definitions.

trapRegRowState [trapRegTable]

Syntax

Syntax is described in Table 2–29.

Table 2–29: trapRegRowState Syntax

Value	Declaration	Description
Integer	1 (rowDestroy)	Remove row from table.
	2 (rowInactive)	Row exists, but TRAPs disabled.
	3 (rowActive)	Row exists and is enabled for sending traps.

Access

Read-write

Status

Mandatory

Description

Specifies the state of the row (see Table 2–30).

Table 2–30: TrapRegRowState for Read/Write

Trap	Read	Write
rowDestroy	Can never happen.	Remove this row from the table.
rowInactive	Indicates that this row does exist, but that traps are not enabled to be sent to the target.	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	Indicates that this row exists, and that traps are enabled to be sent to the target.	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.

NOTE: This entry always returns rowActive and allows for read-only.

Revision Number

The Revision Number group consists of the `revisionNumber` object.

revisionNumber

Syntax

Display String of size 4

Access

Read-only

Status

Mandatory

Description

This is the revision number for this MIB. The format of the revision value is:

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 current value of this object is:

```
0 = "0"
1 = "3"
2 = "0"
3 = "0"
```

This defines a revision of 02.20

NOTE: Set to "0220".

The Hub Statistics Group

Port types are aggregated into a port type class, such as all the fabric port types. There is one statistics table for each individual port. For all objects in statistics tables, 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 zero. The high order bit is reserved to indicate if the object is supported or not. All objects start at a value of zero at hardware initialization and continue incrementing till end of 63 bits and then wrap to zero.

connUnitStatusChange

Enterprise

fcmgmt

Variables

connUnitStatus, *connUnitState*

Description

The overall status of the connectivity unit has changed. The recommended severity level (for filtering): alert.

NOTE: Generated when *connUnitStatus* changes, refer to the *connUnitStatus* section for a description of how the value is calculated.

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.

connUnitSensorStatusChange

Enterprise

fcmgmt

Variables

connUnitSensorStatus

Description

The overall status of the connectivity unit has changed.

connUnitPortStatusChange

Enterprise

fcmgmt

Variables

connUnitPortStatus, *connUnitPortState*

Description

Overall status of the connectivity unit changed. Recommended severity level (for filtering): alert.

3

FCFabric Element MIB Object Types

Overview

This chapter contains descriptions and other information that is specific to FCFabric Element MIB (*in the experimental branch*) and Fibre Channel FE MIB (*in the standard branch*) object types. These object types are divided into the following groupings:

- The Configuration Group on page 3-10
- The Operation Group on page 3-45
- The Error Group on page 3-82
- The Capability Group on page 3-100

NOTE: Compaq supports two versions of FE-MIB for release v3.0 of the Fabric Operating System:

- FCFabric Element MIB is supported in the experimental branch.
- Fibre Channel FE MIB is supported in the standard branch.

FE-MIB File System Organization

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

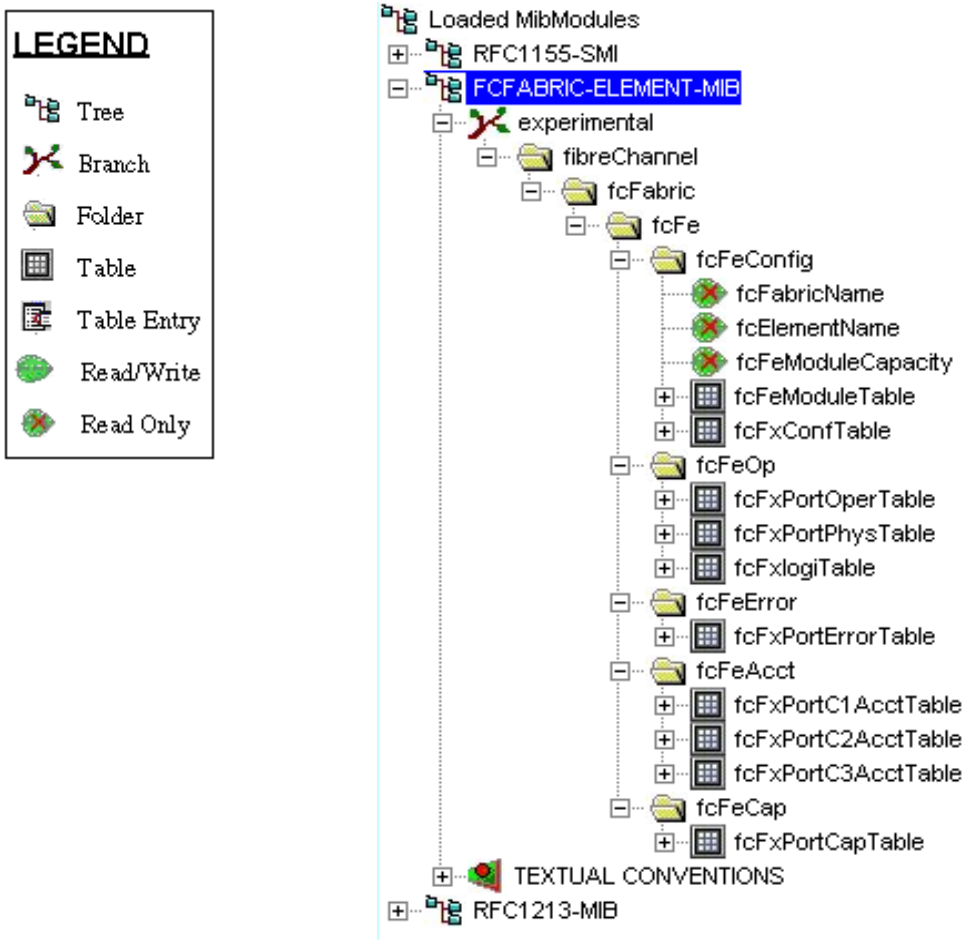


Figure 3–1: FE-MIB overall tree structure

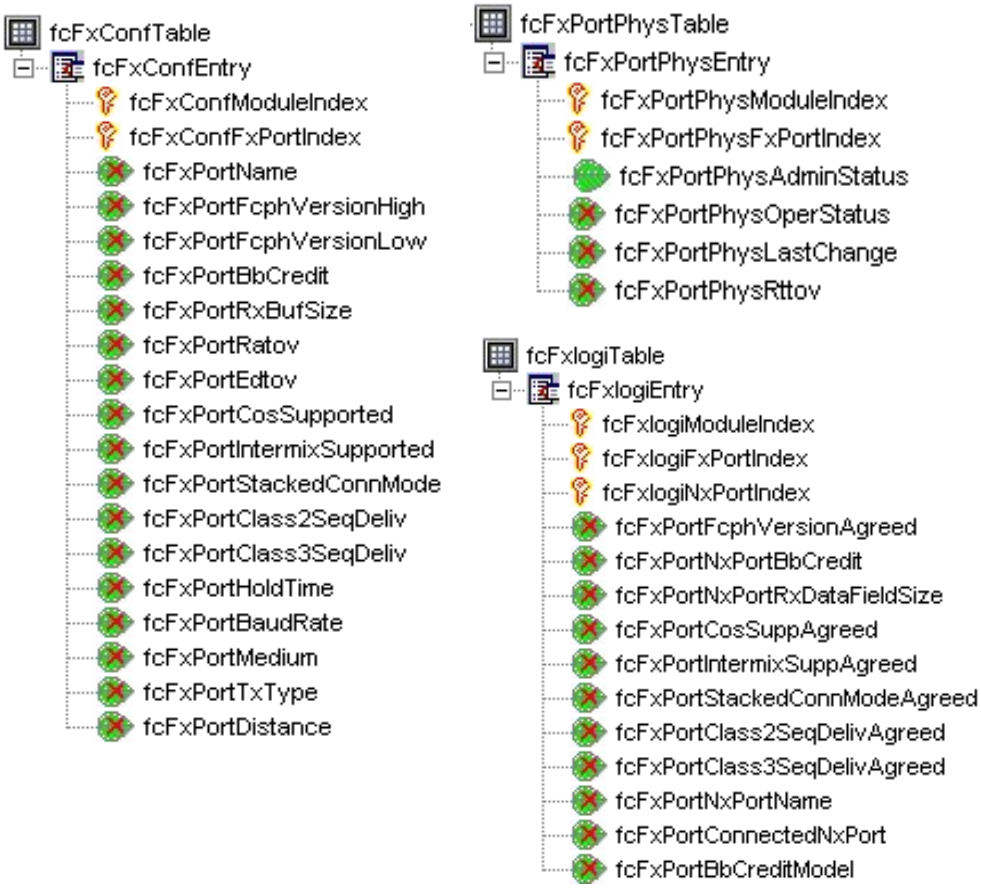


Figure 3–2: Tree structure for fcFeConfig and fcFeOp tables

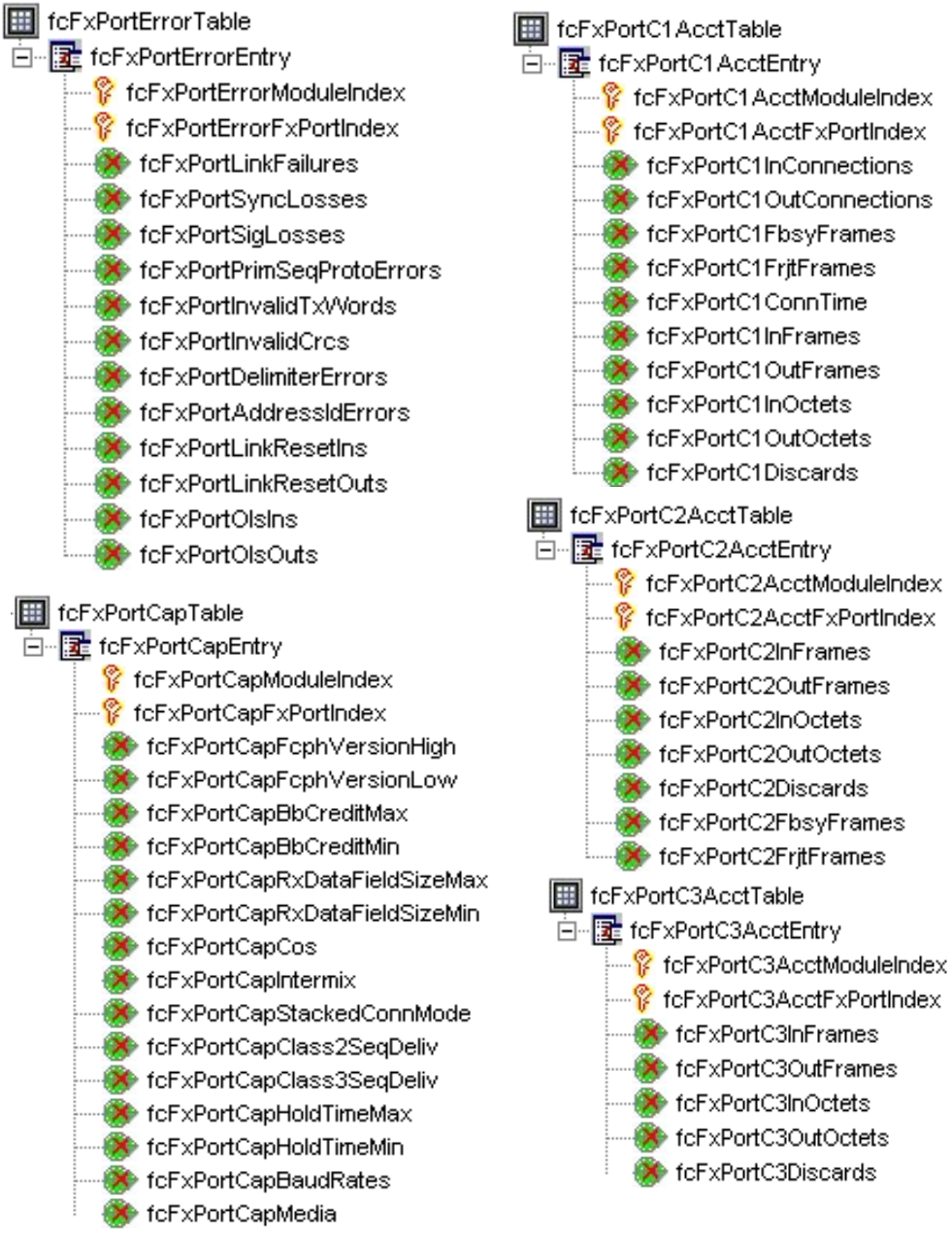


Figure 3–3: Tree structure for fcFeError, fcFeAcct, and fcFeCap tables

Definitions for FE-MIB Object Types

Table 3–1 contains the definitions that are used for FE-MIB.

Table 3–1: MIB-II Conventions

Type Definition	Value	Declaration	Description
Display String	Octet String of size 0 to 255		
MilliSeconds	Integer from 0 to 2147383647		
MicroSeconds	Integer from 0 to 2147383647		
FcNameId Worldwide Name or Fibre Channel Name associated with an FC entity. It's 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.	Octet String of size 8	Name_Identifier hex values: 0—Ignored) 1—IEEE 48-bit address) 2—IEEE extended) 3—Locally assigned) 4—32-bit IP address)	
FcNameId	Octet String of size 8		
FabricName FcNameId - The Name Identifier of a Fabric. Each Fabric provides a unique Fabric Name.	Octet String of size 8	IEEE48 Local	

Table 3–1: MIB-II Conventions (Continued)

Type Definition	Value	Declaration	Description
FabricName FcNameId - The Name Identifier associated with a port.	Octet String of size 8	IEEE48 IEEE extended Local	
FcAddressId A 24-bit value unique within the address space of a Fabric	Octet String of size 8	IEEE48 IEEE extended Local	
FcRxDataFieldSize	Integer from 128 to 2112		
FcBbCredit	Integer from 0 to 32767		
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)	

Table 3–1: MIB-II Conventions (Continued)

Type Definition	Value	Declaration	Description
Fc0BaudRate	Integer according to FC-0 Baud Rates	1 (other) 2 (oneEighth) 4 (quarter) 8 (half) 16 (full) 32 (double) 64 (quadruple)	None of below 155 Mbaud (12.5MB/s) 266 Mbaud (25.0MB/s) 532 Mbaud (50.0MB/s) 1 Gbaud (100MB/s) 2 Gbaud (200MB/s) 4 Gbaud (400MB/s)
Fc0BaudRateCap	Integer from 0 to 127	bit 0(other) bit 1 (oneEighth) 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 (multi-mode fibre 50 micron (m5)) bit 3 (multi-mode fibre 62.5 micron (m6)) bit 4 (video cable (tv)) bit 5 (miniature cable (mi))	

Table 3–1: MIB-II Conventions (Continued)

Type Definition	Value	Declaration	Description
Fc0MediaCap (continued)		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)	

Table 3–1: MIB-II Conventions (Continued)

Type Definition	Value	Declaration	Description
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)	

The Configuration Group

This group consists of scalar objects and tables. It contains the configuration and service parameters of the Fabric Element and the FxPorts.

The group represents a set of parameters associated with the Fabric Element or an FxPort to support its NxPorts.

Implementation of this group is mandatory.

The configuration group consists of the following objects:

Configuration

Configuration consists of the following:

- fcFabricName on page 3-11
- fcElementName on page 3-12
- fcFeModuleCapacity on page 3-13

fcFabricName

Syntax

```
FabricName
```

Access

Read-only

Status

Mandatory

Description

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

NOTE: Returns the WWN of the switch.

fcElementName

Syntax

`FcNameId`

Access

Read-only

Status

Mandatory

Description

The Name_Identifier of the fabric element.

NOTE: Returns the WWN of the switch.

fcFeModuleCapacity

Syntax

`fcFeModuleCapacity`

Access

Read-only

Status

Mandatory

Description

The maximum number of modules in the Fabric Element, regardless of their current state.

NOTE: The valid value for Compaq StorageWorks Fibre Channel SAN Switches = 1.

fc Fabric Element Module Table

The fc Fabric Element Module Table consists of:

fcFeModuleTable

Syntax

Sequence of `fcFeModuleEntry`

Access

Not accessible

Status

Mandatory

Description

A table that contains, one entry for each module in the Fabric Element, information of the modules.

fcFeModuleEntry [fcFeModuleTable]

Syntax

`fcFeModuleEntry`

Access

Not accessible

Status

Mandatory

Description

An entry containing the configuration parameters of a module.

Index

Table 3–2 contains the `fcFeModuleEntry` objects and object types.

Table 3–2: fcFeModuleEntry Objects and Object Types

Object	Description
`fcFeModuleIndex` on page 3–16	FcFeModuleIndex
`fcFeModuleDescr` on page 3–17	Display String
`fcFeModuleObjectID` on page 3–18	Object Identifier
`fcFeModuleOperStatus` on page 3–19	Integer
`fcFeModuleLastChange` on page 3–20	TimeTicks
`fcFeModuleFxPortCapacity` on page 3–21	FcFeFxPortCapacity

fcFeModuleIndex [fcFeModuleTable]

Syntax

`fcFeModuleIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the module within the Fabric Element for which this entry contains information. This value is never greater than `fcFeModuleCapacity`.

fcFeModuleDescr [fcFeModuleTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

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: See `sysDescr` in Chapter 1, "MIB-II Object Types."

fcFeModuleObjectID [fcFeModuleTable]

Syntax

Object Identifier

Access

Read-only

Status

Mandatory

Description

The vendor's authoritative identification of the module. This value may 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
- identifier 1.3.6.1.4.1.99649.3.9 was assigned to its 'FeFiFo-16 PlugInCard.'

NOTE: See `sysObjectID` in Chapter 1, "MIB-II Object Types."

fcFeModuleOperStatus [fcFeModuleTable]

Syntax

The syntax is described in Table 3–3.

Table 3–3: fcFeModuleOperStatus Syntax

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

Access

Read-only

Status

Mandatory

Description

Indicates the operational status of the module.

fcFeModuleLastChange [fcFeModuleTable]

Syntax

TimeTicks

Access

Read-only

Status

Mandatory

Description

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

fcFeModuleFxPortCapacity [fcFeModuleTable]

Syntax

`fcFeFxPortCapacity`

Access

Read-only

Status

Mandatory

Description

The number of FxPort 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 value for Compaq StorageWorks Fibre Channel SAN Switches = 16.

fcFeModuleName [fcFeModuleTable]

Syntax

`FcNameId`

Access

Read-only (instead of read-write)

Status

Mandatory

Description

The Name_Identifier of the module.

NOTE: The return value is the WWN of the switch.

FxPort Configuration Table

The FxPort Configuration Table consists of:

- fcFxConfTable on page 3-23
- fcFxConfEntry on page 3-24
- fcFxConfModuleIndex on page 3-26
- fcFxConfFxPortIndex on page 3-27
- fcFxPortName on page 3-28

fcFxConfTable

Syntax

Sequence of `FcFxConfEntry`

Access

Not accessible

Status

Mandatory

Description

A table that contains, one entry for each FxPort in the Fabric Element, configuration and service parameters of the FxPorts.

fcFxConfEntry [fcFxConfTable]

Syntax

`fcFxConfEntry`

Access

Not accessible

Status

Mandatory

Description

An entry containing the configuration and service parameters of a FxPort.

Index

Table 3–4 contains the `fcFxConfEntry` objects and object types.

Table 3–4: fcFxConfEntry Objects and Object Types

Object	Description
`fcFxConfModuleIndex` on page 3–26	FcFeModuleIndex
`fcFxConfFxPortIndex` on page 3–27	FcFeFxPortIndex
`fcFxPortName` on page 3–28	FcPortName
FxPort Common Service Parameters	
`fcFxPortFcphVersionHigh` on page 3–29	FcphVersion
`fcFxPortFcphVersionLow` on page 3–30	FcphVersion
`fcFxPortBbCredit` on page 3–31	FcBbCredit
`fcFxPortRxBufSize` on page 3–32	FcRxDataFieldSize
`fcFxPortRatov` on page 3–33	MilliSeconds
`fcFxPortEdtov` on page 3–34	MilliSeconds

Table 3–4: fcFxConfEntry Objects and Object Types (Continued)

Object	Description
FxPort Class Service Parameters	
`fcFxPortCosSupported` on page 3–35	FcCosCap
`fcFxPortIntermixSupported` on page 3–36	Integer
`fcFxPortStackedConnMode` on page 3–37	FcStackedConnMode
`fcFxPortClass2SeqDeliv` on page 3–38	Integer
`fcFxPortClass3SeqDeliv` on page 3–39	Integer
Other FxPort Parameters	
`fcFxPortHoldTime` on page 3–40	MicroSeconds
`fcFxPortBaudRate` on page 3–41	Fc0BaudRate
`fcFxPortMedium` on page 3–42	Fc0Medium
`fcFxPortTxType` on page 3–43	Fc0TxType
`fcFxPortDistance` on page 3–44	Fc0Distance

fcFxConfModuleIndex [fcFxConfTable]

Syntax

`fcFeModuleIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the module containing the FxPort for which this entry contains information.

fcFxConfFxPortIndex [fcFxConfTable]

Syntax

`fcFeFxPortIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the FxPort within the module. This number ranges from 1 to the value of `fcFeModulePortCapacity` for the associated module. The value remains constant for the identified FxPort until the module is re-initialized.

fcFxPortName [fcFxConfTable]

Syntax

`fcFxPortName`

Access

Read-only

Status

Mandatory

Description

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

NOTE: The return value is the WWN of the port.

FxPort Common Service Parameters

The FxPort COmmon Service Parameters consists of:

- fcFxPortFcphVersionHigh on page 3-29
- fcFxPortFcphVersionLow on page 3-30
- fcFxPortBbCredit on page 3-31
- fcFxPortRxBufSize on page 3-32
- fcFxPortRatov on page 3-33
- fcFxPortEdtov on page 3-34

fcFxPortFcphVersionHigh [fcFxConfTable]

Syntax

`FcphVersion`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortFcphVersionLow [fcFxConfTable]

Syntax

`FcphVersion`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortBbCredit [fcFxConfTable]

Syntax

`FcBbCredit`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortRxBufSize [fcFxConfTable]

Syntax

`FcRxDataFieldSize`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortRatov [fcFxConfTable]

Syntax

MilliSeconds

Access

Read-only

Status

Mandatory

Description

The Resource_Allocation_Timeout Value configured for the FxPort. This is used as the time-out value for determining when to reuse an NxPort resource such as a Recovery_Qualifier. It represents E_D_TOV (see `fcFxPortEdtov`, on page 3–34) plus twice the maximum time that a frame may be delayed within the Fabric and still be delivered.

fcFxPortEdtov [fcFxConfTable]

Syntax

MilliSeconds

Access

Read-only

Status

Mandatory

Description

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

FxPort Class Service Parameters

The FxPort Class Service Parameters consist of:

- fcFxPortCosSupported on page 3-35
- fcFxPortIntermixSupported on page 3-36
- fcFxPortStackedConnMode on page 3-37
- fcFxPortClass2SeqDeliv on page 3-38
- fcFxPortClass3SeqDeliv on page 3-39

fcFxPortCosSupported [fcFxConfTable]

Syntax

FcCosCap

Access

Read-only

Status

Mandatory

Description

A value indicating the set of Classes of Service supported by the FxPort.

fcFxPortIntermixSupported [fcFxConfTable]

Syntax

Syntax described in Table 3–5.

Table 3–5: fcFxPortIntermixSupported Syntax

Value	Declaration	Description
Integer	1 (yes)	FxPort supports an Intermixed Dedicated Connection.
	2 (no)	FxPort does not support an Intermixed Dedicated Connection.

Access

Read-only

Status

Mandatory

Description

A flag indicating whether the FxPort supports an Intermixed Dedicated Connection.

fcFxPortStackedConnMode [fcFxConfTable]

Syntax

`FcStackedConnMode`

Access

Read-only

Status

Mandatory

Description

A value indicating the mode of Stacked Connect supported by the FxPort.

fcFxPortClass2SeqDeliv [fcFxConfTable]

Syntax

Syntax described in Table 3–6.

Table 3–6: fcFxPortClass2SeqDeliv Syntax

Value	Declaration	Description
Integer	1 (yes)	Class 2 Sequential Delivery is supported by the FxPort.
	2 (no)	Class 2 Sequential Delivery is not supported by the FxPort.

Access

Read-only

Status

Mandatory

Description

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

fcFxPortClass3SeqDeliv [fcFxConfTable]

Syntax

Syntax described in Table 3–7.

Table 3–7: fcFxPortClass3SeqDeliv Syntax

Value	Declaration	Description
Integer	1 (yes)	Class 3 Sequential Delivery is supported by the FxPort.
	2 (no)	Class 3 Sequential Delivery is not supported by the FxPort.

Access

Read-only

Status

Mandatory

Description

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

Other FxPort Parameters

Other FxPort Parameters consist of:

fcFxPortHoldTime [fcFxConfTable]

Syntax

MicroSeconds

Access

Read-only

Status

Mandatory

Description

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

fcFxPortBaudRate [fcFxConfTable]

Syntax

```
Fc0BaudRate
```

Access

Read-only

Status

Deprecated

Description

The FC-0 baud rate of the FxPort.

NOTE: The valid value for Compaq StorageWorks Fibre Channel SAN Switches = 16 (full), 32 (double)

fcFxPortMedium [fcFxConfTable]

Syntax

`Fc0Medium`

Access

Read-only

Status

Deprecated

Description

The FC-0 medium of the FxPort.

fcFxPortTxType [fcFxConfTable]

Syntax

`Fc0TxType`

Access

Read-only

Status

Deprecated

Description

The FC-0 transmitter type of the FxPort.

fcFxPortDistance [fcFxConfTable]

Syntax

```
Fc0Distance
```

Access

Read-only

Status

Deprecated

Description

The FC-0 distance range of the FxPort transmitter.

The Operation Group

This group consists of tables that contains operational status and established service parameters for the Fabric Element and the attached NxPorts.

Implementation of this group is mandatory.

The operation group consistesmof the following object types:

- FxPort Operation Table on page 3-45
- FxPort Physical Level Table on page 3-56
- FxPort Fabric Login Table on page 3-64

FxPort Operation Table

ThemFxPort Operation Table consists of:

- fcFxPortOperTable on page 3-46
- fcFxPortOperEntry on page 3-47
- fcFxPortOperModuleIndex on page 3-48
- fcFxPortOperFxPortIndex on page 3-49
- fcFxPortID on page 3-50
- fcFPortAttachedPortName on page 3-51
- fcFPortConnectedPort on page 3-52
- fcFxPortBbCreditAvailable on page 3-53
- fcFxPortOperMode on page 3-54
- fcFxPortAdminMode on page 3-55
- fcFxPortPhysTable on page 3-56
- fcFxPortPhysEntry on page 3-57
- fcFxPortPhysModuleIndex on page 3-58
- fcFxPortPhysFxPortIndex on page 3-59
- fcFxPortPhysAdminStatus on page 3-60
- fcFxPortPhysOperStatus on page 3-61
- fcFxPortPhysLastChange on page 3-62
- fcFxPortPhysRttov on page 3-63

fcFxPortOperTable

Syntax

Sequence of `fcFxPortOperEntry`

Access

Not accessible

Status

Mandatory

Description

A table that contains, one entry for each FxPort in the Fabric Element, operational status and parameters of the FxPorts.

fcFxPortOperEntry [fcFxPortOperTable]

Syntax

`fcFxPortOperEntry`

Access

Not accessible

Status

Mandatory

Description

An entry containing operational status and parameters of a FxPort.

Index

Table 3–8 contains the `fcFxPortOperEntry` objects and object types.

Table 3–8: fcFxPortOperEntry Objects and Object Types

Object	Description
`fcFxPortOperModuleIndex` on page 3–48	FcFeModuleIndex
`fcFxPortOperFxPortIndex` on page 3–49	FcFeFxPortIndex
`fcFxPortID` on page 3–50	FcAddressId
`fcFPortAttachedPortName` on page 3–51	FcPortName
`fcFPortConnectedPort` on page 3–52	FcAddressId
`fcFxPortBbCreditAvailable` on page 3–53	Gauge
`fcFxPortOperMode` on page 3–54	FcFxPortMode
`fcFxPortAdminMode` on page 3–55	FcFxPortMode

fcFxPortOperModuleIndex [fcFxPortOperTable]

Syntax

`fcFeModuleIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the module containing the FxPort for which this entry contains information.

fcFxPortOperFxPortIndex [fcFxPortOperTable]

Syntax

`fcFeFxPortIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the FxPort within the module. This number ranges from 1 to the value of `fcFeModulePortCapacity` for the associated module. The value remains constant for the identified FxPort until the module is re-initialized.

fcFxPortID [fcFxPortOperTable]

Syntax

`fcAddressId`

Access

Read-only

Status

Mandatory

Description

The address identifier by which this FxPort is identified within the Fabric. The FxPort may assign its address identifier to its attached NxPort(s) during Fabric Login.

fcFPortAttachedPortName [fcFxPortOperTable]

Syntax

`fcPortName`

Access

Read-only

Status

Deprecated

Description

The port name of the attached N_Port, if applicable. If the value of this object is '0000000000000000'H, this FxPort has no NxPort attached to it. This variable has been deprecated and may be implemented for backward compatibility.

fcFPortConnectedPort [fcFxPortOperTable]

Syntax

`FcAddressId`

Access

Read-only

Status

Deprecated

Description

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

fcFxPortBbCreditAvailable [fcFxPortOperTable]

Syntax

Gauge

Access

Read-only

Status

Mandatory

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 [fcFxPortOperTable]

Syntax

`FcFxPortMode`

Access

Read-only

Status

Mandatory

Description

The current operational mode of the FxPort.

fcFxPortAdminMode [fcFxPortOperTable]

Syntax

`FcFxPortMode`

Access

Read-only -- instead of read-write

Status

Mandatory

Description

The desired operational mode of the FxPort.

FxPort Physical Level Table

The FxPort Physical Level Table consists of:

fcFxPortPhysTable

Syntax

Sequence of `fcFxPortPhysEntry`

Access

Not accessible

Status

Mandatory

Description

A table that contains, one entry for each FxPort in the Fabric Element, physical level status and parameters of the FxPorts.

fcFxPortPhysEntry [fcFxPortPhysTable]

Syntax

`fcFxPortPhysEntry`

Access

Not accessible

Status

Mandatory

Description

An entry containing physical level status and parameters of a FxPort.

Index

Table 3–9 contains the `fcFxPortPhysEntry` objects and object types.

Table 3–9: fcFxPortPhysEntry Objects and Object Types

Object	Description
`fcFxPortPhysModuleIndex` on page 3–58	FcFeModuleIndex
`fcFxPortPhysFxPortIndex` on page 3–59	FcFeFxPortIndex
`fcFxPortPhysAdminStatus` on page 3–60	Integer
`fcFxPortPhysOperStatus` on page 3–61	Integer
`fcFxPortPhysLastChange` on page 3–62	TimeTicks
`fcFxPortPhysRttov` on page 3–63	MilliSeconds

fcFxPortPhysModuleIndex [fcFxPortPhysTable]

Syntax

`FcFeModuleIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the module containing the FxPort for which this entry contains information.

fcFxPortPhysFxPortIndex [fcFxPortPhysTable]

Syntax

`FcFeFxPortIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the FxPort within the module. This number ranges from 1 to the value of `fcFeModulePortCapacity` for the associated module. The value remains constant for the identified FxPort until the module is re-initialized.

fcFxPortPhysAdminStatus [fcFxPortPhysTable]

Syntax

Syntax described in Table 3–10.

Table 3–10: fcFxPortPhysAdminStatus Syntax

Value	Declaration	Description
Integer	1 (online)	Place port online.
	2 (offline)	Take port offline.
	3 (testing	Initiate test procedures.

Access

Read-write

Status

Mandatory

Description

The desired state of the FxPort. A management station may place the FxPort in a desired state by setting this object accordingly.

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

fcFxPortPhysOperStatus [fcFxPortPhysTable]

Syntax

Syntax described in Table 3–11.

Table 3–11: fcFxPortPhysOperStatus Syntax

Value	Declaration	Description
Integer	1 (online)	Login may proceed.
	2 (offline)	Login cannot proceed.
Integer	3 (testing)	Port is under test.
	4 (link-failure)	Failure after online/testing.

NOTE: Other values may be used to indicate diagnostic for failed test.

Access

Read-only

Status

Mandatory

Description

The current operational status of the FxPort.

The 3 (testing) indicates that no operational frames can be passed.

If `fcFxPortPhysAdminStatus` is 2 (offline), then `fcFxPortPhysOperStatus` should be 2 (offline).

If `fcFxPortPhysAdminStatus` is changed to 1 (online), then `fcFxPortPhysOperStatus` should change to 1 (online).

if the FxPort is ready to accept Fabric Login request from the attached NxPort, it should proceed and remain in the 4 (link-failure) state if and only if there is a fault that prevents it from going to the 1 (online) state.

fcFxPortPhysLastChange [fcFxPortPhysTable]

Syntax

TimeTicks

Access

Read-only

Status

Mandatory

Description

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

fcFxPortPhysRttov [fcFxPortPhysTable]

Syntax

MilliSeconds

Access

Read-only

Status

Mandatory

Description

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

FxPort Fabric Login Table

This table contains one entry for each FxPort in the Fabric Element and the Service Parameters that have been established from the most recent Fabrix Login whether implicit or explicit.

This table contains, one entry for each FxPort in the Fabric Element and the Service Parameters that have been established from the most recent Fabric Login (implicit or explicit).

This table is deprecated since FEMIB v1.9. It is not supported in Fibre Channel Switch agent after firmware v1.5. Instead, the new table, FxPort Fabric Login Table (to follow after FxPort Physical Level Table), is supported.

The FxPort Fabric Login Table consists of:

fcFxlogiTable

Syntax

Sequence of `fcFxlogiEntry`

Access

Not accessible

Status

Mandatory

Description

A table that contains, one entry for each FxPort in the Fabric Element, services parameters established from the most recent Fabric Login, explicit or implicit.

fcFxlogiEntry [fcFxlogiTable]

Syntax

`FcFxlogiEntry`

Access

Not accessible

Status

Mandatory

Description

An entry containing service parameters established from a successful Fabric Login.

Index

Table 3–12 contains the `fcFxloglEntry` objects and object types.

Table 3–12: fcFxlogiEntry Objects and Object Types

Object	Description
`fcFxlogiModuleIndex` on page 3–68	FcFeModuleIndex
`fcFxlogiFxPortIndex` on page 3–69	FcFeFxPortIndex
`fcFxlogiNxPortIndex` on page 3–70	FcFeNxPortIndex
`fcFxPortFcphVersionAgreed` on page 3–71	FcphVersion
`fcFxPortNxPortBbCredit` on page 3–72	FcBbCredit
`fcFxPortNxPortRxDataFieldSize` on page 3–73	FcRxDataFieldSize
`fcFxPortCosSuppAgreed` on page 3–74	FcCosCap
`fcFxPortIntermixSuppAgreed` on page 3–75	Integer
`fcFxPortStackedConnModeAgreed` on page 3–76	FcStackedConnMode
`fcFxPortClass2SeqDelivAgreed` on page 3–77	Integer
`fcFxPortClass3SeqDelivAgreed` on page 3–78	Integer

Table 3–12: fcFxlogiEntry Objects and Object Types (Continued)

Object	Description
`fcFxPortNxPortName` on page 3–79	FcPortName
`fcFxPortConnectedNxPort` on page 3–80	FcAddressId
`fcFxPortBbCreditModel` on page 3–81	FcBbCreditModel

fcFxlogiModuleIndex [fcFxlogiTable]

Syntax

`FcFeModuleIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the module containing the FxPort for which this entry contains information.

fcFxlogiFxPortIndex [fcFxlogiTable]

Syntax

`FcFeFxPortIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the FxPort within the module. This number ranges from 1 to the value of `fcFeModulePortCapacity` for the associated module. The value remains constant for the identified FxPort until the module is re-initialized.

fcFxlogiNxPortIndex [fcFxlogiTable]

Syntax

`FcFeNxPortIndex`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortFcphVersionAgreed [fcFxlogiTable]

Syntax

`FcphVersion`

Access

Read-only

Status

Mandatory

Description

The version of FC-PH that the FxPort has agreed to support from the Fabric Login.

fcFxPortNxPortBbCredit [fcFxlogiTable]

Syntax

`FcBbCredit`

Access

Read-only

Status

Mandatory

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 NxPort.

It is for buffer- to-buffer flow control in the direction from FxPort to NxPort. The buffer-to-buffer flow control mechanism is indicated in the respective `fcFxPortBbCredit` Model.

fcFxPortNxPortRxDataFieldSize [fcFxlogiTable]

Syntax

`FcRxDataFieldSize`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortCosSuppAgreed [fcFxlogiTable]

Syntax

`FcCosCap`

Access

Read-only

Status

Mandatory

Description

Indicates that the attached NxPort has requested the FxPort for the support of classes of services and the FxPort has granted the request.

fcFxPortIntermixSuppAgreed [fcFxlogiTable]

Syntax

Syntax described in Table 3–13.

Table 3–13: fcFxPortIntermixSuppAgreed Syntax

Value	Declaration	Description
Integer	1 (yes)	The attached NxPort has requested the FxPort for the support of Intermix and the FxPort has granted the request.
	2 (no)	The attached NxPort has not requested the FxPort for the support of Intermix.

Access

Read-only

Status

Mandatory

Description

A variable indicating that the attached NxPort has requested the FxPort for the support of Intermix and the FxPort has granted the request. This flag is only valid if Class 1 service is supported.

fcFxPortStackedConnModeAgreed [fcFxlogiTable]

Syntax

`FcStackedConnMode`

Access

Read-only

Status

Mandatory

Description

Indicates whether the FxPort has agreed to support stacked connect from the Fabric Login. This is only meaningful if Class 1 service has been agreed to.

fcFxPortClass2SeqDelivAgreed [fcFxlogiTable]

Syntax

Syntax described in Table 3–14.

Table 3–14: fcFxPortClass2SeqDelivAgreed Syntax

Value	Declaration	Description
Integer	1 (yes)	The FxPort has agreed to support Class 2 sequential delivery from the Fabric Login.
	2 (no)	The FxPort has not agreed to support Class 2 sequential delivery from the Fabric Login.

Access

Read-only

Status

Mandatory

Description

A variable indicating whether the FxPort has agreed to support Class 2 sequential delivery from the Fabric Login. This is only meaningful if Class 2 service has been agreed.

fcFxPortClass3SeqDelivAgreed [fcFxlogiTable]

Syntax

Syntax described in Table 3–15.

Table 3–15: fcFxPortClass3SeqDelivAgreed Syntax

Value	Declaration	Description
Integer	1 (yes)	The FxPort has agreed to support Class 3 sequential delivery from the Fabric Login.
	2 (no)	The FxPort has not agreed to support Class 3 sequential delivery from the Fabric Login.

Access

Read-only

Status

Mandatory

Description

A flag indicating whether the FxPort has agreed to support Class 3 sequential delivery from the Fabric Login. This is only meaningful if Class 3 service has been agreed.

fcFxPortNxPortName [fcFxlogiTable]

Syntax

FcPortName

Access

Read-only

Status

Mandatory

Description

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

fcFxPortConnectedNxPort [fcFxlogiTable]

Syntax

`FcAddressId`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortBbCreditModel [fcFxlogiTable]

Syntax

`FcBbCreditModel`

Access

Read-only

Status

Mandatory

Description

Identifies the BB_Credit model used by the FxPort. The regular model refers to the buffer-to-buffer flow control mechanism defined in FC-PH [1] is 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.

The Error Group

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

Implementation of this group is optional.

The error group consists of the FxPort Error Table:

FxPort Error Table

This table contains, one entry for each FxPort in the Fabric Element and counters recording numbers of errors detected since the management agent re-initialized.

NOTE: The first 6 columnar objects after the port index corresponds to the counters in the Link ErrorStatus Block.

fcFxPortErrorTable

Syntax

Sequence of `fcFxPortErrorEntry`

Access

Not accessible

Status

Mandatory

Description

A table that contains, one entry for each FxPort, counters that record the numbers of errors detected since the management agent re-initialized.

NOTE: The first 6 columnar objects after the port index corresponds to the counters in the Link ErrorStatus Block.

fcFxPortErrorEntry [fcFxPortErrorTable]

Syntax

`fcFxPortErrorEntry`

Access

Not accessible

Status

Mandatory

Description

An entry containing error counters of a FxPort.

Index

Table 3–16 contains the `fcFxPortErrorEntry` objects and object types.

Table 3–16: FcFxPortErrorEntry Objects and Object Types

Object	Description
`fcFxPortErrorModuleIndex` on page 3–86	FcFeModuleIndex
`fcFxPortErrorFxPortIndex` on page 3–87	FcFeFxPortIndex
`fcFxPortLinkFailures` on page 3–88	Counter
`fcFxPortSyncLosses` on page 3–89	Counter
`fcFxPortSigLosses` on page 3–90	Counter
`fcFxPortPrimSeqProtoErrors` on page 3–91	Counter
`fcFxPortInvalidTxWords` on page 3–92	Counter
`fcFxPortInvalidCrcs` on page 3–93	Counter
`fcFxPortDelimiterErrors` on page 3–94	Counter
`fcFxPortAddressIdErrors` on page 3–95	Counter
`fcFxPortLinkResetIns` on page 3–96	Counter

Table 3–16: FcFxPortErrorEntry Objects and Object Types (Continued)

Object	Description
`fcFxPortLinkResetOut` on page 3–97	Counter
`fcFxPortOlsIns` on page 3–98	Counter
`fcFxPortOlsOuts` on page 3–99	Counter

fcFxPortErrorModuleIndex [fcFxPortErrorTable]

Syntax

`FcFeModuleIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the module containing the FxPort for which this entry contains information.

fcFxPortErrorFxPortIndex [fcFxPortErrorTable]

Syntax

`FcFeFxPortIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the FxPort within the module. This number ranges from 1 to the value of `fcFeModulePortCapacity` for the associated module. The value remains constant for the identified FxPort until the module is re-initialized.

fcFxPortLinkFailures [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of link failures detected by this FxPort.

fcFxPortSyncLosses [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of loss of synchronization detected by the FxPort.

fcFxPortSigLosses [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of loss of signal detected by the FxPort.

fcFxPortPrimSeqProtoErrors [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of primitive sequence protocol errors detected by the FxPort.

fcFxPortInvalidTxWords [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of invalid transmission word detected by the FxPort.

fcFxPortInvalidCrcs [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

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

fcFxPortDelimiterErrors [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of Delimiter Errors detected by this FxPort.

fcFxPortAddressIdErrors [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of address identifier errors detected by this FxPort.

fcFxPortLinkResetIns [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of Link Reset Protocol received by this FxPort from the attached NxPort.

fcFxPortLinkResetOuts [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of Link Reset Protocol issued by this FxPort to the attached NxPort.

fcFxPortOlsIns [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of Offline Sequence received by this FxPort.

fcFxPortOlsOuts [fcFxPortErrorTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

The number of Offline Sequence issued by this FxPort.

The Capability Group

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

Implementation of this group is optional.

The capability group consists of the FxPort Capability Table:

FxPort Capability Table

fcFxPortCapTable

Syntax

Sequence of `fcFxPortCapEntry`

Access

Not accessible

Status

Mandatory

Description

A table that contains, one entry for each FxPort, the capabilities of the port within the Fabric Element.

fcFxPortCapEntry [fcFxPortCapTable]

Syntax

`fcFxPortCapEntry`

Access

Not accessible

Status

Mandatory

Description

An entry containing the capabilities of a FxPort.

Index

Table 3–17 contains the `fcFxPortCapEntry` objects and object types.

Table 3–17: fcFxPortCapEntry Objects and Object Types

Object	Description
`fcFxPortCapModuleIndex` on page 3–104	FcFeModuleIndex
`fcFxPortCapFxPortIndex` on page 3–105	FcFeFxPortIndex
`fcFxPortCapFcphVersionHigh` on page 3–106	FcphVersion
`fcFxPortCapFcphVersionLow` on page 3–107	FcphVersion
`fcFxPortCapBbCreditMax` on page 3–108	FcBbCredit
`fcFxPortCapBbCreditMin` on page 3–109	FcBbCredit
`fcFxPortCapRxDataFieldSizeMax` on page 3–110	FcRxDataFieldSize
`fcFxPortCapRxDataFieldSizeMin` on page 3–111	FcRxDataFieldSize
`fcFxPortCapCos` on page 3–112	FcCosCap
`fcFxPortCapIntermix` on page 3–113	Integer
`fcFxPortCapStackedConnMode` on page 3–114	FcStackedConnMode

Table 3–17: fcFxPortCapEntry Objects and Object Types (Continued)

Object	Description
fcFxPortCapClass2SeqDeliv on page 3–115	Integer
fcFxPortCapClass3SeqDeliv on page 3–116	Integer
fcFxPortCapHoldTimeMax on page 3–117	MicroSeconds
fcFxPortCapHoldTimeMin on page 3–118	MicroSeconds
fcFxPortCapBaudRates on page 3–119	Fc0BaudRateCap
fcFxPortCapMedia on page 3–120	Fc0MediaCap

fcFxPortCapModuleIndex

Syntax

`FcFeModuleIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the module containing the FxPort for which this entry contains information.

fcFxPortCapFxPortIndex [fcFxPortCapTable]

Syntax

`FcFeFxPortIndex`

Access

Read-only

Status

Mandatory

Description

Identifies the FxPort within the module. This number ranges from 1 to the value of `fcFeModulePortCapacity` for the associated module. The value remains constant for the identified FxPort until the module is re-initialized.

fcFxPortCapFcphVersionHigh [fcFxPortCapTable]

Syntax

`FcphVersion`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortCapFcphVersionLow [fcFxPortCapTable]

Syntax

`FcphVersion`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortCapBbCreditMax [fcFxPortCapTable]

Syntax

`FcBbCredit`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortCapBbCreditMin [fcFxPortCapTable]

Syntax

`FcBbCredit`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortCapRxDataFieldSizeMax [fcFxPortCapTable]

Syntax

`FcRxDataFieldSize`

Access

Read-only

Status

Mandatory

Description

The maximum size in bytes of the Data Field in a frame that the FxPort is capable of receiving from its attached NxPort.

fcFxPortCapRxDataFieldSizeMin [fcFxPortCapTable]

Syntax

`FcRxDataFieldSize`

Access

Read-only

Status

Mandatory

Description

The minimum size in bytes of the Data Field in a frame that the FxPort is capable of receiving from its attached NxPort.

fcFxPortCapCos [fcFxPortCapTable]

Syntax

`FcCosCap`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortCapIntermix [fcFxPortCapTable]

Syntax

Syntax described in Table 3–18.

Table 3–18: fcFxPortCapIntermix Syntax

Value	Declaration	Description
Integer	1 (yes)	The FxPort is capable of supporting the intermixing of Class 2 and Class 3 frames during a Class 1 connection.
	2 (no)	The FxPort is not capable of supporting the intermixing of Class 2 and Class 3 frames during a Class 1 connection.

Access

Read-only

Status

Mandatory

Description

A flag indicating whether the FxPort 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.

fcFxPortCapStackedConnMode [fcFxPortCapTable]

Syntax

`FcStackedConnMode`

Access

Read-only

Status

Mandatory

Description

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

fcFxPortCapClass2SeqDeliv [fcFxPortCapTable]

Syntax

Syntax described inTable 3–19.

Table 3–19: fcFxPortCapClass2SeqDeliv Syntax

Value	Declaration	Description
Integer	1 (yes)	The FxPort is capable of supporting Class 2 Sequential Delivery.
	2 (no)	The FxPort is not capable of supporting Class 2 Sequential Delivery.

Access

Read-only

Status

Mandatory

Description

A flag indicating whether the FxPort is capable of supporting Class 2 Sequential Delivery.

fcFxPortCapClass3SeqDeliv [fcFxPortCapTable]

Syntax

Syntax described in Table 3–20.

Table 3–20: fcFxPortCapClass3SeqDeliv Syntax

Value	Declaration	Description
Integer	1 (yes)	The FxPort is capable of supporting Class 3 Sequential Delivery.
	2 (no)	The FxPort is capable of supporting Class 3 Sequential Delivery.

Access

Read-only

Status

Mandatory

Description

A flag indicating whether the FxPort is capable of supporting Class 3 Sequential Delivery.

fcFxPortCapHoldTimeMax [fcFxPortCapTable]

Syntax

MicroSeconds

Access

Read-only

Status

Mandatory

Description

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

fcFxPortCapHoldTimeMin [fcFxPortCapTable]

Syntax

MicroSeconds

Access

Read-only

Status

Mandatory

Description

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

fcFxPortCapBaudRates [fcFxPortCapTable]

Syntax

`Fc0BaudRateCap`

Access

Read-only

Status

Deprecated

Description

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

fcFxPortCapMedia [fcFxPortCapTable]

Syntax

`Fc0MediaCap`

Access

Read-only

Status

Deprecated

Description

A value indicating the set of media that the FxPort is capable of supporting. This variable has been Deprecated and may be implemented for backward compatibility.

4

FCSwitch MIB Object Types

Overview

This chapter contains descriptions and other information that is specific to FC Switch MIB (SW-MIB) object types. This chapter provides information on the various groupings of the FCSwitch object types:

The SW-MIB FCSwitch is organized as shown in Table 4–1.

Table 4–1: FCSwitch Organizational Listing

Name	Description
bcsi	enterprises (1588)
Product Lines or Generic Product Information	
	bcsi (1) = Reserved
commDev	bcsi (2) = Communication devices

Table 4–1: FCSwitch Organizational Listing (Continued)

Name	Description
fibrechannel	commDev (1)
fcSwitch	fibrechannel (1)
sw	fcSwitch (1)
sw28k	fcSwitch (2)
sw21kN24k	fcSwitch (3)
sw20x0	fcSwitch (4)

SW-MIB File System Organization

The following graphics depict the organization and structure of SW-MIB:

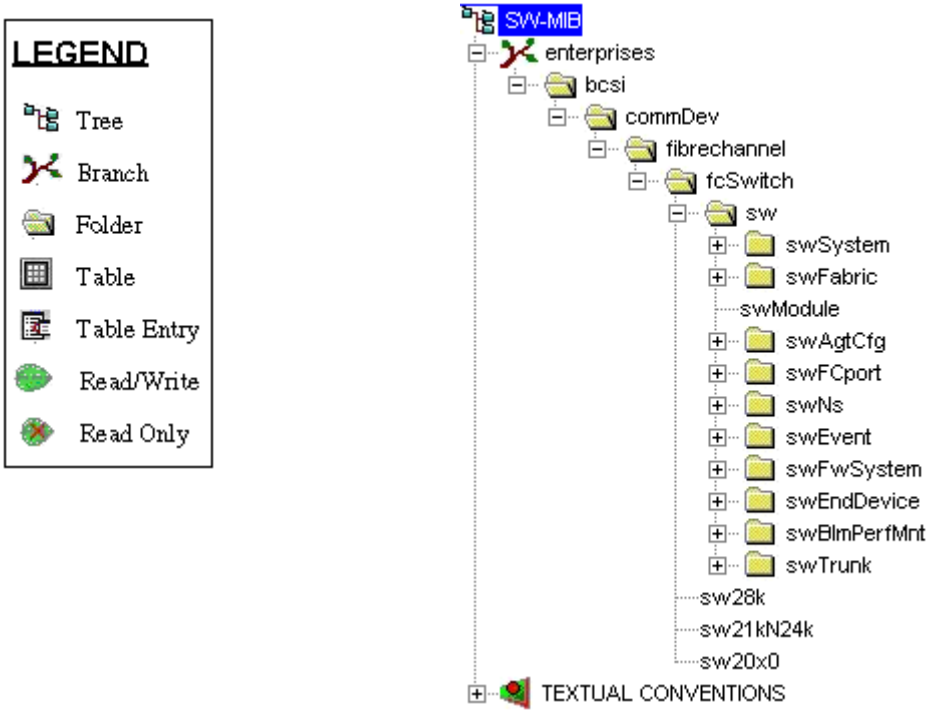


Figure 4–1: SW-MIB Overall tree structure

Figure 4–2: Structure for swSystem, swFabric, swAgtCfg, and swFCPort groups

Figure 4–3: Structure for swNs, swEvent, swFwSystem, and swEndDevice groups

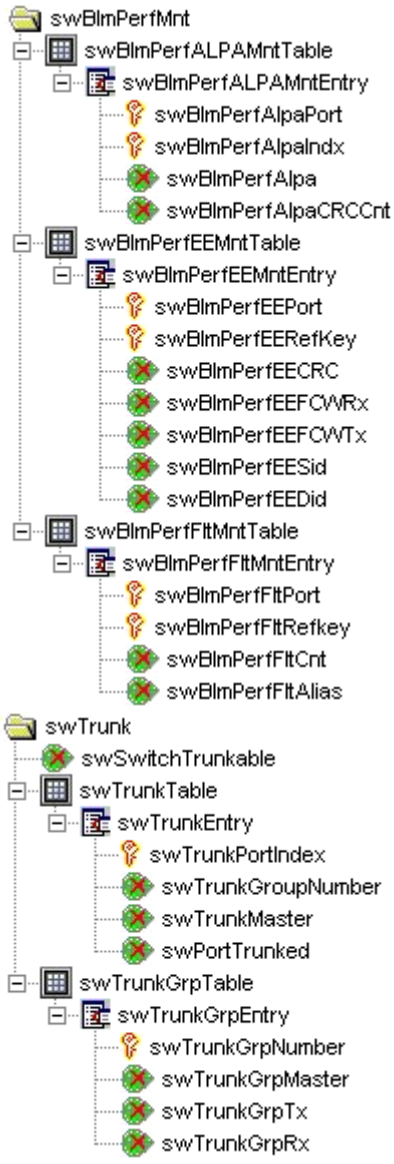


Figure 4–4: Structure for swBlm, and swTrunk groups

Definitions for SW-MIB

Table 4–2 contains the definitions that are used for SW-MIB.

Table 4–2: SW-MIB Definitions (Sheet 1 of 4)

Type Definition	Value	Declaration	Description
Display String	Octet String		
FcWwn	Octet String of size 8		
SwDomainIndex	Integer of size 0 to 239		
SwNbIndex	Integer of size 0 to 2048		
SwSensorIndex	Integer of size 0 to 1024		
SwFwActs	Integer	0 (swFwNoAction) 1 (swFwErrlog) 2 (swFwSnmptrap) 3 (swFwErrlogSnmptrap) 4 (swFwPortloglock) 5 (swFwErrlogPortloglock) 6 (swFwSnmptrapPortloglock) 7 (swFwErrlogSnmptrapPortloglock)	
SwFwLevels	Integer	1 (swFwReserved) 2 (swFwDefault) 3 (swFwCustom)	
SwFwClasses Areas	Integer	1 (swFwEnvTemp) 2 (swFwEnvFan) 3 (swFwEnvPs) 4 (swFwGbicTemp) 5 (swFwGbicRxp) 6 (swFwGbicTxp)	
		7 (swFwGbicCurrent)	

Table 4–2: SW-MIB Definitions (Sheet 2 of 4)

Type Definition	Value	Declaration	Description
		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)	

Table 4–2: SW-MIB Definitions (Sheet 3 of 4)

Type Definition	Value	Declaration	Description
		37 (swFwFCUPortPe) 38 (swFwFCUPortWords) 39 (swFwFCUPortCrcs) 40 (swFwFCUPortRXPerf) 41 (swFwFCUPortTXPerf) 42 (swFwFCUPortState) 43 (swFwFOPPortLink) 44 (swFwFOPPortSync) 45 (swFwFOPPortSignal) 46 (swFwFOPPortPe) 47 (swFwFOPPortWords) 48 (swFwFOPPortCrcs) 49 (swFwFOPPortRXPerf) 50 (swFwFOPPortTXPerf) 51 (swFwFOPPortState)	
SwFwWrite Vals	Integer	1 (swFwCancelWrite) 2 (swFwApplyWrite)	
SwFwTime base	Integer	1 (swFwTbNone) 2 (swFwTbSec) 3 (swFwTbMin) 4 (swFwTbHour) 5 (swFwTbDay)	
SwFwStatus	Integer	1 (disabled) 2 (enabled)	
SwFwEvent	Integer	1 (started) 2 (changed)	
		3 (exceeded) 4 (below) 5 (above)	

Table 4–2: SW-MIB Definitions (Sheet 4 of 4)

Type Definition	Value	Declaration	Description
		6 (inBetween)	
SwFwBehavior	Integer	1 (triggered) 2 (continuous)	
SwFwState	Integer	1 (swFwInformative) 2 (swFwNormal) 3 (swFwFaulty)	
SwFwLicense	Integer	1 (swFwLicensed) 2 (swFwNotLicensed)	

The System Group

The system group consists of the following objects:

- System Objects on page 4-9
- FLASH Administration on page 4-20
- Environment Sensor Table on page 4-30

System Objects

System Objects consist of the following:

- swCurrentDate on page 4-10
- swBootDate on page 4-11
- swFWLastUpdated on page 4-12
- swFlashLastUpdated on page 4-13
- swBootPromLastUpdated on page 4-14
- swFirmwareVersion on page 4-15
- swOperStatus on page 4-16
- swAdmStatus on page 4-17
- swTelnetShellAdmStatus on page 4-18
- swSsn on page 4-19

swCurrentDate

Syntax

Display String of size 0 to 64

Access

Read-only

Status

Mandatory

Description

The current date and time.

NOTE: The return string is displayed 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

For example: Thu Aug 17 15:16:09 2000.

swBootDate

Syntax

Display String of size 0 to 64

Access

Read-only

Status

Mandatory

Description

The date and time when the system last booted.

NOTE: The return string is displayed using the following format:

ddd MMM DD hh:mm:ss yyyy

Where:

d*dd* = Day
MMM = Month
DD = Date
hh = Hour
mm = Minute
ss = Seconds
yyyy = Year

```
For example: Thu Aug 17 15:16:09 2000.
```

swFWLastUpdated

Syntax

Display String of size 0 to 64

Access

Read-only

Status

Mandatory

Description

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

NOTE: The return string is displayed 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

For example: Thu Aug 17 15:16:09 2000.

swFlashLastUpdated

Syntax

Display String

Access

Read-only

Status

Mandatory

Description

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

NOTE: The return string is displayed 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

For example: Thu Aug 17 15:16:09 2000.

swBootPromLastUpdated

Syntax

Display String of size 0 to 64

Access

Read-only

Status

Mandatory

Description

The date and time when the BootPROM was last updated.

NOTE: The return string is displayed 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

For example: Thu Aug 17 15:16:09 2000.

swFirmwareVersion

Syntax

Display String of size 0 to 24

Access

Read-only

Status

Mandatory

Description

The current version of the firmware.

NOTE: The return value is displayed using the following format:

vM.m.f

Where:

v = The deployment indicator

M = Major version

m = Minor version

f = Software maintenance version

For example: v3.0 (indicating Fabric Operating System version 3.0).

swOperStatus

Syntax

Syntax is described in Table 4–3.

Table 4–3: swOperStatus Syntax

Value	Declaration	Description
Integer	1 (online)	The switch is accessible by an external Fibre Channel port.
	2 (offline)	The switch is not accessible.
	3 (testing)	The switch is in a built-in test mode and is not accessible by an external Fibre Channel port.
	4 (faulty)	The switch is not operational.

Access

Read-only

Status

Mandatory

Description

The current operational status of the switch.

swAdmStatus

Syntax

Syntax is described in Table 4–4.

Table 4–4: swAdmStatus Syntax

Value	Declaration	Description
Integer	1 (online)	Set the switch to be accessible by an external Fibre Channel port.
	2 (offline)	Set the switch to be inaccessible.
	3 (testing)	Set the switch to run the built-in test.
	4 (faulty)	Set the switch to a “soft” faulty condition.
	5 (reboot)	Set the switch to reboot in 1 second.
	6 (fastboot)	Set the switch to fastboot in 1 second. Fastboot causes the switch to boot but skip over the POST.

Access

Read-write

Status

Mandatory

Description

The desired administrative status of the switch. A management station may place the switch in a desired state by setting this object accordingly.

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

swTelnetShellAdmStatus

Syntax

Syntax is described in Table 4–5.

Table 4–5: swTelnetShellAdmStatus Syntax

Value	Declaration	Description
Integer	0 (unknown)	The status of the current telnet shell task is unknown.
	1 (terminated)	The current telnet shell task is deleted.

Access

Read-write

Status

Mandatory

Description

The desired administrative status of the telnet shell.

NOTE: 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.

swSsn

Syntax

Display String of size 0 to 128

Access

Read-only

Status

Mandatory

Description

The soft serial number of the switch.

NOTE: By default, the return value is the WWN of the switch.

FLASH Administration

Flash Administration 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:

1. Set swFlashDLHost.0, swFlashDLUser.0 and swFlashDLFile.0 to appropriate host IP address in user dot notation (for example, 192.168.1.7), user name (for example, administrator), and
2. Set file name of the firmware or configuration file (for example, /home/fcswh/v2.2) respectively.

Or,

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

Flash Administration consist ofthe following objects:

swFlashDLOperStatus

Syntax

Syntax is described in Table 4–6.

Table 4–6: swFlashDLOperStatus Syntax

Value	Declaration	Description
Integer	1 (swCurrent)	The FLASH contains the current firmware image or configuration file.
	2 (swFwUpgraded)	The FLASH contains the image upgraded from the swFlashDLHost.0.
	3 (swCfUploaded)	The switch configuration file has been uploaded to the host.
	4 (swCfDownloaded)	The switch configuration file has been downloaded from the host.

Access

Read-only

Status

Mandatory

Description

The operational status of the FLASH.

swFlashDLAdmStatus

Syntax

Syntax is described in Table 4–7.

Table 4–7: swFlashDLAdmStatus Syntax

Value	Declaration	Description
Integer	1 (swCurrent)	The FLASH contains the current firmware image or configuration file.
	2 (swFwUpgrad)	The firmware in the FLASH is to be upgraded from the host specified.
	3 (swCfUpload)	The switch configuration file is to be uploaded to the host specified.
	4 (swCfDownload)	The switch configuration file is to be downloaded from the host specified.

Access

Read-write

Status

Mandatory

Description

The desired state of the FLASH.

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

NOTE: For more information about the following commands, reference the appropriate user guide.

- firmwareDownload
- configUpload
- configDownload

swFlashDLHost

Syntax

Display String of size 0 to 64

Access

Read-write

Status

Mandatory

Description

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

swFlashDLUser

Syntax

Display String of size 0 to 64

Access

Read-write

Status

Mandatory

Description

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

swFlashDLFile

Syntax

Display String of size 0 to 256

Access

Read-write

Status

Mandatory

Description

The name of the file to be downloaded or uploaded.

swFlashDLPassword

Syntax

Display String of size 0 to 100

Access

Read-write

Status

Mandatory

Description

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

swBeaconOperStatus

Syntax

Syntax described in Table 4–8.

Table 4–8: swBeaconOperStatus Syntax

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

Access

Read-only

Status

Mandatory

Description

The current operational status of the switch beacon. When the beacon is on, the LEDs on the front panel of the switch run alternately from left to right and right to left. In this state, the color of the LED is yellow. When the beacon is off, each LED will be in their its regular status indicating color and state.

swBeaconAdmStatus

Syntax

Syntax described in Table 4–9.

Table 4–9: swBeaconAdmStatus Syntax

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

Access

Read-write

Status

Mandatory

Description

The desired status of the switch beacon. When the beacon is set to on, the LEDs on the front panel of the switch run alternately from left to right and right to left. The color is yellow. When the beacon is set to off, each LED will be in its regular status indicating color and state.

swDiagResult

Syntax

Syntax described in Table 4–10.

Table 4–10: swDiagResult Syntax

Value	Declaration	Description
Integer	1 (sw-ok)	The switch is OK.
	2 (sw-central-memory-fault)	The switch has experienced a central memory fault.
	3 (sw-embedded-port-fault)	The switch has experienced an embedded port fault.

Access

Read-only

Status

Mandatory

Description

The result of the power-on startup (POST) diagnostics.

Environment Sensor Table

This table describes the Temperature, Fan, Power Supply, and Others.

The environment Sensor table consists of:

swNumSensors

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The number of sensors inside a Compaq StorageWorks Fibre Channel SAN Switch = 13

swSensorTable

Syntax

Sequence of `SwSensorEntry`

Access

Not accessible

Status

Mandatory

Description

The table of sensor entries.

swSensorEntry [swSensorTable]

Syntax

`SwSensorEntry`

Access

Not accessible

Status

Mandatory

Description

An entry of the sensor information.

Index

Table 4–11 contains the `swSensorEntry` objects and object types.

Table 4–11: swSensorEntry Objects and Object Types

Object	Description
`swSensorIndex` on page 4–33	Index
`swSensorType` on page 4–34	Integer
`swSensorStatus` on page 4–35	Integer
`swSensorValue` on page 4–36	Integer
`swSensorInfo` on page 4–37	Display String of size 0 to 255

swSensorIndex [swSensorTable]

Syntax

SwSensorIndex

Access

Read-only

Status

Mandatory

Description

The index of the sensor.

NOTE: Values for the index range from 1 through 13.

swSensorType [swSensorTable]

Syntax

Syntax described in Table 4–12.

Table 4–12: swSensorType Syntax

Value	Declaration	Description
Integer	1 (temperature)	Temperature sensor.
	2 (fan)	Fan sensor.
	3 (power-supply)	Power supply sensor.

Access

Read-only

Status

Mandatory

Description

The type of sensor.

swSensorStatus [swSensorTable]

Syntax

Syntax described in Table 4–13.

Table 4–13: swSensorStatus Syntax

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

Access

Read-only

Status

Mandatory

Description

The current status of the sensor.

NOTE: See the following list for valid values:

- For Temperature, valid values include 3 (below-min), 4 (above-max), and 6 (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 [swSensorTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The current value (reading) of the sensor.

The value, -2147483648, represents an unknown quantity.

It also means that the sensor does not have the capability to measure the actual value. In V2.0, the temperature sensor value will be in Celsius; the fan value will be in RPM (revolution per minute); and the power supply sensor reading will be unknown.

NOTE: For Fan, the value -2147483648, indicates that the unit is missing.
For Power Supply, the return value is always -2147483648.

swSensorInfo [swSensorTable]

Syntax

Display String of size 0 to 255

Access

Read-only

Status

Mandatory

Description

Additional displayable information on the sensor. In V2.x, it contains the sensor type and number in textual format. For example, Temp 3 or Fan 6.

NOTE: 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

swTrackChangesInfo

Syntax

Display String of size 0 to 256

Access

Read-only

Status

Mandatory

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

The Fabric Group

The Fabric group consists of the following objects:

swDomainID

Syntax

`SwDomainIndex`

Access

Read-write

Status

Mandatory

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

Syntax

Syntax described in

Table 4–14: swPrincipalSwitch Syntax

Value	Declaration	Description
Integer	1 (yes)	This is the principal switch for FC-SW.
	2 (no)	This is not the principal switch for FC-SW.

Access

Read-only

Status

Mandatory

Description

Indicates whether the switch is the Principal switch as per FC-SW.

swNumNbs

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The number of Inter-Switch Links in the (immediate) neighborhood.

swNbTable

Syntax

Sequence of `SwNbEntry`

Access

Not accessible

Status

Mandatory

Description

This table contains the ISLs in the immediate neighborhood of the switch.

swNbEntry [swNbTable]

Syntax

SwNbEntry

Access

Not accessible

Status

Mandatory

Description

An entry containing each neighbor ISL parameters.

Index

Table 4–15 contains the swNbEntry objects and object types.

Table 4–15: swNbEntry Entry Objects and Object Types

Object	Description
swNbIndex on page 4–44	SwNbIndex
swNbMyPort on page 4–45	Integer
swNbRemDomain on page 4–46	SwDomainIndex
swNbRemPort page 4–47	Integer
swNbBaudRate on page 4–48	Integer
swNbIslState on page 4–49	Integer
swNbIslCost on page 4–50	Integer
swNbRemPortName on page 4–51	Octet String of size 8

swNbIndex [swNbTable]

Syntax

SwNbIndex

Access

Read-only

Status

Mandatory

Description

The neighborhood ISL entry.

swNbMyPort [swNbTable]

Syntax

Syntax described in Table 4–16.

Table 4–16: swNbMyPort Syntax

Value	Declaration	Description
Integer	1 (portNum-0) 2 (portNum-1) 3 (portNum-2) 4 (portNum-3) 5 (portNum-4) 6 (portNum-5) 7 (portNum-6) 8 (portNum-7) 9 (portNum-8) 10 (portNum-9) 11 (portNum-10) 12 (portNum-11) 13 (portNum-12) 14 (portNum-13) 15 (portNum-14) 16 (portNum-15)	

Access

Read-only

Status

Mandatory

Description

This is the port that has an ISL to another switch. The physical port number of the local switch, plus one. The valid values for Compaq StorageWorks Fibre Channel SAN Switches = `portNum-0 through portNum-15`.

swNbRemDomain [swNbTable]

Syntax

SwDomainIndex

Access

Read-only

Status

Mandatory

Description

This is the Fibre Channel domain on the other end of the ISL. This is the domain ID of the remote switch.Valid values are 1 through 239 as defined by FCS-SW.

swNbRemPort [swNbTable]

Syntax

Syntax described in Table 4–17.

Table 4–17: swNbRemPort Syntax

Value	Declaration	Description
Integer	1 (portNum-0) 2 (portNum-1) 3 (portNum-2) 4 (portNum-3) 5 (portNum-4) 6 (portNum-5) 7 (portNum-6) 8 (portNum-7) 9 (portNum-8) 10 (portNum-9) 11 (portNum-10) 12 (portNum-11) 13 (portNum-12) 14 (portNum-13) 15 (portNum-14) 16 (portNum-15)	

Access

Read-only

Status

Mandatory

Description

This is the port index on the other end of the ISL. The physical port number of the remote switch, plus one. The valid values for Compaq StorageWorks Fibre Channel SAN Switches = `portNum-0 through portNum-15`.

swNbBaudRate [swNbTable]

Syntax

Syntax described in Table 4–18.

Table 4–18: swNbBaudRate Syntax

Value	Declaration	Description
Integer	1 (other)	None of below.
	2 (oneEighth)	155 Mbaud.
	4 (quarter)	266 Mbaud.
	8 (half)	532 Mbaud.
	16 (full)	1 Gbaud.
	32 (double)	2 Gbaud.
	64 (quadruple)	4 Gbaud.

Access

Read-only

Status

Mandatory

Description

The baud rate of the ISL. The valid values for Compaq StorageWorks Fibre Channel SAN Switches = 6 (full), 32 (double).

swNbIslState [swNbTable]

Syntax

Syntax described in Table 4–19.

Table 4–19: swNbIslState Syntax

Value	Declaration	Description
Integer	0 (sw-down) 1 (sw-init) 2 (sw-internal2) 3 (sw-internal3) 4 (sw-internal4) 5 (sw-active)	

Access

Read-only

Status

Mandatory

Description

The current state of the ISL.

swNbIslCost [swNbTable]

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

The current link cost of the ISL. In other words, the cost of a link to control the routing algorithm.

swNbRemPortName [swNbTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The WWN of the remote port.

SW Agent Configuration Group

The SW Agent Configuration group consists of the following objects:

swAgtCmtyTable

Syntax

Sequence of `SwAgtCmtyEntry`

Access

Not accessible

Status

Mandatory

Description

A table that contains, one entry for each Community, the access control and parameters of the Community.

swAgtCmtyEntry [swAgtCmtyTable]

Syntax

SwAgtCmtyEntry

Access

Not accessible

Status

Mandatory

Description

An entry containing the Community parameters.

Index

Table 4–20 contains the swAgtCmtyEntry objects and object types.

Table 4–20: swAgtCmtyEntry Objects and Object Types

Object	Description
swAgtCmtyIdx on page 4–54	Integer of size 1 to 6
swAgtCmtyStr on page 4–55	Display String of size 0 to 16
swAgtTrapRcp on page 4–56	NetworkAddress

swAgtCmtyIdx [swAgtCmtyTable]

Syntax

Integer of size 1 to 6

Access

Read-only

Status

Mandatory

Description

The SNMPv1 Community entry.

NOTE: The return value for this entry is always numbers 4 through 6, which are communities that are read-only.

swAgtCmtyStr [swAgtCmtyTable]

Syntax

Display String of size 0 to 16

Access

Read-write

Status

Mandatory

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:

- Secret Code
- OrigEquipMfr
- private
- public
- common
- FibreChannel

Change the Community setting using the `agtcfgSet` telnet command.

swAgtTrapRcp [swAgtCmtyTable]

Syntax

NetworkAddress

Access

Read-write

Status

Mandatory

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.

A setting of non-0.0.0.0 IP address, SNMP traps are sent to the host with the associated community string.

The 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. For example, F_Port, E_Port, U_Port, FL_Port.

The Fibre Channel Port Group consists of the following objects:

swFCPortCapacity

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The 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 value for Compaq StorageWorks Fibre Channel SAN Switch = 16.

swFCPortTable

Syntax

Sequence of `SwFCPortEntry`

Access

Not accessible

Status

Mandatory

Description

A table that contains, one entry for each switch port, configuration and service parameters of the port.

swFCPortEntry [swFCPortTable]

Syntax

SwFCPortEntry

Access

Not accessible

Status

Mandatory

Description

An entry containing the configuration and service parameters of the switch port.

Index

Table 4–21 contains the swFCPortEntry objects and object types.

Table 4–21: swFCPortEntry Objects and Object Types

Object	Description
swFCPortIndex on page 4–63	Integer
swFCPortType on page 4–64	Integer
swFCPortPhyState on page 4–65	Integer
swFCPortOpStatus on page 4–66	Integer
swFCPortAdmStatus on page 4–67	Integer
swFCPortLinkState on page 4–68	Integer
The following are mapped to gstat_t:	
swFCPortTxWords on page 4–70	Counter
swFCPortRxWords on page 4–71	Counter
swFCPortTxFrames on page 4–72	Counter
swFCPortRxFrames on page 4–73	Counter

Table 4–21: swFCPortEntry Objects and Object Types (Continued)

Object	Description
swFCPortRxC2Frames on page 4–74	Counter
swFCPortRxC3Frames on page 4–75	Counter
swFCPortRxLCs on page 4–76	Counter
swFCPortRxMcasts on page 4–77	Counter
swFCPortTooManyRdys on page 4–78	Counter
swFCPortNoTxCredits on page 4–79	Counter
swFCPortRxEncInFrs on page 4–80	Counter
swFCPortRxCrcs on page 4–81	Counter
swFCPortRxTruncs on page 4–82	Counter
swFCPortRxTooLongs on page 4–83	Counter
swFCPortRxBadEofs on page 4–84	Counter
swFCPortRxEncOutFrs on page 4–85	Counter
swFCPortRxBadOs on page 4–86	Counter
swFCPortC3Discards on page 4–87	Counter
swFCPortMcastTimedOuts on page 4–88	Counter
swFCPortTxMcasts on page 4–89	Counter
LIP Statistics:	
swFCPortLipIns on page 4–90	Counter,
swFCPortLipOuts on page 4–91	Counter,
swFCPortLipLastAlpa on page 4–92	Octet String of size 4
swFCPortWwn on page 4–93	Octet String
Port Speed Statistics:	
swFCPortSpeed on page 4–94	Integer

swFCPortIndex [swFCPortTable]

Syntax

Syntax described in Table 4–22.

Table 4–22: swFCPortIndex Syntax

Value	Declaration	Description
Integer	1 (portNum-0)	Port Number 0.
	2 (portNum-1)	Port Number 1.
	3 (portNum-2)	Port Number 2.
	4 (portNum-3)	Port Number 3.
	5 (portNum-4)	Port Number 4.
	6 (portNum-5)	Port Number 5.
	7 (portNum-6)	Port Number 6.
	8 (portNum-7)	Port Number 7.
	9 (portNum-8)	Port Number 8.
	10 (portNum-9)	Port Number 9.
	11 (portNum-10)	Port Number 10.
	12 (portNum-11)	Port Number 11.
	13 (portNum-12)	Port Number 12.
	14 (portNum-13)	Port Number 13.
	15 (portNum-14)	Port Number 14.
	16 (portNum-15)	Port Number 15.

Access

Read-only

Status

Mandatory

Description

The switch port index. The physical port number of the switch, plus one. The valid value for Compaq StorageWorks Fibre Channel SAN Switch = `portNum-0 through portNum-15`.

swFCPortType [swFCPortTable]

Syntax

Syntax described in Table 4–23.

Table 4–23: swFCPortType Syntax

Value	Declaration	Description
Integer	1 (stitch) 2 (flannel) 3 (2000 Series) 4 (3000Series)	

Access

Read-only

Status

Mandatory

Description

The type of ASIC for the switch port. The valid value for Compaq StorageWorks Fibre Channel SAN Switch = 4 (bloom)

swFCPortPhyState [swFCPortTable]

Syntax

Syntax described in Table 4–24.

Table 4–24: swFCPortPhyState Syntax

Value	Declaration	Description
Integer	1 (noCard)	No card is present in this switch slot.
	2 (noGbic)	No GBIC module in this port.
	3 (laserFault)	The module is signaling a laser fault (defective GBIC).
	4 (noLight)	The module is not receiving light.
	5 (noSync)	The module is receiving light but is out of sync.
	6 (inSync)	The module is receiving light and is in sync.
	7 (portFault)	The port is marked faulty (defective GBIC, cable or device).
	8 (diagFault)	The port failed diagnostics (defective G_Port or FL_Port card or motherboard).
	9 (lockRef)	Port is locking to the reference signal.

Access

Read-only

Status

Mandatory

Description

The physical state of the port.

swFCPortOpStatus [swFCPortTable]

Syntax

Syntax described in Table 4–25.

Table 4–25: swFCPortOpStatus Syntax

Value	Declaration	Description
Integer	0 (unknown)	The port module is physically absent.
	1 (online)	User frames can be passed.
	2 (offline)	No user frames can be passed.
	3 (testing)	No user frames can be passed.
	4 (faulty)	The port module is physically faulty.

Access

Read-only

Status

Mandatory

Description

The operational status of the port.

swFCPortAdmStatus [swFCPortTable]

Syntax

Syntax described in Table 4–26.

Table 4–26: swFCPortAdmStatus Syntax

Value	Declaration	Description
Integer	1 (online)	User frames can be passed.
	2 (offline)	No user frames can be passed.
	3 (testing)	No user frames can be passed.
	4 (faulty)	No user frames can be passed.

Access

Read-write

Status

Mandatory

Description

The desired state of the port. A management station may place the port in a desired state by setting this object accordingly.

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.

swFCPortLinkState [swFCPortTable]

Syntax

Syntax described in Table 4–27.

Table 4–27: swFCPortLinkState Syntax

Value	Declaration	Description
Integer	1 (enabled)	The port is allowed to participate in the FC-PH protocol with its attached port (or ports if it is in a FC-AL loop).
	2 (disabled)	The port is not allowed to participate in the FC-PH protocol with its attached port(s).
	3 (loopback)	The port may transmit frames through an internal path to verify the health of the transmitter and receiver path.

Access

Read-write

Status

Mandatory

Description

Indicates the link state of the port.

NOTE: When the port's link state changes, its operational status (`swFCPortOpStatus`) is affected.

swFCPortTxType [swFCPortTable]

Syntax

Syntax described in Table 4–28.

Table 4–28: swFCPortTxType Syntax

Value	Declaration	Description
Integer	1 (unknown)	Cannot determined to the port driver.
	2 (lw)	Long wave laser.
	3 (sw)	Short wave laser.
	4 (ld)	Long wave LED.
	5 (cu)	Copper (electrical).

Access

Read-only

Status

Mandatory

Description

Indicates the media transmitter type of the port.

swFCPortTxWords [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Fibre Channel words that the port has transmitted.

swFCPortRxWords [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Fibre Channel words that the port has received.

swFCPortTxFrames [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Fibre Channel frames that the port has transmitted.

swFCPortRxFrames [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Fibre Channel frames that the port has received.

swFCPortRxC2Frames [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Class 2 frames that the port has received.

swFCPortRxC3Frames [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Class 3 frames that the port has received.

swFCPortRxLCs [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Link Control frames that the port has received.

swFCPortRxMcasts [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Multicast frames that the port has received.

swFCPortTooManyRdys [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of times when RDYs exceeds the frames received.

swFCPortNoTxCredits [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of times when the transmit credit has reached zero.

swFCPortRxEncInFrs [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of encoding error or disparity error inside frames received.

swFCPortRxCrcs [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of CRC errors detected for frames received.

swFCPortRxTruncs [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of truncated frames that the port has received.

swFCPortRxTooLongs [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of received frames that are too long.

swFCPortRxBadEofs [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of received frames that have bad EOF delimiter.

swFCPortRxEncOutFrs [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of encoding error or disparity error outside frames received.

swFCPortRxBadOs [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of invalid Ordered Sets received.

swFCPortC3Discards [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Class 3 frames that the port has discarded.

swFCPortMcastTimedOuts [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Multicast frames that has been timed out.

swFCPortTxMcasts [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Multicast frames that has been transmitted.

swFCPortLipIns [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Loop Initializations that has been initiated by loop devices attached.

swFCPortLipOuts [swFCPortTable]

Syntax

Counter

Access

Read-only

Status

Mandatory

Description

Counts the number of Loop Initializations that has been initiated by the port.

swFCPortLipLastAlpa [swFCPortTable]

Syntax

Octet String of size 4

Access

Read-only

Status

Mandatory

Description

Indicates the Physical Address (AL_PA) of the loop device that initiated the last Loop Initialization.

swFCPortWwn [swFCPortTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The WWN of the Fibre Channel port. The contents of an instance are in the IEEE extended format as specified in FC-PH.

swFCPortSpeed [swFCPortTable]

Syntax

Syntax described in Table 4–29.

Table 4–29: swFCPortSpeed Syntax

Value	Declaration	Description
Integer	1 (one-GB) 2 (two-GB) 3 (auto-Negotiate)	

Access

Read-write

Status

Mandatory

Description

The desired baud rate for the port.

The Name Server Database Group

The Name Server Database Group consists of the following objects:

swNsLocalNumEntry

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The number of local Name Server entries.

swNsLocalTable

Syntax

Sequence of `SwNsEntry`

Access

Not accessible

Status

Mandatory

Description

The table of local Name Server entries.

swNsLocalEntry [swNsLocalTable]

Syntax

SwNsEntry

Access

Not accessible

Status

Mandatory

Description

An entry from the local Name Server database.

Index

Table 4–30 contains the swNsEntry objects and object types.

Table 4–30: swNsEntry Objects and Object Types

Object	Description
swNsEntryIndex on page 4–100	Integer
swNsPortID on page 4–101	Octet String of size 4
swNsPortType on page 4–102	Integer
swNsPortName on page 4–103	FcWwn
swNsPortSymb on page 4–104	Octet String
swNsNodeName on page 4–105	FcWwn
swNsNodeSymb on page 4–106	Octet String
swNsIPA on page 4–107	Octet String
swNsIpAddress on page 4–108	Octet String
swNsCos on page 4–109	Integer
swNsFc4 on page 4–110	Octet String

Table 4–30: swNsEntry Objects and Object Types (Continued)

Object	Description
swNsIpNxPort on page 4–111	Octet String of size 16
swNsWwn on page 4–112	Octet String of size 8
swNsHardAddr on page 4–113	Octet String of size 3

swNsEntryIndex [swNsLocalTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The index of the Name Server database entry.

swNsPortID [swNsLocalTable]

Syntax

Octet String of size 4

Access

Read-only

Status

Mandatory

Description

The Fibre Channel port address ID of the entry.

swNsPortType [swNsLocalTable]

Syntax

Syntax described in Table 4–31.

Table 4–31: swNsPortType Syntax

Value	Declaration	Description
Integer	0 (unknown)	The type is defined in FC-GS-2.
	1 (nPort)	The type is defined in FC-GS-2.
	2 (nlPort)	The type is defined in FC-GS-2.

Access

Read-only

Status

Mandatory

Description

The type of port for this entry.

swNsPortName [swNsLocalTable]

Syntax

FcWwn

Access

Read-only

Status

Mandatory

Description

The Fibre Channel WWN of the port entry.

swNsPortSymb [swNsLocalTable]

Syntax

Octet String of size 0 to255

Access

Read-only

Status

Mandatory

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 [swNsLocalTable]

Syntax

FcWwn

Access

Read-only

Status

Mandatory

Description

The Fibre Channel WWN of the associated node as defined in FC-GS-2.

swNsNodeSymb [swNsLocalTable]

Syntax

Octet String of size 0 to 255

Access

Read-only

Status

Mandatory

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 [swNsLocalTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The Initial Process Associators of the node for the entry as defined in FC-GS-2.

swNsIpAddress [swNsLocalTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

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 [swNsLocalTable]

Syntax

Syntax described in Table 4–32.

Table 4–32: swNsCos Syntax

Value	Declaration	Description
Integer	0 (class-unknown) 1 (class-F) 2 (class-1) 3 (class-F-1) 4 (class-2) 5 (class-F-2) 6 (class-1-2) 7 (class-F-1-2) 8 (class-3) 9 (class-F-3) 10 (class-1-3) 11 (class-F-1-3) 12 (class-2-3) 13 (class-F-2-3) 14 (class-1-2-3) 15 (class-F-1-2-3)	

Access

Read-only

Status

Mandatory

Description

The class of services supported by the port.

swNsFc4 [swNsLocalTable]

Syntax

Octet String of size 32

Access

Read-only

Status

Mandatory

Description

The FC-4s supported by the port as defined in FC-GS-2.

swNsIpNxPort [swNsLocalTable]

Syntax

Octet String of size 16

Access

Read-only

Status

Mandatory

Description

The object identifies the IpAddress of the Nx_port for the entry.

swNsWwn [swNsLocalTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

The object identifies the World Wide Name (WWN) of the Fx_port for the entry.

swNsHardAddr [swNsLocalTable]

Syntax

Octet String of size 3

Access

Read-only

Status

Mandatory

Description

The object identifies the 24-bit hard address of the node for the entry.

The 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. The value of swEventIndex shall indicate the event number that has occurred since the switch booted. The values range from 1 through 2147383647 ($2^{31 - 1}$).

The Event Group consists of the following objects:

- swEventTrapLevel on page 4-115
- swEventNumEntries on page 4-116
- swEventTable on page 4-117
- swEventEntry on page 4-118
- swEventIndex on page 4-119
- swEventTimeInfo on page 4-120
- swEventLevel on page 4-121
- swEventRepeatCount on page 4-122
- swEventDescr on page 4-123

swEventTrapLevel

Syntax

Syntax described in Table 4–33.

Table 4–33: swEventTrapLevel Syntax

Value	Declaration	Description
Integer	0 (none) 1 (critical) 2 (error) 3 (warning) 4 (informational) 5 (debug)	

Access

Read-write

Status

Mandatory

Description

Specifies the `swEventTrap` level in conjunction with an event's severity level. When an event occu rs, if its severity level is at or below the specified numeric value, the agent sends the associated `swEventTrap` to the configured recipients.

For example, if this variable is set to 3 (warning), all error logs of severity 1 (critical), 2 (error), and 3 (warning) are sent as an SNMP Trap of `swEventTrap` as shown in swEventTrap on page 4-219.

swEventNumEntries

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The number of entries in the Event Table. Logically, the `swEventTable` is separate from the error log since it is essentially a view of the error log within a particular time window. The value of `swEventIndex` shall indicate the event number that has occurred since the switch booted. The values range from 1 through 2147383647 ($2^{31 - 1}$).

swEventTable

Syntax

Sequence of `SwEventEntry`

Access

Not accessible

Status

Mandatory

Description

The table of event entries.

swEventEntry [swEventTable]

Syntax

SwEventEntry

Access

Not accessible

Status

Mandatory

Description

An entry of the event table.

Index

Table 4–34 contains the swEventIndex objects and object types.

Table 4–34: swEventIndex Objects and Object Types

Object	Description
swEventIndex on page 4–119	Integer
swEventTimeInfo on page 4–120	Display String
swEventLevel on page 4–121	Integer
swEventRepeat on page 4–122	CountInteger
swEventDescr on page 4–123	Display String

swEventIndex [swEventTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

The index of the event entry. Logically, the `swEventTable` is separate from the error log since it is essentially a view of the error log within a particular time window. The value of `swEventIndex` shall indicate the event number that has occurred since the switch booted. The values range from 1 through 2147383647 ($2^{31 - 1}$).

swEventTimeInfo [swEventTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

Description

The date and time when this event occurred.

NOTE: The return string is displayed using the following format:

ddd MMM DD hh:mm:ss

Where:

ddd = Day
MMM = Month
DD = Date
hh = Hour
mm = Minute
ss = Seconds

For example: Thu Aug 17 15:16:09.

swEventLevel [swEventTable]

Syntax

Syntax described in Table 4–35.

Table 4–35: swEventLevel Syntax

Value	Declaration	Description
Integer	1 (critical) 2 (error) 3 (warning) 4 (informational) 5 (debug)	

Access

Read-only

Status

Mandatory

Description

The severity level of this event entry.

swEventRepeatCount [swEventTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

If the most recent event is the same as the previous, this number is incremented by one, and is the count of consecutive times this particular event has occurred.

swEventDescr [swEventTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

Description

A textual description of the event.

NOTE: The return string is displayed using the following format:

```
taskId (taskname) errorname description

Where:

taskId = FOS taskId in hex.
taskname = FOS taskname that generated this event.
errorname = category-subcategory (for example, SYS-BOOT)
description = Textual description of the event.

For example, 0x10fb7670 (tSwitch) SYS-BOOT Restart reason: Reboot
```

For more information on error messages, see *Fabric Operating System Reference Guide*, *Appendix A*.

The Fabric Watch Group

The Fabric Watch group contains one license scalar and two tables.

- The license scalar (swFwFabricWatchLicense on page 4-124), is used to tell is if the switch has proper license for Fabric Watch.
- One table, Fabric Watch Class Area Table (swFwClassAreaTable on page 4-126), 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, Fabrix Watch Threshold Table (swFwThresholdTable on page 4-155), contains individual threshold information such as name, label, last event, and so forth. The thresholds are contained in SwFwThresholdEntry

License Scalar

swFwFabricWatchLicense

Syntax

`SwFwLicense`

Access

Read-only

Status

Mandatory

Description

If the license key is installed on the switch for the Fabric Watch, the return value is `swFwLicensed`. Otherwise the value is `swFwNotLicensed`.

Fabric Watch Class Area Table

The Fabric Watch Class Area Table consists of:

swFwClassAreaTable

Syntax

Sequence of `SwFwClassAreaEntry`

Access

Not accessible

Status

Mandatory

Description

The table of classes and areas.

swFwClassAreaEntry [swFwClassAreaTable]

Syntax

SwFwClassAreaEntry

Access

Not accessible

Status

Mandatory

Description

An entry of the classes and areas.

Index

Table 4–36 contains the swFwClassAreaEntry objects and object types.

Table 4–36: swFwClassAreaEntry Objects and Object Types

Object	Description
swFwClassAreaIndex on page 4–129	SwFwClassesAreas
swFwWriteThVals on page 4–130	SwFwWriteVals
swFwDefaultUnit on page 4–131	Display String of size 0 to 256
swFwDefaultTimebase on page 4–132	SwFwTimebase
swFwDefaultLow on page 4–133	Integer
swFwDefaultHigh on page 4–134	Integer
swFwDefaultBufSize on page 4–135	Integer
swFwCustUnit on page 4–136	Display String of size 0 to 256
swFwCustTimebase on page 4–137	SwFwTimebase
swFwCustLow on page 4–138	Integer
swFwCustHigh on page 4–139	Integer

Table 4–36: swFwClassAreaEntry Objects and Object Types (Continued)

Object	Description
swFwCustBufSize on page 4–140	Integer
swFwThLevel on page 4–141	SwFwLevels
swFwWriteActVals on page 4–142	SwFwWriteVals
swFwDefaultChangedActs on page 4–143	SwFwActs
swFwDefaultExceededActs on page 4–144	SwFwActs
swFwDefaultBelowActs on page 4–145	SwFwActs
swFwDefaultAboveActs on page 4–146	SwFwActs
swFwCustChangedActs on page 4–147	SwFwActs
swFwCustExceededActs on page 4–149	SwFwActs
swFwCustBelowActs on page 4–150	SwFwActs
swFwCustAboveAct on page 4–151	sSwFwActs
swFwValidActs on page 4–153	SwFwActs
swFwActLevel on page 4–154	SwFwLevel

swFwClassAreaIndex [swFwClassAreaTable]

Syntax

SwFwClassesAreas

Access

Read-only

Status

Mandatory

Description

This index represents the Fabric Watch classArea combination.

swFwWriteThVals [swFwClassAreaTable]

Syntax

SwFwWriteVals

Access

Read-write

Status

Mandatory

Description

This applies or cancels the configuration value changes.

NOTE: For a read operation, the return value is always swFwCancelWrite.
The following are the custom configuration variables that can be modified.

- swFwCustUnit
- swFwCustTimebase
- swFwCustLow
- swFwCustHigh
- swFwCustBufSize

Changes to these custom configuration variables can be saved by setting this variable to swFwApplyWrite, and they can be removed by setting this variable to swFwCancelWrite.

swFwDefaultUnit [swFwClassAreaTable]

Syntax

Display String of size 0 to 256

Access

Read-only

Status

Mandatory

Description

A default unit string name, used to identify the unit of measure for a Fabric Watch classArea combination. For example:

- C = environment (class), temperature (area).
- RPM = environment (class), fan (area).

swFwDefaultTimebase [swFwClassAreaTable]

Syntax

`SwFwTimebase`

Access

Read-only

Status

Mandatory

Description

A default polling period for the Fabric Watch classArea combination. For example:

- `swFwTbMin` = port (class), link loss (area).
- `swFwTbNone` = environment (class), temperature (area).

swFwDefaultLow [swFwClassAreaTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

A default low threshold value.

swFwDefaultHigh [swFwClassAreaTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

A default high threshold value.

swFwDefaultBufSize [swFwClassAreaTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

A default buffer size value.

swFwCustUnit [swFwClassAreaTable]

Syntax

Display String of size 0 to 256

Access

Read-write

Status

Mandatory

Description

A customizable unit string name, used to identify the unit of measure for a Fabric Watch classArea combination. For example:

- C = environment (class), temperature (area).
- RPM = environment (class), fan (area).

swFwCustTimebase [swFwClassAreaTable]

Syntax

`SwFwTimebase`

Access

Read-write

Status

Mandatory

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 [swFwClassAreaTable]

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

A customizable low-threshold value for a Fabric Watch classArea combination.

swFwCustHigh [swFwClassAreaTable]

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

A customizable high-threshold value for a Fabric Watch classArea combination.

swFwCustBufSize [swFwClassAreaTable]

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

A customizable buffer size value for a Fabric Watch classArea combination.

swFwThLevel [swFwClassAreaTable]

Syntax

SwFwLevels

Access

Read-write

Status

Mandatory

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 [swFwClassAreaTable]

Syntax

SwFwWriteVals

Access

Read-write

Status

Mandatory

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 [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-only

Status

Mandatory

Description

Default action matrix for changed event.

swFwDefaultExceededActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-only

Status

Mandatory

Description

Default action matrix for an exceeded event. The exceeded value may be either above the high-threshold or below the low-threshold.

swFwDefaultBelowActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-only

Status

Mandatory

Description

Default action matrix for below event.

swFwDefaultAboveActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-only

Status

Mandatory

Description

Default action matrix for above event.

swFwDefaultInBetweenActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-only

Status

Mandatory

Description

Default action matrix for in-between event.

swFwCustChangedActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-write

Status

Mandatory

Description

Custom action matrix for changed event.

swFwCustExceededActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-write

Status

Mandatory

Description

Custom action matrix for an exceeded event.

swFwCustBelowActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-write

Status

Mandatory

Description

Custom action matrix for below event.

swFwCustAboveActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-write

Status

Mandatory

Description

Custom action matrix for above event.

swFwCustInBetweenActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-write

Status

Mandatory

Description

Custom action matrix for in-between event.

swFwValidActs [swFwClassAreaTable]

Syntax

SwFwActs

Access

Read-only

Status

Mandatory

Description

Matrix of valid acts for an ClassArea.

swFwActLevel [swFwClassAreaTable]

Syntax

SwFwLevels

Access

Read-write

Status

Mandatory

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

Fabric Watch Threshold Table

The Fabric Watch Threshold Table consists of the following:

swFwThresholdTable

Syntax

Sequence of `SwFwThresholdEntry`

Access

Not accessible

Status

Mandatory

Description

The table of individual thresholds.

swFwThresholdEntry [swFwThresholdTable]

Syntax

`SwFwThresholdEntry`

Access

Not accessible

Status

Mandatory

Description

An entry of an individual threshold.

Index

Table 4–37 contains the `swFwThresholdEntry` objects and object types.

Table 4–37: swFwThresholdEntry Objects and Object Types

Object	Description
`swFwThresholdIndex` on page 4–157	Integer
`swFwStatus` on page 4–158	SwFwStatus
`swFwName` on page 4–159	Display String of size 0 to 32
`swFwLabel` on page 4–162	Display String of size 0 to 32
`swFwCurVal` on page 4–163	Integer
`swFwLastEvent` on page 4–164	SwFwEvent
`swFwLastEventVal` on page 4–165	Integer
`swFwLastEventTime` on page 4–166	Display String of size 0 to 32
`swFwLastState` on page 4–167	SwFwState
`swFwBehaviorType` on page 4–168	SwFwBehavior
`swFwBehaviorInt` on page 4–169	Integer

swFwThresholdIndex [swFwThresholdTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Represents the element index of a threshold. 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 [swFwThresholdTable]

Syntax

SwFwStatus

Access

Read-write

Status

Mandatory

Description

Indicates whether a threshold is enabled or disabled.

swFwName [swFwThresholdTable]

Syntax

Display String of size 0 to 32

Access

Read-only

Status

Mandatory

Description

Name of the threshold. Table 4–38 contains examples.

Table 4–38: swFwName Threshold Names

Names	Description
envFan001	Env Fan 1
envPS002	Env Power Supply 2
envTemp001	Env Temperature 1
gbicTemp001	Gbic Temperature 1
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

Table 4–38: swFwName Threshold Names (Continued)

Names	Description
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
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

Table 4–38: swFwName Threshold Names (Continued)

Names	Description
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 [swFwThresholdTable]

Syntax

Display String of size 0 to 32

Access

Read-only

Status

Mandatory

Description

Label of the threshold.

NOTE: See swFwThresholdTable on page 4-155.

swFwCurVal [swFwThresholdTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Current counter of the threshold.

swFwLastEvent [swFwThresholdTable]

Syntax

SwFwEvent

Access

Read-only

Status

Mandatory

Description

Last event type of the threshold.

swFwLastEventVal [swFwThresholdTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Last event value of the threshold.

swFwLastEventTime [swFwThresholdTable]

Syntax

Display String of size 0 to 32

Access

Read-only

Status

Mandatory

Description

Last event time of the threshold.

NOTE: This value is in the same format as in `swCurrentDate`.

swFwLastState [swFwThresholdTable]

Syntax

SwFwState

Access

Read-only

Status

Mandatory

Description

Last event state of the threshold.

swFwBehaviorType [swFwThresholdTable]

Syntax

SwFwBehavior

Access

Read-write

Status

Mandatory

Description

A behavior of which the thresholds generate event.

swFwBehaviorInt [swFwThresholdTable]

Syntax

Integer

Access

Read-write

Status

Mandatory

Description

A integer of which the thresholds generate continuous event.

End Device Group

The End Device Group consists of the following objects:

swEndDeviceRlsTable

Syntax

Sequence of `SwEndDeviceRlsEntry`

Access

Not accessible

Status

Mandatory

Description

The table of rls for individual end devices.

swEndDeviceRlsEntry [swEndDeviceRlsTable]

Syntax

SwEndDeviceRlsEntry

Access

Not accessible

Status

Mandatory

Description

An entry of an individual end devices' rls.

Index

Table 4–39 contains the swEndDeviceRlsEntry objects and object types.

Table 4–39: swEndDeviceRlsEntry Objects and Object Types

Object	Description
swEndDevicePort on page 4–172	Integer
swEndDeviceAlpa on page 4–173	Integer
swEndDeviceLinkFailure on page 4–175	Integer
swEndDeviceSyncLoss on page 4–176	Integer
swEndDeviceSigLoss on page 4–177	Integer
swEndDeviceProtoErr on page 4–178	Integer
swEndDeviceInvalidWord on page 4–179	Integer
swEndDeviceInvalidCRC on page 4–180	Integer

NOTE: Compaq StorageWorks Fibre Channel SAN Switches start with port # 0, therefore, snmp port # should be physical port # + 1. In turn, that means that snmp port # 3 translates to port # 2

swEndDevicePort [swEndDeviceRlsTable]

Syntax

Integer

Access

Not accessible

Status

Mandatory

Description

This object represents the port of the local switch to which the end device is connected.

swEndDeviceAlpa [swEndDeviceRlsTable]

Syntax

Integer

Access

Not accessible

Status

Mandatory

Description

This object represents the ALPA of the end device. SNMP ALPA number should be the logical ALPA number + 1. For example, SNMP ALPA number 0xf0 translates to 0xef.

swEndDevicePortID [swEndDeviceRlsTable]

Syntax

Octet String of size 4

Access

Read-only

Status

Mandatory

Description

The Fibre Channel port address ID of the entry.

swEndDeviceLinkFailure [swEndDeviceRlsTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Link failure count for the end device.

swEndDeviceSyncLoss [swEndDeviceRlsTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Sync loss count for the end device.

swEndDeviceSigLoss [swEndDeviceRlsTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Sig loss count for the end device.

swEndDeviceProtoErr [swEndDeviceRIsTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Protocol err count for the end device.

swEndDeviceInvalidWord [swEndDeviceRlsTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Invalid word count for the end device.

swEndDeviceInvalidCRC [swEndDeviceRlsTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Invalid CRC count for the end device.

Bloom Performance Monitoring Group

The Bloom Perfromance Monitoring Group consists of the following objects:

- Bloom Performance ALPA Monitoring Table on page 4-181
- Bloom Performance End-to-End Monitoring Table on page 4-187
- Bloom Performance Filter Base Monitoring Table on page 4-196

Bloom Performance ALPA Monitoring Table

The Bloom Performance ALPA MonitorignTable consists of:

- swBlmPerfALPAMntTable on page 4-181
- swBlmPerfALPAMntEntry on page 4-182
- swBlmPerfAlpaPort on page 4-183
- swBlmPerfAlpaIndx on page 4-184
- swBlmPerfAlpa on page 4-185
- swBlmPerfAlpaCRCCnt on page 4-186

swBlmPerfALPAMntTable

Syntax

Sequence of `SwBlmPerfALPAMntEntry`

Access

Not accessible

Status

Mandatory

Description

ALPA monitoring counter Table.

swBlmPerfALPAMntEntry

Syntax

`SwBlmPerfALPAMntEntry`

Access

Not accessible

Status

Mandatory

Description

ALPA monitoring counter for given ALPA.

Index

Table 4–40 contains the `swBlmPerfALPAMntEntry` objects and object types.

Table 4–40: swBlmPerfALPAMntEntry Objects and Object Types

Object	Description
`swBlmPerfAlpaPort` on page 4–183	SwPortIndex
`swBlmPerfAlpaIndx` on page 4–184	Integer
`swBlmPerfAlpa` on page 4–185	Integer
`swBlmPerfAlpaCRCCnt` on page 4–186	Octet String

swBlmPerfAlpaPort [swBlmPerfALPAMntTable]

Syntax

SwPortIndex

Access

Read-only

Status

Mandatory

Description

This Object identifies the port index of the switch.

swBlmPerfAlpaIndx [swBlmPerfALPAMntTable]

Syntax

Integer (1...126)

Access

Read-only

Status

Mandatory

Description

This Object identifies the ALPA index. There can be 126 ALPA values.

swBlmPerfAlpa [swBlmPerfALPAMntTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

This Object identifies the ALPA values. These values range between `x'01'` and `x'EF'` (1 to 239).

NOTE: ALPA value `x'00'` is reserved for FL_Port If Alpa device is invalid, then it will have a `-1` value.

swBlmPerfAlpaCRCCnt [swBlmPerfALPAMntTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

Get CRC count for given ALPA and port. This monitoring provides information on the number of CRC errors occurred on the frames destined to each possible ALPA attached to a specific port.

Bloom Performance End-to-End Monitoring Table

The Bloom Performance End-to-End monitorignTable consists of:

swBlmPerfEEMntTable

Syntax

Sequence of `SwBlmPerfEEMntEntry`

Access

Not accessible

Status

Mandatory

Description

End-to-End monitoring counter table.

swBlmPerfEEMntEntry

Syntax

swBlmPerfEEMntEntry

Access

Not accessible

Status

Mandatory

Description

End-to-End monitoring counter for given port.

Index

Table 4–41contains the swBlmPerfEEMntEntry objects and object types.

Table 4–41: SwBlmPerfEEMntEntry Objects and Object Types

Object	Description
swBlmPerfEEPort on page 4–189	SwPortIndex
swBlmPerfEERefKey on page 4–190	Integer
swBlmPerfEECRC on page 4–191	Octet String
swBlmPerfEEFCWRx on page 4–192	Octet String
swBlmPerfEEFCWTx on page 4–193	Octet String
swBlmPerfEESid on page 4–194	Integer
swBlmPerfEEDid on page 4–195	Integer

swBlmPerfEEPort [swBlmPerfEEMntTable]

Syntax

SwPortIndex

Access

Read-only

Status

Mandatory

Description

This object identifies the port number of the switch.

swBlmPerfEERefKey [swBlmPerfEEMntTable]

Syntax

Integer (1...8)

Access

Read-only

Status

Mandatory

Description

This object identifies the reference number of the counter. This reference is number assigned when a filter is created.

NOTE: In SNMP Index start one instead of 0, add one to actual ref key.

swBlmPerfEECRC [swBlmPerfEEMntTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

End-to-End CRC error for the frames that matched the SID-DID pair.

swBlmPerfEEFCWRx [swBlmPerfEEMntTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

Get End-to-End count of Fibre Channel words (FCW), received by the port, that matched the SID-DID pair.

swBlmPerfEEFCWTx [swBlmPerfEEMntTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

Get End-to-End count of Fibre Channel words (FCW), transmitted by the port, that matched the SID-DID pair.

swBlmPerfEESid [swBlmPerfEEMntTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Gets DID info by reference number.

swBlmPerfEEDid [swBlmPerfEEMntTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Gets SID info 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.

Bloom Performance Filter Base Monitoring Table

The Bloom Performance Filter Base Monitoring Table consists of:

swBlmPerfFltMntTable

Syntax

Sequence of `SwBlmPerfFltMntEntry`

Access

Not accessible

Status

Mandatory

Description

Filter based monitoring counter.

swBlmPerfFltMntEntry

Syntax

`SwBlmPerfFltMntEntry`

Access

Not accessible

Status

Mandatory

Description

Filter base monitoring counter for given port.

Index

Table 4–42 contains the `swBlmPerfFltMntEntry` objects and object types.

Table 4–42: swBlmPerfFltMntEntry Objects and Object Types

Object	Description
`swBlmPerfFltPort` on page 4–198	SwPortIndex
`swBlmPerfFltRefkey` on page 4–199	Integer
`swBlmPerfFltCnt` on page 4–200	Octet String
`swBlmPerfFltAlias` on page 4–201	Display String

swBlmPerfFltPort [swBlmPerfFltMntTable]

Syntax

SwPortIndex

Access

Not accessible

Status

Mandatory

Description

This object identifies the port number of the switch.

swBlmPerfFltRefkey [swBlmPerfFltMntTable]

Syntax

Integer (1...8)

Access

Read-only

Status

Mandatory

Description

This object identifies the reference number of the filter. This reference number is assigned when a filter is created. In SNMP Index start one instead of 0, add one to actual ref key.

swBlmPerfFltCnt [swBlmPerfFltMntTable]

Syntax

Octet String of size 8

Access

Read-only

Status

Mandatory

Description

Get statistics of filter based monitor. Filter based monitoring provides information about a filter hit count such as:

1. Read command
2. SCSI or IP traffic
3. SCSI Read/Write

swBlmPerfFltAlias [swBlmPerfFltMntTable]

Syntax

Display String

Access

Read-only

Status

Mandatory

Description

Alias name for the filter.

Trunking Group

The Trunking Group Consists of the following objects:

- Trunking Scaler on page 4-202
- Trunking Table on page 4-203
- Trunking Group Table on page 4-209

Trunking Scaler

swSwitchTrunkable

Syntax

Syntax described in Table 4–43.

Table 4–43: swSwitchTrunkable Syntax

Value	Declaration	Description
Integer	0 (No) 8 (Yes)	

Access

Not accessible

Status

Mandatory

Description

The trunking status of the switch (whether the switch supports the trunking feature or not).

Trunking Table

The Trunking Table consists of:

- swTrunkTable on page 4-203
- swTrunkEntry on page 4-204
- swTrunkPortIndex on page 4-205
- swTrunkGroupNumber on page 4-206
- swTrunkMaster on page 4-207
- swPortTrunked on page 4-208

swTrunkTable

Syntax

Sequence of `SwTrunkEntry`

Access

Not accessible

Status

Mandatory

Description

Table to display trunking information for the switch.

swTrunkEntry

Syntax

SwTrunkEntry

Access

Not accessible

Status

Mandatory

Description

Entry for the trunking table.

Index

Table 4–44 contains the swTrunkEntry objects and object types.

Table 4–44: swTrunkEntry Objects and Object Types

Object	Description
swTrunkPortIndex on page 4–205	Integer
swTrunkGroupNumber on page 4–206	Integer
swTrunkMaster on page 4–207	Integer
swPortTrunked on page 4–208	Integer

swTrunkPortIndex [swTrunkTable]

Syntax

Syntax described in Table 4–45.

Table 4–45: swTrunkPortIndex Syntax

Value	Declaration	Description
Integer	1 (portNum-0) 2 (portNum-1) 3 (portNum-2) 4 (portNum-3) 5 (portNum-4) 6 (portNum-5) 7 (portNum-6) 8 (portNum-7) 9 (portNum-8) 10 (portNum-9) 11 (portNum-10) 12 (portNum-11) 13 (portNum-12) 14 (portNum-13) 15 (portNum-14) 16 (portNum-15)	

Access

Read-only

Status

Mandatory

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 [swTrunkTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

This object is a logical entity which specifies the Group Number to which the port belongs to. If this value is Zero it means the port is not trunked.

swTrunkMaster [swTrunkTable]

Syntax

Syntax described in Table 4–46.

Table 4–46: swTrunkMaster Syntax

Value	Declaration	Description
Integer	0 (None) 1 (portNum-0) 2 (portNum-1) 3 (portNum-2) 4 (portNum-3) 5 (portNum-4) 6 (portNum-5) 7 (portNum-6) 8 (portNum-7) 9 (portNum-8) 10 (portNum-9) 11 (portNum-10) 12 (portNum-11) 13 (portNum-12) 14 (portNum-13) 15 (portNum-14) 16 (portNum-15)	

Access

Read-only

Status

Mandatory

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 [swTrunkTable]

Syntax

Syntax described in Table 4–47.

Table 4–47: swPortTrunked Syntax

Value	Declaration	Description
Integer	0 (Disabled) 1 (Enabled)	

Access

Read-only

Status

Mandatory

Description

The current state of trunking for a member port.

Trunking Group Table

The Trunking GroupTable consists of:

swTrunkGrpTable

Syntax

Sequence of `SwTrunkGrpEntry`

Access

Not accessible

Status

Mandatory

Description

Table to display trunking performance information for the switch.

swTrunkGrpEntry

Syntax

SwTrunkGrpEntry

Access

Not accessible

Status

Mandatory

Description

Entry for the trunking group table.

Index

Table 4–48 contains the swTrunkEntry objects and object types.

Table 4–48: swTrunkEntry Objects and Object Types

Object	Description
swTrunkGrpNumber on page 4–211	Integer
swTrunkGrpMaster on page 4–212	Integer
swTrunkGrpTx on page 4–213	Integer
swTrunkGrpRx on page 4–214	Integer

swTrunkGrpNumber [swTrunkGrpTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

This object is a logical entity which specifies the Group Number to which port belongs.

swTrunkGrpMaster [swTrunkGrpTable]

Syntax

Syntax described in Table 4–49.

Table 4–49: swTrunkGrpMaster Syntax

Value	Declaration	Description
Integer	0 (None) 1 (portNum-0) 2 (portNum-1) 3 (portNum-2) 4 (portNum-3) 5 (portNum-4) 6 (portNum-5) 7 (portNum-6) 8 (portNum-7) 9 (portNum-8) 10 (portNum-9) 11 (portNum-10) 12 (portNum-11) 13 (portNum-12) 14 (portNum-13) 15 (portNum-14) 16 (portNum-15)	

Access

Read-only

Status

Mandatory

Description

This object gives the master port id for the TrunkGroup.

swTrunkGrpTx [swTrunkGrpTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Gives the aggregate value of the transmitted words from this TrunkGroup.

swTrunkGrpRx [swTrunkGrpTable]

Syntax

Integer

Access

Read-only

Status

Mandatory

Description

Gives the aggregate value of the received words by this TrunkGroup.

sw Trap Types

This section contains descriptions and other information that is specific to sw Trap types. The swTrapTypes consistes of the following object types:

sw Traps

SW Traps consist of:

swFault

Enterprise

sw

Variables

swDiagResult

Description

A “1” (swFault) is generated whenever the diagnostics detects a fault with the switch. Table 4–50 contains a list of the swFault types and their descriptions.

Table 4–50: swFault Types

Fault Types	Description
#TYPE	Switch is faulty.
#SUMMARY	Faulty reason: %d
#ARGUMENTS	0
#SEVERITY	Critical
#TIMEINDEX	1
#STATE	Non-operational

swSensorScn
(obsoleted by swFabricWatchTrap)

Enterprise

sw

Variables

swSensorStatus, swSensorIndex, swSensorType, swSensorValue, swSensorInfo

Description

A "2" (swSensorScn) is generated whenever an environment sensor changes its operational state.

For instance, a fan stops working. The VarBind in the Trap Data Unit shall 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. Table 4–51 contains the swSensorScn types.

Table 4–51: swSensorScn Types

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

swFCPortScn

Enterprise

sw

Variables

swFCPortOpStatus, swFCPortIndex

Description

A 3 (swFCPortScn) is generated whenever an FC_Port changes its operational state.

For instance, the FC_Port goes from on-line to offline. The VarBind in the Trap Data Unit shall contain the corresponding instance of the FC_Port's operational status and index. Table 4–52 contains a list of the swFCPortScn types.

Table 4–52: swFCPortScn Types

Scan Type	Description
#TYPE	A Fibre Channel Port changed its operational state.
#SUMMARY	Port Index %d changed state to %d
#ARGUMENTS	1, 0
#SEVERITY	Informational
#TIMEINDEX	1
#STATE	Operational

swEventTrap

Enterprise

sw

Variables

swEventIndex, swEventTimeInfo, swEventLevel, swEventRepeatCount, swEventDescr

Description

This trap is generated when an event occurs, with a level that is at or below swEventTrapLevel. Table 4–53 contains a list of the swEventTrap types.

Table 4–53: swEventTrap Types

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

Traps for Fabric Watch Systems

Traps for Fabric Watch Systems consist of:

- swFabricWatchTrap on page 4-220
- swTrackChangesTrap on page 4-221

swFabricWatchTrap

Enterprise

`sw`

Variables

swFwClassAreaIndex on page 4-129
swFwThresholdIndex on page 4-157
swFwName on page 4-159
swFwLabel on page 4-162
swFwLastEvent on page 4-164
swFwLastEventVal on page 4-165
swFwLastEventTime on page 4-166
swFwLastState on page 4-167

Description

Trap to be sent by Fabric Watch to notify of an event. Table 4–54 contains a list of the `swFabricWatchTrap` types.

Table 4–54: swFabricWatchTrap Types

Trap	Description
#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.
#ARGUMENTS	2, 0, 1, 6, 4, 5, 7
#SEVERITY	Warning
#TIMEINDEX	1
#STATE	Operational

Traps for Track Changes Subsystems

swTrackChangesTrap

Enterprise

sw

Variables

swTrackChangesInfo

Description

Trap to be sent for tracking login/logout/configuration changes. Table 4–55 contains a ist of the swTrackChangesTrap types.

Table 4–55: swTrackChangesTrap Types

Trap Type	Description
#TYPE	Track changes has generated a trap.
#SUMMARY	%s
#ARGUMENTS	0
#SEVERITY	Informational
#TIMEINDEX	1
#STATE	Operational

A

MIB Functional Groupings

Overview

This appendix provides a function-based listing of MIB objects. You can see the correlation of various objects to a particular function, including those on the following list:

- Switch Variables on page A-1
- Sensor Variables on page A-2
- Port Variables on page A-2
- Event Variables on page A-2
- ISL and End Device Variables on page A-3
- SNMP Configuration Variables on page A-3

Switch Variables

MIB variables that assist in monitoring or modifying the status/state of switches are in the following tables or groups:

- Connectivity Unit Port Statisitics Table (on page 2– 124)
- Connectivity Unit Table of Revisions for Hardware/Software Elements on page 2-47
- fc Fabric Element Module Table on page 3-14
- FLASH Administration on page 4-20

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 on page 2-53
- Environment Sensor Table on page 4-30

Port Variables

MIB variables that assist in monitoring or modifying ports are divided into:

- Variables for State and Status
- Variables for Statistics and Measurement

Variables for State and Status

- Connectivity Unit Port Table on page 2-63
- FxPort Configuration Table on page 3-23
- FxPort Operation Table on page 3-45
- FxPort Physical Level Table on page 3-56
- FxPort Capability Table on page 3-101
- The Fibre Channel Port Group on page 4-57

Variables for Statistics and Measurement

- FxPort Error Table on page 3-83

Event Variables

MIB variables that assist in monitoring or modifying events are in the following tables or groups:

- Connectivity Unit Event Table on page 2-93
- The Event Group on page 4-114

ISL and End Device Variables

MIB variables that assist in monitoring or modifying ISL and end-devices are:

- ISL Variables
- End Device Variables

ISL Variables

- Connectivity Unit Link Table on page 2-105
- The Fabric Group on page 4-39

End Device Variables

- Connectivity Unit Link Table on page 2-105
- FxPort Physical Level Table on page 3-56
- The Name Server Database Group on page 4-95

SNMP Configuration Variables

MIB variables that assist in configuring SNMP are in the following tables or groups:

- SNMP Trap Registration Table on page 2-201
- SW Agent Configuration Group on page 4-52

Bloom Variables

MIB variables that assist in performance monitoring and Trunking for the Bloom chip are in the following tables or groups:

- Bloom Performance ALPA Monitoring Table on page 4-181
- Bloom Performance End-to-End Monitoring Table on page 4-187
- Bloom Performance Filter Base Monitoring Table on page 4-196
- Trunking Scaler on page 4-202
- Trunking Table on page 4-203
- Trunking Group Table on page 4-209

Glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

8b/10b Encoding
An encoding scheme that converts each 8-bit byte into 10 bits. Used to balance ones and zeros in high-speed transports.

Address Identifier
A 24-bit or 8-bit value used to identify the source or destination of a frame.

AL_PA
Arbitrated Loop Physical Address; a unique 8-bit value assigned during loop initialization to a port in an arbitrated loop.

Alias Address Identifier
An address identifier recognized by a port in addition to its standard identifier. An alias address identifier may be shared by multiple ports.

Alias AL_PA
An AL_PA value recognized by an L_Port in addition to the AL_PA assigned to the port. See also *AL_PA*.

Alias Server
A fabric software facility that supports multicast group management.

API
Application Programming Interface; defined protocol that allows applications to interface with a set of services.

Arbitrated Loop
A shared 100 MBps Fibre Channel transport structured as a loop. Can support up to 126 devices and one fabric attachment. See also *Topology.*

ASIC
Application Specific Integrated Circuit.

ATM
Asynchronous Transfer Mode; a transport used for transmitting data over LANs or WANs that transmit fixed-length units of data. Provides any-to-any connectivity, and allows nodes to transmit simultaneously.

AW_TOV
Arbitration Wait Time-out Value; the minimum time an arbitrating L_Port waits for a response before beginning loop initialization.

Bandwidth
The total transmission capacity of a cable, link, or system. Usually measured in bps (bits per second). May also refer to the range of transmission frequencies available to a network. See also *Throughput*.

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*.

Beginning Run Disparity
The disparity at the transmitter or receiver when the special character associated with an ordered set is encoded or decoded. See also *Disparity.*

BER
Bit Error Rate; the rate at which bits are expected to be received in error. Expressed as the ratio of error bits to total bits transmitted. See also *Error.*

Block
As applies to Fibre Channel, upper-level application data that is transferred in a single sequence.

Bridge
Hardware that connects incompatible networks by providing translation for both hardware and software. For example, an ATM gateway can connect a Fibre Channel link to an ATM connection.

Broadcast
The transmission of data from a single source to all devices in the fabric, regardless of zoning. See also *Multicast*, *Unicast*.

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*.

Cascade
Two or more interconnected Fibre Channel switches. The recommended number of interswitch links is seven. See also *Fabric*, *ISL*.

Chassis
The metal frame in which the switch and switch components are mounted.

Circuit
An established communication path between two ports. Consists of two virtual circuits capable of transmitting in opposite directions. See also *Link*.

Class 1
Service that provides a dedicated connection between two ports (also called connection-oriented service), with notification of delivery or nondelivery.

Class 2
Service that provides multiplex and connection-less frame switching service between two ports, with notification of delivery or nondelivery.

Class 3
Service that provides a connection-less frame switching service between two ports, without notification of delivery or nondelivery of data. Can also be used to provide a multicast connection between the originator and recipients, with notification of delivery or nondelivery.

Class 4
Connection-oriented service that provides a virtual circuit between two ports, with notification of delivery or nondelivery. Allows fractional parts of the bandwidth to be used in a virtual circuit.

Class 6
Connection-oriented service that provides a multicast connection between the multicast originator and recipients, with notification of delivery or nondelivery.

Class F
Connection-less service for control traffic between switches, with notification of delivery or nondelivery of data between the E_Ports.

Class of Service
A specified set of delivery characteristics and attributes for frame delivery.

CLS
Close Primitive Signal. The protocol used by a port in an arbitrated loop to close a circuit.

Code Balance
The ratio of one bit to the total number of transmitted bits.

Comma
A unique pattern (either 1100000 or 0011111) used in 8B/10B encoding to specify character alignment within a data stream. See also *K28.5*.

Command Line
Interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a GUI.

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*.

Connection Initiator
A port that has originated a Class 1 dedicated connection and received a response from the recipient.

Connection Recipient
A port that has received a Class 1 dedicated connection request and transmitted a response to the originator.

CRC
Cyclic Redundancy Check; a check for transmission errors included in every data frame.

Credit
As applies to Fibre Channel, the number of receive buffers available for transmission of frames between ports. See also *BB_Credit*, *EE_Credit*.

CT_HDR
Common Transport Header. A header that conforms to the Fibre Channel Common Transport (FC_CT) protocol.

CT_IU
Common Transport Information Unit. An information unit that conforms to the Fibre Channel Common Transport (FC_CT) protocol.

Current Fill Word
The fill word currently selected by the LPSM (loop port state machine). See also *Fill Word.*

Cut-through
A switching technique that allows the route for a frame to be selected as soon as the destination address is received. See also *Route*.

Data Word
Type of transmission word that occurs within frames. The frame header, data field, and CRC all consist of data words. See also *Frame*, *Ordered set*, *Transmission Word.*

Defined Zone Configuration
The set of all zone objects defined in the fabric. May include multiple zone configurations. See also *Enabled Configuration*, *Zone Configuration*.

Disparity
The relationship of ones and zeros in an encoded character. “Neutral disparity” means an equal number of each, “positive disparity” means a majority of ones, and “negative disparity” means a majority of zeros.

DLS
Dynamic Load Sharing; dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx_Port or E_Port changes status.

Domain ID
As applies to SAN switches, a unique number between 1 and 239 that identifies the switch to the fabric and is used in routing frames. Usually automatically assigned by the switch, but can be manually assigned.

E_D_TOV
Error Detect Time-out Value; the minimum amount of time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error condition is declared. See also *R_A_TOV*, *RR_TOV.*

E_Port
Expansion Port; a type of switch port that can be connected to an E_Port on another switch to create an ISL. See also *ISL*.

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 the exchange of frames across the fabric between source and destination. See also *End-to-end Flow Control*, *BB_Credit*.

EIA Rack
A storage rack that meets the standards set by the Electronics Industry Association.

Enabled Zone Configuration
The currently enabled configuration of zones. Only one configuration can be enabled at a time. See also *Defined Configuration*, *Zone Configuration*.

End-to-end Flow Control
Governs flow of class 1 and 2 frames between N_Ports. See also *EE_Credit*.

Error
As applies to Fibre Channel, a missing or corrupted frame, time-out, loss of synchronization, or loss of signal (link errors). See also *Loop Failure*.

Exchange
The highest level Fibre Channel mechanism used for communication between N_Ports. Composed of one or more related sequences, and can work in either one or both directions.

F_Port
Fabric Port; a port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N_Port to a switch. See also *FL_Port*, *Fx_Port*.

Fabric Name
The unique identifier assigned to a fabric and communicated during login and port discovery.

Fabric
A Fibre Channel network containing two or more switches in addition to hosts and devices. May also be referred to as a switched fabric. See also *Topology*, *SAN*, *Cascade*.

FC-AL-3
The Fibre Channel Arbitrated Loop standard defined by ANSI. Defined on top of the FC-PH standards.

FC-FLA
The Fibre Channel Fabric Loop Attach standard defined by ANSI.

FCIA
Fibre Channel Industry Association. An international organization of Fibre Channel industry professionals. Among other things, provides oversight of ANSI and industry developed standards

FCP
Fibre Channel Protocol; mapping of protocols onto the Fibre Channel standard protocols. For example, SCSI FCP maps SCSI-3 onto Fibre Channel.

FC-PH-1, 2, 3
The Fibre Channel Physical and Signalling Interface standards defined by ANSI.

FC-PI
The Fibre Channel Physical Interface standard defined by ANSI.

FC-PLDA
The Fibre Channel Private Loop Direct Attach standard defined by ANSI. Applies to the operation of peripheral devices on a private loop.

FC-SW-2
The second generation of the Fibre Channel Switch Fabric standard defined by ANSI. Specifies tools and algorithms for the interconnection and initialization of Fibre Channel switches in order to create a multi-switch Fibre Channel fabric.

Fibre Channel Transport
A protocol service that supports communication between Fibre Channel service providers. See also *FSP*.

Fill Word
An IDLE or ARB ordered set that is transmitted during breaks between data frames to keep the Fibre Channel link active.

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 *F_Port*, *Fx_Port*.

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, any optional headers, the data payload, a cyclic redundancy check (CRC), and an end-of-frame delimiter. There are two types of frames: Link control frames (transmission acknowledgements, etc.) and data frames.

FS_ACC
Fibre Channel Services Accept. The information unit used to indicate acceptance of a request for a Fibre Channel service.

FS_IU
Fibre Channel Services Information Unit. An information unit that has been defined by a specific Fibre Channel service.

FS_REQ
Fibre Channel Services Request. A request for a Fibre Channel services function, or notification of a fabric condition or event.

FS_RJT
Fibre Channel Services Reject. An indication that a request for Fibre Channel services could not be processed.

FS
Fibre Channel Service; a service that is defined by Fibre Channel standards and exists at a well-known address. For example, the Simple Name Server is a Fibre Channel service. See also *FSP*.

FSP
Fibre Channel Service Protocol; the common protocol for all fabric services, transparent to the fabric type or topology. See also *FS*.

FSPF
Fabric Shortest Path First; the routing protocol for Fibre Channel switches.

Full Fabric
The licensing 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 *F_Port*, *FL_Port*.

G_Port
Generic Port; a port that can operate as either an E_Port or 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
A device such as a switch that connects different subnets together. A switch can be used as a gateway from the Ethernet to the Fibre Channel. Set the gateway address on one switch to the Fibre Channel IP address of another switch to enable the other switch to forward IP traffic to the ethernet port on the second switch.

GBIC
Gigabit Interface Converter; a removable serial transceiver module that allows gigabaud physical-level transport for Fibre Channel and gigabit ethernet. Also known as Optical Transceiver.

Gbps
Gigabits per second (1,062,500,000 bits/second).

GBps
GigaBytes per second (1,062,500,000 bytes/second).

Half-duplex
A mode of communication that allows a port to either transmit or receive frames at any time, but not 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. The following two hardware translative modes are available to a QuickLoop enabled switch:

- Standard Translative Mode: Allows public devices to communicate with private devices that are directly connected to the fabric.
- QuickLoop Mode: Allows initiator devices to communicate with private or public devices that are not in the same loop.

HBA
Host Bus Adapter; the interface card between a server or workstation bus and the Fibre Channel network.

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.

Idle
Continuous transmission of an ordered set over a Fibre Channel link when no data is being transmitted, to keep the link active and maintain bit, byte, and word synchronization.

IN_ID
Initial Identifier. The field in the CT_HDR where the port ID of the client originator of a Fibre Channel Services request.

Initiator
A server or workstation on a Fibre Channel network that initiates communications with storage devices. See also *Target*.

Integrated Fabric
The fabric created by a Compaq StorageWorks Fibre Channel SAN Switch IS/32 or IS/64, or SAN Switches 16-EL/8-EL switches cabled together and configured to handle traffic as a seamless group.

IOD
In-order Delivery; a parameter that, when set, guarantees that frames are either delivered in order or dropped.

IPA
Initial Process Associator. An identifier associated with a process at an N_Port.

ISL
Interswitch Link; a Fibre Channel link from the E_Port of one switch to the E_Port of another. See also *E_Port*, *Cascade*.

Isolated E_Port
An E_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E_D_TOVs). See also *E_Port*.

IU
Information Unit; a set of information as defined by either upper-level process protocol definition or upper-level protocol mapping.

K28.5
A special 10-bit character used to indicate the beginning of a transmission word that performs Fibre Channel control and signaling functions. The first seven bits of the character are the comma pattern. See also *Comma*.

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 one of two modes:

- *Fabric mode* Connected to a port that is not loop capable, and using fabric protocol.
- *Loop mode* In an arbitrated loop and using loop protocol. An L_Port in loop mode can also be in participating mode or non-participating mode.

See also *Non-participating Mode, Participating Mode*.

Latency
The period of time required to transmit a frame, from the time it is sent until it arrives.

Link Services
A protocol for link-related actions.

Link
As applies to Fibre Channel, a physical connection between two ports, consisting of both transmit and receive fibres. See also *Circuit*.

LIP
Loop Initialization Primitive; the signal used to begin initialization in a loop. Indicates either loop failure or resetting of a node.

LIS_HOLD_TIME
Loop Initialization Sequence Hold Time. The maximum period of time for a node to forward a loop initialization sequence.

LM_TOV
Loop Master Time-out Value; the minimum time that the loop master waits for a loop initialization sequence to return.

Login BB_Credit
The number of receive buffers a receiving L_Port has available when a circuit is first established. Communicated through PLOGI, PDISC link services, or FLOGI.

Loop Circuit
A temporary bidirectional communication path established between L_Ports.

Loop Failure
Loss of signal within a loop for any period of time, or loss of synchronization for longer than the time-out value.

Loop Initialization
The logical procedure used by an L_Port to discover its environment. Can be used to assign AL_PA addresses, detect loop failure, or reset a node.

Loop_ID
A hex value representing one of the 127 possible AL_PA values in an arbitrated loop.

Looplet
A set of devices connected in a loop to a port that is a member of another loop.

LPSM
Loop Port State Machine; the logical entity that performs arbitrated loop protocols and defines the behavior of L_Ports when they require access to an arbitrated loop.

LWL
Long Wavelength; a type of fiber optic cabling that is based on 1300-mm lasers and supports link speeds of 1.0625 Gbps. May also refer to the type of GBIC or SFP. See also *SWL*.

Master Port
As relates to trunking, the port that determines the routing paths for all traffic flowing through the trunking group. One of the ports in the first ISL in the trunking group is designated as the master port for that group. See also *ISL Trunking*.

MIB
Management Information Base; an SNMP structure to help with device management, providing configuration and device information.

Monitoring State
The state in which a port is monitoring the flow of information for data relevant to the port.

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*, *Unicast*.

Multimode
A fiber optic cabling specification that allows up to 500 meters between devices.

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*.

NAA
Network Address Authority. An identifier that indicates the format of a network address.

Name Server
Frequently used to indicate Simple Name Server. See also *SNS*.

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 Name
The unique identifier for a node, communicated during login and port discovery.

Node
A Fibre Channel device that contains an N_Port or NL_Port.

Non-participating Mode
A mode in which an L_Port in a loop is inactive and cannot arbitrate or send frames, but can retransmit any received transmissions. This mode is entered if there are more than 127 devices in a loop and an AL_PA cannot be acquired. See also *L_Port*, *Participating Mode*.

Nx_Port
A node port that can operate as either an N_Port or NL_Port.

Open Originator
The L_Port that wins arbitration in an arbitrated loop and sends an OPN ordered set to the destination port, then enters the Open state.

Open Recipient
The L_Port that receives the OPN ordered set from the open originator, and then enters the Open state.

Open State
The state in which a port can establish a circuit with another port. A port must be in the Open state before it can arbitrate.

OPN
Open Primitive Signal. The protocol used by a port that has won arbitration in an arbitrated loop to establish a circuit.

Ordered Set
A transmission word that uses 8B/10B mapping and begins with the K28.5 character. Ordered sets occur outside of frames, and include the following items:

- *Frame delimiters* Mark frame boundaries and describe frame contents.
- *Primitive signals* Indicate events.
- *Primitive sequences* Indicate or initiate port states.

Ordered sets are used to differentiate Fibre Channel control information from data frames and to manage the transport of frames.

Packet
A set of information transmitted across a network. See also *Frame*.

Participating Mode
A mode in which an L_Port in a loop has a valid AL_PA and can arbitrate, send frames, and retransmit received transmissions. See also *L_Port*, *Non-participating Mode*.

Path Selection
The selection of a transmission path through the fabric. The Compaq switches use the FSPF protocol.

Phantom Address
An AL_PA value that is assigned to an device that is not physically in the loop. Also known as phantom AL_PA.

A twenty-bit public address created for an 8-bit loop device to allow public devices to access it.

Phantom Device
A device that is not physically in an arbitrated loop, but is logically included through the use of a phantom address.

PLOGI
Port Login; the port-to-port login process by which initiators establish sessions with targets. See also *FLOGI*.

Point-to-point
A Fibre Channel topology that employs direct links between each pair of communicating entities. See also *Topology*.

Port Cage
The metal casing extending out of the optical port on the switch, and in which the SFP can be inserted.

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.

Private Device
A device that supports arbitrated loop protocol and can interpret 8-bit addresses, but cannot log into the fabric.

Private Loop
An arbitrated loop that does not include a participating FL_Port.

Private NL_Port
An NL_Port that communicates only with other private NL_Ports in the same loop and does not log into the fabric.

Protocol
A defined method and a set of standards for communication.

Public NL_Port
An NL_Port that logs into the fabric, can function within either a public or a private loop, and can communicate with either private or public NL_Ports.

Public Device
A device that can log into the fabric and support 20-bit addresses (or has 20-bit phantom addresses created for it by the switch). See also *Phantom Addresses*

Public Loop
An arbitrated loop that includes a participating FL_Port, and may contain both public and private NL_Ports.

QuickLoop
A feature that makes it possible to allow private devices within loops to communicate with public and private devices across the fabric through the creation of a larger loop.

May also refer to the arbitrated loop created using this software. A QuickLoop can contain a number of devices or looplets; all devices in the same QuickLoop share a single AL_PA space.

R_A_TOV
Resource Allocation Time-out Value; the maximum time a frame can be delayed in the fabric and still be delivered. See also *E_D_TOV*, *RR_TOV*.

Route
As applies to a fabric, the communication path between two switches. May 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 Time-out Value; the minimum time a target device in a loop waits after a LIP before logging out a SCSI initiator. See also *E_D_TOV*, *R_A_TOV*.

RSCN
Registered State Change Notification; a switch function that allows notification of fabric changes to be sent from the switch to specified nodes.

RX_ID
Responder Exchange Identifier. A 2-byte field in the frame header used by the responder of the Exchange to identify frames as being part of a particular exchange.

SAN
Storage Area Network; a network of systems and storage devices that communicate using Fibre Channel protocols. See also *Fabric*.

Sequence
A group of related frames transmitted in the same direction between two N_Ports.

Service Rate
The rate at which an entity can service requests. See also *Request Rate*.

Single Mode
The fiber optic cabling standard that corresponds to distances of up to 10 km between devices.

SI
Sequence Initiative.

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)*.

SNMPv1
The original SNMP protocol, now labeled v1.

SNS
Simple Name Server; 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. May also be referred to as directory service. See also *FS*.

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.

Switch
Hardware that routes frames according to Fibre Channel protocol and is controlled by software.

SWL
Short Wavelength; a type of fiber optic cabling that is based on 850-mm lasers and supports 1.0625-Gbps link speeds. May also refer to the type of GBIC or SFP. See also *LWL*.

Target
A storage device on a Fibre Channel network. See also *Initiator*.

Tenancy
The time from when a port wins arbitration in a loop until the same port returns to the monitoring state. Also referred to as loop tenancy.

Throughput
The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second). See also *Bandwidth*.

Topology
As applies to Fibre Channel, 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.

Transfer State
The state in which a port can establish circuits with multiple ports without reentering the arbitration cycle for each circuit. This state can only be accessed by an L_Port in the Open state.

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*.

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.

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.

UDP
User Datagram Protocol; a protocol that runs on top of IP and provides port multiplexing for upper-level protocols.

ULP_TOV
Upper-level Time-out Value; the minimum time that a SCSI ULP process waits for SCSI status before initiating ULP recovery.

ULP
Upper-level Protocol; the protocol that runs on top of Fibre Channel. Typical upper-level protocols are SCSI, IP, HIPPI, and IPI.

Unicast
The transmission of data from a single source to a single destination. See also *Broadcast*, *Multicast*.

Well-known Address
As pertaining to Fibre Channel, a logical address defined by the Fibre Channel standards as assigned to a specific function, and stored on the switch.

Workstation
A computer used to access and manage the fabric. May also be referred to as a management station or host.

WWN
Worldwide Name; an identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

Xmitted Close State
The state in which an L_Port cannot send messages, but can retransmit messages within the loop. A port in the XMITTED CLOSE state cannot attempt to arbitrate.

Zone Configuration
A specified set of zones. Enabling a configuration enables all zones in that configuration. See also *Defined Configuration*, *Enabled Configuration*.

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 permission to others in the zone, but are not visible to any outside the zone. See also *Zoning*.

Zoning
A feature that runs on Fabric OS and allows partitioning of the fabric into logical groupings of devices. Devices in a zone can only access and be accessed by devices in the same zone. See also *Zone*.