

Network Working Group
Request for Comments: 4936
Category: Standards Track

C. DeSanti
H.K. Vivek
K. McCloghrie
Cisco Systems
S. Gai
Nuova Systems
August 2007

Fibre Channel Zone Server MIB

Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Copyright Notice

Copyright (C) The IETF Trust (2007).

Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects for information related to a Fibre Channel Zone Server.

Table of Contents

1. Introduction	3
2. The Internet-Standard Management Framework	3
3. Overview of Fibre Channel	3
3.1. General Overview	3
3.2. Zoning	4
3.3. Zoning Configuration and Management	5
4. Relationship to Other MIBs	7
5. MIB Overview	8
5.1. Fibre Channel Management Instance	8
5.2. Switch Index	8
5.3. Fabric Index	8
5.4. Locking the Fabric	9
5.5. Basic and Enhanced Modes	10
5.6. Persistent Storage	10
5.7. The Active Zone Set and the Zone Set Database	11
5.8. Conformance Groups	12
6. The T11-FC-FABRIC-LOCK-MIB Module	13
7. The T11-FC-ZONE-SERVER-MIB Module	24
8. IANA Considerations	79
9. Security Considerations	79
10. Acknowledgements	80
11. Normative References	81
12. Informative References	82

1. Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects for information related to a Fibre Channel network's Zone Server.

This memo was previously approved by International Committee for Information Technology Standards (INCITS) Task Group T11.5 (<http://www.t11.org>); this document is a product of the IETF's IMSS working group.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, RFC 2119 [RFC2119].

2. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

3. Overview of Fibre Channel

3.1. General Overview

The Fibre Channel (FC) is logically a bidirectional point-to-point serial data channel, structured for high performance. Fibre Channel provides a general transport vehicle for higher-level protocols such as Small Computer System Interface (SCSI) command sets, the High-Performance Parallel Interface (HIPPI) data framing, IP (Internet Protocol), IEEE 802.2, and others.

Physically, Fibre Channel is an interconnection of multiple communication points, called N_Ports, interconnected either by a switching network, called a Fabric, or by a point-to-point link. A Fibre Channel "node" consists of one or more N_Ports. A Fabric may consist of multiple Interconnect Elements, some of which are

switches. An N_Port connects to the Fabric via a port on a switch called an F_Port. When multiple FC nodes are connected to a single port on a switch via an "Arbitrated Loop" topology, the switch port is called an FL_Port, and the nodes' ports are called NL_Ports. The term Nx_Port is used to refer to either an N_Port or an NL_Port. The term Fx_Port is used to refer to either an F_Port or an FL_Port. A switch port, which is interconnected to another switch port via an Inter-Switch Link (ISL), is called an E_Port. A B_Port connects a bridge device with an E_Port on a switch; a B_Port provides a subset of E_Port functionality.

Many Fibre Channel components, including the Fabric, each node, and most ports, have globally unique names. These globally unique names are typically formatted as World Wide Names (WWNs). More information on WWNs can be found in [FC-FS]. WWNs are expected to be persistent across agent and unit resets.

Fibre Channel frames contain 24-bit address identifiers that identify the frame's source and destination ports. Each FC port has both an address identifier and a WWN. For an Nx_Port, its WWN is called a N_Port_Name and its address identifier is called an N_Port_ID. When a Fabric is in use, the FC address identifiers are dynamic and are assigned by a switch. Each octet of a 24-bit address represents a level in an address hierarchy, with a Domain_ID being the highest level of the hierarchy.

3.2. Zoning

Zones within a Fabric provide a mechanism to control frame delivery between Nx_Ports ("Hard Zoning") or to expose selected views of Name Server information ("Soft Zoning").

Communication is only possible when the communicating endpoints are members of a common zone. This technique is similar to virtual private networks in that the Fabric has the ability to group devices into Zones.

Hard zoning and soft zoning are two different means of realizing this. Hard zoning is enforced in the Fabric (i.e., switches) whereas soft zoning is enforced at the endpoints (e.g., host bus adapters (HBAs)) by relying on the endpoints to not send traffic to an N_Port_ID not obtained from the Name Server with a few exceptions for well-known N_Port_IDs used to bootstrap the Fabric (e.g., talk to the Name Server).

Administrators create Zones to increase network security and to prevent data loss or corruption by controlling access between devices or user groups. Zones may be specifically used to create:

- a) Barriers between devices that use different operating systems. It is often critical to separate servers and storage devices with different operating systems because accidental transfer of information from one to another may delete or corrupt data;
- b) Logical subsets of closed user groups. Administrators may authorize access rights to specific Zones for specific user groups, thereby protecting confidential data from unauthorized access;
- c) Groups of devices that are separate from devices in the rest of a Fabric. Zones allow certain processes to be performed on devices in a group without interrupting devices in other groups; or
- d) Temporary access between devices for specific purposes. Administrators may remove Zone restrictions temporarily, then restore Zone restrictions to perform normal processes.

3.3. Zoning Configuration and Management

Zones are configured via a Fabric Zone Server, using requests defined in [FC-GS-5]), or via the T11-FC-ZONE-SERVER-MIB module defined in this memo, or via some other mechanism.

An Nx_Port may be a member of one or more Zones. Zone membership may be specified by:

- a) The N_Port_Name of the Nx_Port connected to the switch;
- b) The N_Port_ID assigned during Fabric Login;
- c) The Node_Name associated with the Nx_Port; note that the Node_Name may include more than one Nx_Port;
- d) The F_Port_Name of the Fx_Port to which the Nx_Port is connected; or
- e) The domain identifier (Domain_ID) and physical port number of the Switch Port to which the Nx_Port is attached.

A Fabric's Zone Server may be used to create a Zone by specifying the Zone Members. One or more Zones may be collected into a Zone Set, and a Zone may be a member of more than one Zone Set. A Zone Set creates a collection of Zones that may be activated or deactivated as a single entity across all Switches in a Fabric (e.g., having two Zone Sets, one for normal operation, and a second for backup during off-hours). Only one Zone Set may be activated at one time.

Other terminology defined in [FC-GS-5] is: an Active Zone Set is the Zone Set currently enforced by a Fabric; a Zone Set Database is a database of the Zone Sets available to be activated within a Fabric;

and a Zoning Database is a generic term used to indicate a combination of an Active Zone Set and a Zone Set Database.

Two distinct sets of management requests, Enhanced and Basic, are defined in [FC-GS-5] to interact with a Fabric Zone Server. Basic Zoning provides compatibility with [FC-GS-4] and earlier versions of Fibre Channel's Generic Services specification. If all the Switches in a Fabric support the Enhanced request set, then it may be used to manage zoning; otherwise, only the Basic request set may be used, in order to support backward compatibility.

In the context of Enhanced Zoning Management, a management action (i.e., write access to the Zoning Database) to the Zone Server can only occur inside a server session. A server session is set up using the FC-GS-5's Common Transport (CT) protocol defined in [FC-GS-5]. A server session is delimited by CT protocol requests, Server Session Begin (SSB) and Server Session End (SSE), which are directed to the Management Service and which have the GS_Subtype specifying the Zone Server. Query requests that result in read access to the Zoning Database are not required to be issued inside a server session, although the information returned is not guaranteed to be consistent when supplied outside of a server session.

When setting up a server session for Enhanced Zoning, the Zone Server is required to lock the Fabric. This ensures serialized management access to the Zoning Database and guarantees a deterministic behavior. The switch that receives the SSB request is called the 'managing' switch, and it tries to lock the Fabric using the Fabric Management Session Protocol (see section 10.6 of [FC-SW-4]) by sending an Acquire Change Authorization (ACA) request to all other switches in the Fabric. If any switch(es) respond with an SW_RJT indicating failure, then the attempt to lock the Fabric fails and the SSB request is rejected. If all the other switches respond with an SW_ACC indicating success, then the Fabric is locked and the server session can be established. The subsequent SSE request causes a Release Change Authorization (RCA) request to all other switches, and thus, the Fabric to be unlocked.

For at least one application other than Zoning, the managing switch uses a different type of request to lock the Fabric, i.e., it sends an Enhanced Acquire Change Authorization (EACA) request to all other switches in the Fabric. An EACA reserves local resources associated with a designated application to ensure the consistency of that application's data. The application is identified in the EACA using an Application_ID (see Table 116 in [FC-SW-4]). A lock that was established via an EACA is released using an Enhanced Release Change Authorization (ERCA) request.

Changes requested in a Zoning Database by Enhanced Zoning commands persist after the end of the Zoning (server) session only if the commands are followed, within the same server session, by a Commit Zone Changes (CMIT) request. On receipt of a CMIT request, the Zone Server checks that the Zoning Database as modified by the outstanding changes will pass the applicable consistency checks, and then distributes it to all other switches in the Fabric using a Stage Fabric Configuration Update (SFC) request. If all other switches accept the SFC request, then the "managing" switch sends an Update Fabric Configuration (UFC) Request to each other switch, and the staged Zoning Database thereby becomes the Fabric's (active) Zoning Database.

The latest standard for an interconnecting Fabric containing multiple Fabric Switch elements is [FC-SW-4]. [FC-SW-4] carries forward the earlier specification for the operation of a single Fabric in a physical infrastructure, and augments it with the definition of Virtual Fabrics and with the specification of how multiple Virtual Fabrics can operate within one (or more) physical infrastructures. The use of Virtual Fabrics provides for each frame to be tagged in its header to indicate which one of several Virtual Fabrics that frame is being transmitted on. All frames entering a particular "Core Switch" [FC-SW-4] (i.e., a physical switch) on the same Virtual Fabric are processed by the same "Virtual Switch" within that Core switch.

4. Relationship to Other MIBs

The Fibre Channel Management MIB [RFC4044] defines basic information for Fibre Channel hosts and switches, including extensions to the standard IF-MIB [RFC2863] for Fibre Channel interfaces.

This MIB extends beyond [RFC4044] to cover the management of Fibre Channel Zoning Servers, both for Basic Zoning Management and for Enhanced Zoning Management, as defined in the FC-GS-5 specification.

This MIB imports some common Textual Conventions from T11-TC-MIB, defined in [RFC4439]. It also imports a TC from T11-FC-NAME-SERVER-MIB, defined in [RFC4438], plus InetAddressType and InetAddress from INET-ADDRESS-MIB [RFC4001]. It also includes a reference to snmpCommunitySecurityName defined in [RFC3584].

5. MIB Overview

This document defines two MIB modules: T11-FC-FABRIC-LOCK-MIB and T11-FC-ZONE-SERVER-MIB.

T11-FC-FABRIC-LOCK-MIB supports FC-GS-5's generic capability of locking the Fabric for a particular "application" such as (the management of) Enhanced Zoning. The MIB contains one table in which each entry represents a particular switch being the 'managing' switch of a particular application's Fabric lock.

T11-FC-ZONE-SERVER-MIB is specific to the operation of Zone Servers, which can operate in Basic mode or in Enhanced mode. This MIB module imports the T11NsGs4RejectReasonCode textual convention defined in T11-FC-NAME-SERVER-MIB [RFC4438].

5.1. Fibre Channel Management Instance

A Fibre Channel management instance is defined in [RFC4044] as a separable managed instance of Fibre Channel functionality. Fibre Channel functionality may be grouped into Fibre Channel management instances in whatever way is most convenient for the implementation(s). For example, one such grouping accommodates a single SNMP agent having multiple AgentX [RFC2741] sub-agents, with each sub-agent implementing a different Fibre Channel management instance.

The object, fcmInstanceIndex, is IMPORTed from the FC-MGMT-MIB [RFC4044] as the index value to uniquely identify each Fibre Channel management instance, for example, within the same SNMP context ([RFC3411], section 3.3.1).

5.2. Switch Index

The FC-MGMT-MIB [RFC4044] defines the fcmSwitchTable as a table of information about Fibre Channel switches that are managed by Fibre Channel management instances. Each Fibre Channel management instance can manage one or more Fibre Channel switches. The Switch Index, fcmSwitchIndex, is IMPORTed from the FC-MGMT-MIB as the index value to uniquely identify a Fibre Channel switch amongst those (one or more) managed by the same Fibre Channel management instance.

5.3. Fabric Index

Whether operating on a physical Fabric (i.e., without Virtual Fabrics) or within a Virtual Fabric, the operation of a Zone Server within a Fabric is identical. Therefore, this MIB defines all Fabric-related information in tables that are INDEXed by an arbitrary

integer, named a "Fabric Index", having the syntax, T11FabricIndex, which is IMPORTed from the T11-TC-MIB [RFC4439]. When a device is connected to a single physical Fabric, without use of any Virtual Fabrics, the value of this Fabric Index will always be 1. In an environment of multiple virtual and/or physical Fabrics, this index provides a means to distinguish one Fabric from another.

It is quite possible, and may even be likely, that a Fibre Channel switch will have ports connected to multiple virtual and/or physical Fabrics. Thus, in order to simplify a management protocol query concerning all the Fabrics to which a single switch is connected, fcmSwitchIndex will be listed before an object with FabricIndex as its syntax when both appear in the same INDEX clause.

5.4. Locking the Fabric

The T11-FC-FABRIC-LOCK-MIB module provides for the management of locks on a Fibre Channel Fabric. A Fibre Channel Fabric lock is used to ensure serialized access to some types of management data related to a Fabric, e.g., the Fabric's Zoning Database.

Some (managing) applications obtain a lock by initiating server sessions and the Fabric is locked so as to reserve local resources in each Switch. For this usage, the managing switch sends an Acquire Change Authorization (ACA) request to other switches in order to lock the Fabric.

For some other applications, a managing switch locks the Fabric using an Enhanced Acquire Change Authorization (EACA) request, which identifies the application on whose behalf the Fabric is being locked with an Application_ID. In this case, only local resources associated with the designated application are reserved.

Locks established via ACAs and via EACAs are both represented in the t11FLockTable in the T11-FC-FABRIC-LOCK-MIB. The Application_ID provided by the EACA serves to distinguish between multiple concurrent locks established by EACAs. In order to use this same mechanism to distinguish a lock established via an ACA from each of those established via EACAs, an additional (special) value of Application_ID has been assigned [APPL-ID] for use by this MIB module. Specifically, this newly assigned value will never be used to indicate an Application locked by an EACA, and therefore this MIB module uses it to uniquely distinguish a lock established via an ACA. In other words, with this additional assignment, an Application_ID value can be used to uniquely identify any active lock amongst all those established (on the same Fabric) either by an EACA or an ACA.

5.5. Basic and Enhanced Modes

The `t1lZsServerOperationMode` object indicates whether a Fabric's Zone Server is operating in Basic mode or Enhanced mode. These two modes have a sufficient amount of commonality to make it worthwhile to have one set of MIB objects that are used for the subset of functionality that is common to both modes. To accommodate the differences, additional MIB objects are defined.

For Enhanced mode, the additional objects are defined in a group, `t1lZsEnhancedModeGroup`, which is only required to be implemented in a Zone Server capable of supporting Enhanced mode. The objects specific to Basic mode are always (even in Enhanced mode) expected to be implemented, but when in Enhanced mode, their values are either restricted or do not affect current operations, e.g.,

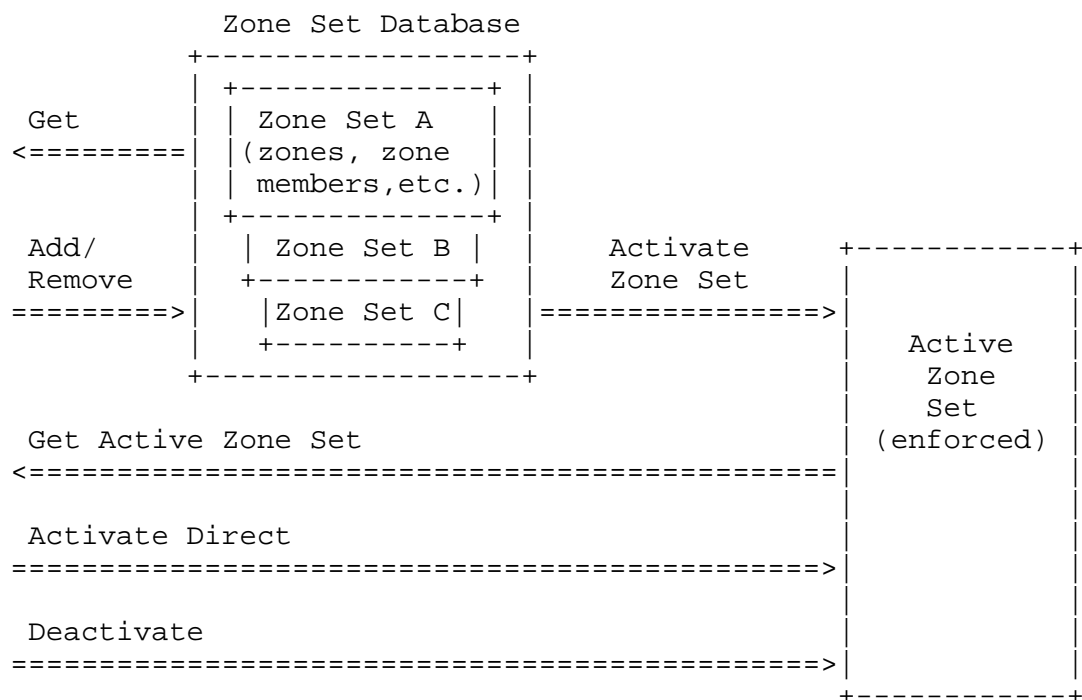
- an example of "restricted" is: the distribution of updates to the Zone Server database throughout the Fabric has to be requested explicitly in Basic mode; this functionality is provided in the MIB by the `t1lZsServerDistribute` object. In contrast, in Enhanced mode, the distribution is an implicit part of the commit function which is initiated using the `t1lZsServerCommit` object. Thus, when operating in Enhanced mode, `t1lZsServerDistribute` has a fixed value, and when operating in Basic mode, `t1lZsServerCommit` has a fixed value.
- an example of "do not affect current operations" is: `t1lZsServerHardZoning`, which specifies whether a switch enforces hard Zoning on a Fabric when in Basic mode. This object is instantiated and could even be modified while in Enhanced mode, but its value only takes effect when in Basic mode. (Note that in Enhanced mode, `t1lZsActiveZoneHardZoning` specifies whether hard Zoning is enabled on a particular Zone.)

5.6. Persistent Storage

A Zone Server Database for a given Fabric consists of the combination of many of the tables defined in this MIB module. In order to ensure that such a Database is consistent, this MIB module defines just one object (`t1lZsServerDatabaseStorageType`) with a syntax of `StorageType`, whose value for a given Fabric is defined to be applicable to all of that Fabric's Zone Server Database as defined in all the tables in this MIB module.

5.7. The Active Zone Set and the Zone Set Database

As described in FC-GS-5 [FC-GS-5], one of the Zone Sets in the Zone Set Database can be activated to become the Active Zone Set, i.e., the one which is enforced on the Fabric. Get/Add/Remove-type requests are defined in FC-GS-5 to allow access to the Zone Set Database. When the Zone Set Database is modified, such modifications don't affect the Active Zone Set unless and until a subsequent activation. Interaction directly with the Active Zone Set is also possible via the FC-GS-5 requests: 'Activate Direct' and 'Get Active Zone Set'. This is illustrated in the following rendition of Figure 15 of [FC-GS-5]:



The T11-FC-ZONE-SERVER-MIB module, defined in section 7, models the above structure by having one set of MIB tables for the Zone Set Database and a separate set for the Active Zone Set, specifically:

- seven tables for the Zone Set Database: t11ZsSetTable, t11ZsZoneTable, t11ZsSetZoneTable, t11ZsAliasTable, t11ZsZoneMemberTable, t11ZsAttribBlockTable and t11ZsAttribTable.
- four tables for the Active Zone Set: t11ZsActiveTable, t11ZsActiveZoneTable, t11ZsActiveZoneMemberTable and t11ZsActiveAttribTable.

5.8. Conformance Groups

5.8.1. The t11ZsBasicGroup

This group contains objects to retrieve and to modify the Zoning configuration of a Zone Server capable of operating in Basic mode.

5.8.2. The t11ZsEnhancedModeGroup

This group contains objects to retrieve and to modify the Zoning configuration of a Zone Server capable of operating in Enhanced mode.

5.8.3. The t11ZsActivateGroup

This group contains objects that allow a Zone Set to be activated via SNMP SetRequests and provide the status and result of such an activation.

5.8.4. The t11ZsStatisticsGroup

This group contains objects for collecting Zone Server statistics.

5.8.5. The t11ZsNotificationGroup

This group contains notifications for monitoring: Zone merge successes and failures, Zone Server request rejections, changes in the Default Zoning behavior, and the success or failure of an attempt to activate or deactivate a Zone Set.

5.8.5.1. Flow-Control for Notifications

When defining SNMP notifications for events that occur in the data-plane, the maximum frequency of their generation needs to be considered. Unless there is some limiting factor, such notifications need to be flow-controlled in some way, e.g., defined such that after some maximum number have occurred within a specified time interval, further notifications are suppressed for some subsequent time interval. However, as and when such a suppression occurs, the Network Management System (NMS) that didn't receive the notifications (because they were suppressed) needs an indication of how many were suppressed. Therefore, an additional Counter32 object needs to be defined, and/or a new type of notification needs to be defined for use at the end of the interval. While this is extra complexity, it is necessary for notifications that need to be flow-controlled.

In contrast, for notifications such as all those defined in this MIB module, which are generated due to control-plane events (and are not able to start a chain reaction):

- estimating the maximum number that could be generated per unit time for each type of notification is too simplistic. For example, it's unreasonable to ask how many of the `t11ZsDefZoneChangeNotify` notifications can be generated in a time interval because it depends on several factors: how many operators can be re-configuring the network at the same time? and how frequently can each of them change the Default Zone Setting?
- the extra complexity of flow-controlling these types of notifications is not warranted.

5.8.6. The `t11ZsNotificationControlGroup`

This group contains objects that allow each type of notification (in the `t11ZsNotificationGroup` group) to be independently enabled or disabled. It also contains objects that are used to include useful information in those notifications; these objects are defined as read-only to allow the values contained in the most recent notification to be queried.

6. The T11-FC-FABRIC-LOCK-MIB Module

T11-FC-FABRIC-LOCK-MIB DEFINITIONS ::= BEGIN

IMPORTS

```

MODULE-IDENTITY, OBJECT-TYPE,
mib-2                                FROM SNMPv2-SMI    -- [RFC2578]
RowStatus                            FROM SNMPv2-TC      -- [RFC2579]
MODULE-COMPLIANCE, OBJECT-GROUP     FROM SNMPv2-CONF  -- [RFC2580]
InetAddressType, InetAddress        FROM
INET-ADDRESS-MIB                    -- [RFC4001]
fcmInstanceIndex, fcmSwitchIndex    FROM FC-MGMT-MIB  -- [RFC4044]
T11NsGs4RejectReasonCode            FROM
T11-FC-NAME-SERVER-MIB              -- [RFC4438]
T11FabricIndex                      FROM T11-TC-MIB;    -- [RFC4439]
```

```

t11FabricLockMIB MODULE-IDENTITY
  LAST-UPDATED   "200706270000Z"
  ORGANIZATION   "For the initial versions, T11.
                  For later versions, the IETF's IMSS Working Group."
  CONTACT-INFO
    "
      Claudio DeSanti
      Cisco Systems, Inc.
      170 West Tasman Drive
      San Jose, CA 95134 USA
      EMail: cds@cisco.com

      Keith McCloghrie
```

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134 USA
EMail: kzm@cisco.com"

DESCRIPTION

"The MIB module for the management of locks on a Fibre Channel Fabric. A Fibre Channel Fabric lock is used to ensure serialized access to some types of management data related to a Fabric, e.g., the Fabric's Zoning Database.

Some (managing) applications generate Fabric locks by initiating server sessions. Server sessions are defined generically in FC-GS-5 to represent a collection of one or more requests to the session's server, e.g., to the Zone Server. Such a session is started by a Server Session Begin (SSB) request, and terminated by a Server Session End (SSE) request. The switch receiving the SSB is called the 'managing' switch. Some applications require the 'managing' switch to lock the Fabric for the particular application, e.g., for Enhanced Zoning, before it can respond successfully to the SSB. On receipt of the subsequent SSE, the lock is released. For this usage, the managing switch sends an Acquire Change Authorization (ACA) request to other switches to lock the Fabric.

For some other applications, a managing switch locks the Fabric using an Enhanced Acquire Change Authorization (EACA) request, which identifies the application on whose behalf the Fabric is being locked with an Application_ID.

Fabric locks can also be requested more directly, e.g., through the use of this MIB. In these situations, the term 'managing' switch is used to indicate the switch that receives such a request and executes it by issuing either ACA or EACA requests to other switches in the Fabric.

This MIB module defines information about the 'managing' switch for currently-active Fabric locks.

Copyright (C) The IETF Trust (2007). This version of this MIB module is part of RFC 4936; see the RFC itself for full legal notices."

REVISION "200706270000Z"

DESCRIPTION

"Initial version of this MIB module, published as RFC 4936."
::= { mib-2 159 }

```

t11FlockMIBObjects      OBJECT IDENTIFIER ::= { t11FabricLockMIB 1 }
t11FlockMIBConformance  OBJECT IDENTIFIER ::= { t11FabricLockMIB 2 }
t11FlockMIBNotifications OBJECT IDENTIFIER ::= { t11FabricLockMIB 0 }
t11FlockConfiguration    OBJECT IDENTIFIER ::= { t11FlockMIBObjects 1 }

```

```
--
```

```
-- The table of Managing Switches and their Fabric Locks
```

```
--
```

```
t11FlockTable OBJECT-TYPE
```

```
    SYNTAX          SEQUENCE OF T11FlockEntry
```

```
    MAX-ACCESS      not-accessible
```

```
    STATUS          current
```

```
    DESCRIPTION
```

"A table containing information about the 'managing' switch of each current Fabric lock, e.g., for the types of Servers defined in FC-GS-5.

Each entry in this table represents either:

- 1) a current Fabric lock,
- 2) an in-progress attempt, requested via SNMP, to set up a lock, or
- 3) a failed attempt, requested via SNMP, to set up a lock.

If an entry is created via t11FlockRowStatus, but the attempt to obtain the lock fails, then the entry continues to exist until it is deleted via t11FlockRowStatus, or it is overwritten by the lock being established via a means other than SNMP. However, rows created via t11FlockRowStatus are not retained over restarts."

```
REFERENCE
```

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, sections 4.9.5 and 6.4.10.2."

```
::= { t11FlockConfiguration 1 }
```

```
t11FlockEntry OBJECT-TYPE
```

```
    SYNTAX          T11FlockEntry
```

```
    MAX-ACCESS      not-accessible
```

```
    STATUS          current
```

```
    DESCRIPTION
```

"Each entry contains information specific to a current Fabric lock set up by a particular 'managing' switch on a particular Fabric. The 'managing switch' is identified by values of fcmInstanceIndex and fcmSwitchIndex.

Server sessions for several different types of servers are defined in FC-GS-5. The behavior of a server with

respect to commands received within a server session is specified for each type of server. For some types, parameter changes can only be made within the context of a session, and the setting up of a session requires that the Fabric be locked. A Fabric is locked by one switch, called the 'managing' switch, sending Acquire Change Authorization (ACA) requests to all other switches in the Fabric.

For other applications, a Fabric lock is established by the 'managing' switch sending Enhanced Acquire Change Authorization (EACA) requests to other switches in the Fabric. Each EACA request includes an Application_ID value to identify the application requesting the lock.

For the benefit of this MIB module, a distinct value of Application_ID has also been assigned/reserved (see ANSI INCITS T11/06-679v0, titled 'FC-SW-5 Letter to T11.5') as a means of distinguishing locks established via Acquire Change Authorization (ACA) requests. This additional assignment allows an Application_ID to be used to uniquely identify any active lock amongst all those established by either an EACA or an ACA.

Whenever a Fabric is locked, by the sending of either an ACA or an EACA, a row gets created in the representation of this table for the 'managing' switch.

In order to process SNMP SetRequests that make parameter changes for the relevant types of servers (e.g., to the Zoning Database), the SNMP agent must get serialized access to the Fabric (for the relevant type of management data), i.e., the Fabric must be locked by creating an entry in this table via an SNMP SetRequest. Creating an entry in this table via an SNMP SetRequest causes an ACA or an EACA to be sent to all other switches in the Fabric. The value of t11FLockApplicationID for such an entry determines whether an ACA or an EACA is sent.

If an entry in this table is created by an SNMP SetRequest, the value of the t11FLockInitiatorType object in that entry will normally be 'snmp'. A row for which the value of t11FLockInitiatorType is not 'snmp' cannot be modified via SNMP. In particular, it cannot be deleted via t11FLockRowStatus. Note that it's possible for a row to be created by an SNMP SetRequest, but for the setup of the lock to fail, and immediately thereafter be replaced by a lock successfully set up by some other means; in such a case, the value of t11FLockInitiatorType would change as and when the

lock was set up by the other means, and so the row could not thereafter be deleted via `t11FLockRowStatus`.

FC-GS-5 mentions various error situations in which a Fabric lock is released so as to avoid a deadlock. In such situations, the agent removes the corresponding row in this table as and when the lock is released. This can happen for all values of `t11FLockInitiatorType`."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, sections 4.9.5.5 and 6.4.7.1.

Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, sections 6.1.17, 10.6.6, and 13.2,
and table 116.

'FC-SW-5 Letter to T11.5' ANSI INCITS T11/06-679v0,
<http://www.t11.org/ftp/t11/pub/fc/sw-5/06-679v0.pdf>,
21 September 2006."

INDEX { `fcmInstanceIndex`, `fcmSwitchIndex`, `t11FLockFabricIndex`,
 `t11FLockApplicationID` }
 ::= { `t11FLockTable 1` }

```
T11FLockEntry ::= SEQUENCE {
    t11FLockFabricIndex          T11FabricIndex,
    t11FLockApplicationID       OCTET STRING,
    t11FLockInitiatorType       INTEGER,
    t11FLockInitiator           OCTET STRING,
    t11FLockInitiatorIpAddress InetAddressType,
    t11FLockInitiatorIpAddress InetAddress,
    t11FLockStatus              INTEGER,
    t11FLockRejectReasonCode    T11NsGs4RejectReasonCode,
    t11FLockRejectReasonCodeExp OCTET STRING,
    t11FLockRejectReasonVendorCode OCTET STRING,
    t11FLockRowStatus           RowStatus
}
```

`t11FLockFabricIndex` OBJECT-TYPE
SYNTAX T11FabricIndex
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"A unique index value that uniquely identifies a particular Fabric.

In a Fabric conformant to FC-SW-4, multiple Virtual Fabrics can operate within one (or more) physical infrastructures, and this index value is used to uniquely identify a

particular (physical or virtual) Fabric within a physical infrastructure.

In a Fabric conformant to versions earlier than FC-SW-4, only a single Fabric could operate within a physical infrastructure, and thus, the value of this Fabric Index was defined to always be 1."

```
::= { t11FLockEntry 1 }
```

t11FLockApplicationID OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The Application_ID value that identifies the type of application for which the Fabric is locked.

A lock established via Acquire Change Authorization (ACA) does not, strictly speaking, have an Application_ID value. However, the value 'FF'h (255 decimal) has been reserved by T11 to be used as the value of this MIB object as and when a lock is established by an ACA. This value was initially documented in a letter from the FC-SW-5 Editor to T11.5, which was approved by the T11 and T11.5 plenary meetings on October 5, 2006."

REFERENCE

"Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, Table 116.

'FC-SW-5 Letter to T11.5' ANSI INCITS T11/06-679v0,
<http://www.t11.org/ftp/t11/pub/fc/sw-5/06-679v0.pdf>,
21 September 2006."

```
::= { t11FLockEntry 2 }
```

t11FLockInitiatorType OBJECT-TYPE

SYNTAX INTEGER {
 other(1),
 ssb(2),
 cli(3),
 snmp(4)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies what type of initiator generated the request that caused this lock to be established:

 other - none of the following.

- ssb - this lock was established due to the receipt of an SSB, e.g., from a GS-5 client.
- cli - this lock was established in order to process a Command Line Interface (CLI) command.
- snmp - this lock was established as a result of an SNMP SetRequest.

"

::= { t11FLockEntry 3 }

t11FLockInitiator OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(0..64))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the initiator whose request caused this lock to be established.

If the value of the corresponding instance of t11FLockInitiatorType is 'ssb', this object will contain the FC_ID of the client that issued the Server Session Begin (SSB) that required the lock to be established.

If the value of the corresponding instance of t11FLockInitiatorType object is 'cli', this object will contain the user name of the CLI (Command Line Interface) user on whose behalf the lock was established.

If the value of the corresponding instance of t11FLockInitiatorType is 'snmp', this object will contain the SNMP securityName used by the SNMPv3 message containing the SetRequest that created this row. (If the row was created via SNMPv1 or SNMPv2c, then the appropriate value of the snmpCommunitySecurityName is used.)"

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5), ANSI INCITS 427-2007, section 4.9.5.2.

SNMP securityName is defined in RFC 3411, 'An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks'.

snmpCommunitySecurityName is defined in RFC 3584, 'Coexistence between Version 1, Version 2, and

Version 3 of the Internet-standard Network
Management Framework.'"

::= { t1lFLockEntry 4 }

t1lFLockInitiatorIpAddrType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the type of IP address contained
in the corresponding instance of t1lFLockInitiatorIpAddr.
If the IP address of the location of the initiator is
unknown or not applicable, this object has the value:
'unknown'."

::= { t1lFLockEntry 5 }

t1lFLockInitiatorIpAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the IP address of the location
of the initiator that established this lock via a
request of the type given by the corresponding instance
of t1lFLockInitiatorType. In cases where the
corresponding instance of t1lFLockInitiatorIpAddrType has
the value: 'unknown', the value of this object is the
zero-length string."

::= { t1lFLockEntry 6 }

t1lFLockStatus OBJECT-TYPE

SYNTAX INTEGER {
active(1),
settingUp(2),
rejectFailure(3),
otherFailure(4)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object gives the current status of the lock:

'active' -- the lock is currently established.
'settingUp' -- the 'managing' switch is currently
attempting to set up the lock, e.g.,
it is waiting to receive Accepts
for ACAs from every switch in the
Fabric.

```

    'rejectFailure' -- the 'managing' switch's attempt to
                      set up the lock was rejected with
                      the reason codes given by:
                        t11FLockRejectReasonCode,
                        t11FLockRejectReasonCodeExp and
                        t11FLockRejectReasonVendorCode.
    'otherFailure'  -- the 'managing' switch's attempt
                      to set up the lock failed (but no
                      reason codes are available).

```

For values of t11FLockInitiatorType other than 'snmp', a row is only required to be instantiated in this table when the value of this object is 'active'.

If the value of the corresponding instance of t11FLockInitiatorType is 'snmp', the initial value of this object when the row is first created is 'settingUp'. As and when the setup succeeds, the value transitions to 'active'. If the setup fails, the value transitions to either 'rejectFailure' or 'otherFailure'. Note that such a failure value is overwritten on the next attempt to obtain the lock, which could be immediately after the failure, e.g., by a GS-5 client.

When the value of this object is 'rejectFailure', the rejection's reason codes are given by the corresponding values of t11FLockRejectReasonCode, t11FLockRejectReasonCodeExp and t11FLockRejectReasonVendorCode."

```
 ::= { t11FLockEntry 7 }
```

t11FLockRejectReasonCode OBJECT-TYPE

```

SYNTAX      T11NsGs4RejectReasonCode
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION

```

"When the value of the corresponding instance of t11FLockStatus is 'rejectFailure', this object contains the rejection's reason code."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5), ANSI INCITS 427-2007, section 4.4.4 and table 10."

```
 ::= { t11FLockEntry 8 }
```

t11FLockRejectReasonCodeExp OBJECT-TYPE

```

SYNTAX      OCTET STRING (SIZE(0 | 1))
MAX-ACCESS  read-only
STATUS      current

```

DESCRIPTION

"When the value of the corresponding instance of t11FLockStatus is 'rejectFailure', this object contains the rejection's reason code explanation."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5), ANSI INCITS 427-2007, sections 4.4.4 and 6.4.9, tables 10 and 252."

::= { t11FLockEntry 9 }

t11FLockRejectReasonVendorCode OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(0 | 1))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"When the value of the corresponding instance of t11FLockStatus is 'rejectFailure', this object contains the rejection's vendor-specific code."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5), ANSI INCITS 427-2007, section 4.4.4."

::= { t11FLockEntry 10 }

t11FLockRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this conceptual row.

A row in this table can be modified or deleted via this object only when the row's value of t11FLockInitiatorType is 'snmp'."

::= { t11FLockEntry 11 }

-- Conformance

t11FLockMIBCompliances

OBJECT IDENTIFIER ::= { t11FLockMIBConformance 1 }

t11FLockMIBGroups OBJECT IDENTIFIER ::= { t11FLockMIBConformance 2 }

t11FLockMIBCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for entities that support Fabric locks in support of GS-5 Server applications."

MODULE MANDATORY-GROUPS { t11FLockActiveGroup }

```
OBJECT          t11FLockRowStatus
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."

 ::= { t11FLockMIBCompliances 1 }

-- Units of Conformance

t11FLockActiveGroup OBJECT-GROUP
OBJECTS { t11FLockInitiatorType,
          t11FLockInitiator,
          t11FLockInitiatorIpAddrType,
          t11FLockInitiatorIpAddr,
          t11FLockStatus,
          t11FLockRejectReasonCode,
          t11FLockRejectReasonCodeExp,
          t11FLockRejectReasonVendorCode,
          t11FLockRowStatus
        }
STATUS          current
DESCRIPTION
    "A collection of objects containing information
     about current Fabric locks."
 ::= { t11FLockMIBGroups 1 }

END
```

7. The T11-FC-ZONE-SERVER-MIB Module

```
T11-FC-ZONE-SERVER-MIB DEFINITIONS ::= BEGIN
```

IMPORTS

```

MODULE-IDENTITY, OBJECT-TYPE,
NOTIFICATION-TYPE, mib-2,
Counter32, Unsigned32
    FROM SNMPv2-SMI -- [RFC2578]
MODULE-COMPLIANCE, OBJECT-GROUP,
NOTIFICATION-GROUP
    FROM SNMPv2-CONF -- [RFC2580]
TEXTUAL-CONVENTION, RowStatus,
StorageType,
TruthValue, TimeStamp
    FROM SNMPv2-TC -- [RFC2579]
SnmpAdminString
    FROM SNMP-FRAMEWORK-MIB -- [RFC3411]
ifIndex
    FROM IF-MIB -- [RFC2863]
fcmInstanceIndex, fcmSwitchIndex,
FcNameIdOrZero,
FcDomainIdOrZero
    FROM FC-MGMT-MIB -- [RFC4044]
T11NsGs4RejectReasonCode
    FROM T11-FC-NAME-SERVER-MIB -- [RFC4438]
T11FabricIndex
    FROM T11-TC-MIB -- [RFC4439]
t11FamLocalSwitchWwn
    FROM T11-FC-FABRIC-ADDR-MGR-MIB; -- [RFC4439]

```

```

t11ZoneServerMIB MODULE-IDENTITY
LAST-UPDATED "200706270000Z"
ORGANIZATION "For the initial versions, T11.
              For later versions, the IETF's IMSS Working Group."
CONTACT-INFO
    "
        Claudio DeSanti
        Cisco Systems, Inc.
        170 West Tasman Drive
        San Jose, CA 95134 USA
        EMail: cds@cisco.com

        Keith McCloghrie
        Cisco Systems, Inc.
        170 West Tasman Drive
        San Jose, CA 95134 USA
        EMail: kzm@cisco.com"

```

DESCRIPTION

```

"The MIB module for the management of Fibre Channel Zoning
Servers, both for Basic Zoning Management and for Enhanced

```


Zoning Management, as defined in the FC-GS-5 specification.

FC-GS-5 defines (in-band) management operations for manipulating the Zone Set Database, some for use in Basic mode (e.g., 'Add Zone Set (AZS)', etc.), and some for use in Enhanced mode (e.g., 'Create Zone Set (CZS)', etc.). When Enhanced Zoning Management is in use, FC-GS-5 requires that these in-band management operations be rejected unless they are issued within the context of a GS-5 server session. The use of a server session ensures serialized access to the Zoning Database since the Fabric lock for the Zone Server must be obtained as a part of establishing the server session to the Zone Server.

Thus, if and when this MIB is used for Enhanced Zoning Management, SNMP SetRequests that request the modification of zoning definitions must be serialized with respect to the GS-5 requests to modify the Zoning Database. This is achieved by requiring that an SNMP management application must first obtain the Fabric lock for the Zone Server before attempting to modify any zoning definitions. The companion T11-FC-FABRIC-LOCK-MIB module is defined as a means of obtaining the Fabric lock for the Zone Server (or any other server).

In Enhanced Zoning Management, a Zone Server keeps track of changes requested in the zoning definitions, but does not update its Zone Set Database unless there is (and until there is) a 'commit' operation. To model this behavior, this MIB module assumes that a Zone Server (in Enhanced mode) takes a snapshot of its Zone Set Database as and when the Fabric lock (for the Zone Server application) is obtained; this snapshot is used to create what is herein called the 'copy' database. It is this 'copy' database that is then updated by SNMP SetRequests (while the Fabric is locked). If and when a 'commit' operation is requested (while the Fabric is still locked), the 'copy' database is then used to overwrite the previously committed contents of the Zone Set Database, and the new Zone Set Database is distributed to all other switches in the Fabric. When the lock is released, any changes made that were not 'committed' are discarded.

When this MIB is used for Basic Zoning Management, the same set of MIB objects as used for Enhanced mode are used to make changes to the Database of a Zone Server on a particular switch, but the changes take immediate effect at that switch without an explicit commit. The distribution of

those changes to Zone Servers on other switches in the Fabric is subsequently requested through the use of a separate set of MIB objects.

The management information specified in this MIB module includes the Zoning Database for each of one or more Fibre Channel Fabrics. A Zoning Database is a combination of the Fabric's Zone Set Database and its Active Zone Set. The Active Zone Set is the Zone Set currently enforced by the Fabric; a Zone Set Database is a database of the Zone Sets available to be activated within a Fabric. All the MIB objects representing a Zone Set Database are modifiable at any time (irrespective of the value of any RowStatus object), whereas all objects representing the Active Zone Set are always read-only (except to deactivate it and/or activate a different one).

Copyright (C) The IETF Trust (2007). This version of this MIB module is part of RFC 4936; see the RFC itself for full legal notices."

REVISION "200706270000Z"

DESCRIPTION

"Initial version of this MIB module, published as RFC 4936."

::= { mib-2 160 }

t11ZsMIBObjects	OBJECT IDENTIFIER ::= { t11ZoneServerMIB 1 }
t11ZsMIBConformance	OBJECT IDENTIFIER ::= { t11ZoneServerMIB 2 }
t11ZsMIBNotifications	OBJECT IDENTIFIER ::= { t11ZoneServerMIB 0 }
t11ZsConfiguration	OBJECT IDENTIFIER ::= { t11ZsMIBObjects 1 }
t11ZsStatistics	OBJECT IDENTIFIER ::= { t11ZsMIBObjects 2 }

-- Textual Conventions

T11ZsZoneMemberType ::= TEXTUAL-CONVENTION

DISPLAY-HINT "x"

STATUS current

DESCRIPTION

"Represents the addressing mechanism by which a member is identified:

- 01 - N_Port_Name
- 02 - Domain_ID and physical port
- 03 - N_Port_ID
- 04 - Node_Name
- 05 - Alias Name
- 06 - F_Port_Name
- E0-FF (hex) - Vendor Specific.

"

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.8.3.6."

SYNTAX Unsigned32 (0..255)

T11ZsRejectReasonExplanation ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The reason code explanation when rejecting a
Zone Server request:

'other'
 - e.g., a reason code assigned too recently
 to be included in this version of this MIB
'noAdditionalExplanation'
 - there is no additional explanation
'zonesNotSupported'
 - Zones are not supported
'zoneSetNameUnknown'
 - Zone Set name is not known
'noZoneSetActive'
 - no Zone Set is currently active
'zoneNameUnknown'
 - Zone name is unknown
'zoneStateUnknown'
 - state of the Zone is not known
'incorrectPayloadLen'
 - payload length is not correct
'tooLargeZoneSet'
 - Zone Set is larger than permitted size
'deactivateZoneSetFailed'
 - deactivation of Zone Set failed
'reqNotSupported'
 - request is not supported
'capabilityNotSupported'
 - capability is not supported
'zoneMemberIDTypeNotSupp'
 - Zone Member Identifier Type is not supported
'invalidZoneSetDefinition'
 - Zone Set definition is invalid
'enhancedZoningCmdsNotSupported'
 - Enhanced Zoning commands are not supported
'zoneSetExists'
 - Zone Set already exists
'zoneExists'
 - Zone already exists
'aliasExists'
 - Zone Alias already exists

```

'zoneSetUnknown'
    - Zone Set unknown
'zoneUnknown'
    - Zone unknown
'aliasUnknown'
    - Zone Alias unknown
'zoneAliasTypeUnknown'
    - unknown Zone attribute type
'unableEnhancedMode'
    - Fabric unable to work in Enhanced Mode
'basicZoningCmdsNotSupported'
    - Basic Zoning commands are not supported
'zoneAttribObjectExists'
    - Zone attribute object already exists
'zoneAttribObjectUnknown'
    - Zone attribute object unknown
'requestInProgress'
    - request in process
'commitInProgress'
    - CMIT in process
'hardEnforcementFailed'
    - hard enforcement failed
'unresolvedReferences'
    - unresolved references in the Zone Set Database
'consistencyChecksFailed'
    - consistency checks failed."

```

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.9."

SYNTAX

```

INTEGER {
    other(1),
    noAdditionalExplanation(2),
    zonesNotSupported(3),
    zoneSetNameUnknown(4),
    noZoneSetActive(5),
    zoneNameUnknown(6),
    zoneStateUnknown(7),
    incorrectPayloadLen(8),
    tooLargeZoneSet(9),
    deactivateZoneSetFailed(10),
    reqNotSupported(11),
    capabilityNotSupported(12),
    zoneMemberIDTypeNotSupp(13),
    invalidZoneSetDefinition(14),
    enhancedZoningCmdsNotSupported(15),
    zoneSetExists(16),
    zoneExists(17),
    aliasExists(18),

```

```

        zoneSetUnknown(19),
        zoneUnknown(20),
        aliasUnknown(21),
        zoneAliasTypeUnknown(22),
        unableEnhancedMode(23),
        basicZoningCmdsNotSupported(24),
        zoneAttribObjectExists(25),
        zoneAttribObjectUnknown(26),
        requestInProgress(27),
        cmitInProgress(28),
        hardEnforcementFailed(29),
        unresolvedReferences(30),
        consistencyChecksFailed(31)
    }

```

T11ZoningName ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This datatype is a refinement of an SnmpAdminString, and is used to represent a name stored in a Fibre Channel Zoning Data Structure.

The value begins with an ASCII letter (upper or lower case) followed by zero or more characters from the set: lower case letters, upper case letters, numbers, and the symbols (\$-^_).

The value does not include fill bytes."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.8.1."

SYNTAX OCTET STRING (SIZE (1..64))

--

-- The table of Zone Servers

--

t11ZsServerTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11ZsServerEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table containing information about the Zone Servers on each Fabric in one or more switches, and providing the capability to perform operations on their Zone Server databases."

::= { t11ZsConfiguration 1 }

```

t11ZsServerEntry OBJECT-TYPE
    SYNTAX      T11ZsServerEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Each entry contains information specific to a
        Zone Server for a particular Fabric (identified by
        the value of t11ZsServerFabricIndex) on a particular
        switch (identified by values of fcmInstanceIndex
        and fcmSwitchIndex).

        The persistence across reboots of writable values in
        a row of this table is given by the instance of
        t11ZsServerDatabaseStorageType in that row."
    INDEX      { fcmInstanceIndex, fcmSwitchIndex,
                  t11ZsServerFabricIndex }
    ::= { t11ZsServerTable 1 }

T11ZsServerEntry ::= SEQUENCE {
    t11ZsServerFabricIndex      T11FabricIndex,
    t11ZsServerCapabilityObject BITS,
    t11ZsServerDatabaseStorageType StorageType,
    t11ZsServerDistribute      INTEGER,
    t11ZsServerCommit          INTEGER,
    t11ZsServerResult          INTEGER,
    t11ZsServerReasonCode      T11NsGs4RejectReasonCode,
    t11ZsServerReasonCodeExp   OCTET STRING,
    t11ZsServerReasonVendorCode OCTET STRING,
    t11ZsServerLastChange      TimeStamp,
    t11ZsServerHardZoning      TruthValue,
    t11ZsServerReadFromDatabase INTEGER,
    t11ZsServerOperationMode   INTEGER,
    t11ZsServerChangeModeResult INTEGER,
    t11ZsServerDefaultZoneSetting INTEGER,
    t11ZsServerMergeControlSetting INTEGER,
    t11ZsServerDefZoneBroadcast TruthValue
}

t11ZsServerFabricIndex OBJECT-TYPE
    SYNTAX      T11FabricIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A unique index value that uniquely identifies a
        particular Fabric."
    ::= { t11ZsServerEntry 1 }

t11ZsServerCapabilityObject OBJECT-TYPE

```

```

SYNTAX          BITS {
                    enhancedMode(0),
                    zoneSetDb(1),
                    activateDirect(2),
                    hardZoning(3)
                }
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This bitmap represents the capability of the switch
    on this Fabric:

        'enhancedMode' - able to support enhanced Zoning
                        mode of operation.

        'zoneSetDb'    - able to support maintaining of
                        a Zone Set Database.

        'activateDirect' - able to support the Activate
                        Direct command.

        'hardZoning'   - able to support Hard Zoning."
REFERENCE
    "Fibre Channel - Switch Fabric-4 (FC-SW-4),
    ANSI INCITS 418-2006, April 2006, section 6.1.23.4.4"
 ::= { t11ZsServerEntry 2 }

```

t11ZsServerDatabaseStorageType OBJECT-TYPE

```

SYNTAX          StorageType
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
    "This object specifies the memory realization, on a
    particular switch, of the Zone Set database for a
    particular Fabric. Specifically, each row in the
    following tables:

        t11ZsSetTable
        t11ZsZoneTable
        t11ZsSetZoneTable
        t11ZsAliasTable
        t11ZsZoneMemberTable
        t11ZsAttribBlockTable
        t11ZsAttribTable

    has a StorageType as specified by the instance of
    this object that is INDEXed by the same values of
    fcmInstanceIndex, fcmSwitchIndex, and

```

t11ZsServerFabricIndex.

The value of this object is also used to indicate the persistence across reboots of writable values in its row of the t11ZsServerTable, as well as the corresponding row in the t11ZsNotifyControlTable.

If an instance of this object has the value 'permanent(4)', the Zone Set database for the given Fabric on the given switch is not required to be writeable."

```
DEFVAL { nonVolatile }
 ::= { t11ZsServerEntry 3 }
```

t11ZsServerDistribute OBJECT-TYPE

```
SYNTAX      INTEGER {
                noop(1),
                zoneSetDb(2)
            }
```

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object can be set only in Basic mode. When set to the value 'zoneSetDb', it requests that the Zone Set database of a particular switch for a particular Fabric be distributed to every other switch in that Fabric, e.g., by using Stage Fabric Configuration Update (SFC) and Update Fabric Configuration (UFC) requests.

Setting this object to 'noop' has no effect. When read, the value of this object is always 'noop'.

When the corresponding instance of t11ZsServerOperationMode has the value 'enhanced', or when the corresponding instance of t11ZsZoneSetResult has the value 'inProgress', it is inconsistent to try to set the value of this object."

REFERENCE

"Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, section 6.1.19.1."

```
::= { t11ZsServerEntry 4 }
```

t11ZsServerCommit OBJECT-TYPE

```
SYNTAX      INTEGER {
                commitZoneChanges(1),
                noop(2)
            }
```

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object is only used in Enhanced mode.

In Enhanced mode, it can only be modified when the Fabric lock for the Zone Server on the particular Fabric has been obtained for use by SNMP SetRequests, and even then, only by the SNMP entity identified by the value of corresponding instance of t11FLockInitiator.

Setting the object requests an action:

commitZoneChanges	- requests that the changes made within this session to the Zone Set Database be committed.
noop	- requests nothing.

When read, the value is always 'noop'."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.10.2."

::= { t11ZsServerEntry 5 }

t11ZsServerResult OBJECT-TYPE

```
SYNTAX      INTEGER {
                none(1),
                inProgress(2),
                success(3),
                rejectFailure(4),
                otherFailure(5)
            }
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"In Basic mode, this object indicates the status/result of the last distribution of the Zone Set database that was invoked via the corresponding instance of t11ZsZoneSetDistribute, e.g., the status/result of Stage Fabric Configuration Update (SFC) request(s) used to implement the setting of t11ZsZoneSetDistribute.

In Enhanced mode, this object indicates the status/result of the last commit of changes to the Zone Set database that was invoked via the corresponding instance of t11ZsServerCommit.

'none'	- no distribution/commit invoked via the corresponding instance of t11ZsZoneSetDistribute (Basic mode)
--------	--

or t11ZsServerCommit (Enhanced mode).

- 'InProgress' - distribution/commit is still in progress.
- 'success' - distribution/commit completed successfully.
- 'rejectFailure' - distribution/commit failed due to an SW_RJT.
- 'otherFailure' - distribution/commit failed for some other reason.

When the value is 'rejectFailure', the corresponding instances of t11ZsServerReasonCode, t11ZsServerReasonCodeExp and t11ZsServerReasonVendorCode contain the reason codes. "

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.10.2.3."

::= { t11ZsServerEntry 6 }

t11ZsServerReasonCode OBJECT-TYPE

SYNTAX T11NsGs4RejectReasonCode

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"When the corresponding instance of t11ZsZoneSetResult has the value 'rejectFailure', this object contains the rejection's reason code.

When the corresponding instance of t11ZsServerResult has a value other than 'rejectFailure', this object should contain the value 'none'."

REFERENCE

"Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, section 6.1.3 and
tables 4, 5, and 6."

::= { t11ZsServerEntry 7 }

t11ZsServerReasonCodeExp OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0 | 1))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"When the corresponding instance of t11ZsZoneSetResult has the value 'rejectFailure', this object contains the rejection's reason code explanation.

When the corresponding instance of t11ZsServerResult has a value other than 'rejectFailure', this object

should contain the zero-length string."

REFERENCE

"Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, section 6.1.3 and
tables 4, 5, and 6."

::= { t11ZsServerEntry 8 }

t11ZsServerReasonVendorCode OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0 | 1))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"When the corresponding instance of t11ZsZoneSetResult
has the value 'rejectFailure', this object contains
the rejection's reason vendor-specific code.

When the corresponding instance of t11ZsServerResult
has a value other than 'rejectFailure', this object
should contain the zero-length string."

REFERENCE

"Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, section 6.1.3 and
tables 4, 5, and 6."

::= { t11ZsServerEntry 9 }

t11ZsServerLastChange OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at the time of the last change
(creation, modification, or deletion) to the Zone Set
database for the Zone Server for a particular Fabric.
If said Zone Set database has not changed since the
last re-initialization of the local network management
system, then this object will contain a zero value."

::= { t11ZsServerEntry 10 }

t11ZsServerHardZoning OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object indicates whether this switch, if and when it
is in Basic mode, enforces Hard Zoning on this Fabric."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.10.3.2."

```
::= { t11ZsServerEntry 11 }
```

```
t11ZsServerReadFromDatabase OBJECT-TYPE
```

```
SYNTAX          INTEGER {
                    committedDB(1),
                    copyDB(2)
                  }
```

```
MAX-ACCESS      read-write
```

```
STATUS          current
```

```
DESCRIPTION
```

"In Enhanced mode, this object specifies whether subsequent SNMP Responses (generated by the local SNMP agent) to operations that read the configuration of Zone Sets, Zones, Members, Aliases and Attributes will reflect the values stored in the current (committed) Zone Set database, or those stored in the 'copy' database.

In Basic mode, the value of this object is always 'committedDB' (since there is no 'copy' database in Basic mode). In SNMP agents that don't support write access to the Zone Set database, this object is always 'committedDB' (since the copy database, if it were to exist, would be identical)."

```
DEFVAL { committedDB }
```

```
::= { t11ZsServerEntry 12 }
```

```
t11ZsServerOperationMode OBJECT-TYPE
```

```
SYNTAX          INTEGER {
                    basic(1),
                    enhanced(2)
                  }
```

```
MAX-ACCESS      read-write
```

```
STATUS          current
```

```
DESCRIPTION
```

"The operational mode of the Zone Server.

Setting this object to 'enhanced' is a request that the mode of operation of the Zone Server be Enhanced mode, which is only possible if all devices in the Fibre Channel Fabric are capable of working in Enhanced mode. If not, the request will fail and the corresponding value of t11ZsServerChangeModeResult will so indicate.

Setting this object to 'basic' is a request that the mode of operation of the Zone Server be Basic mode. However, such a set may fail while operating in Enhanced mode, since FC-GS-5 makes no provision for changing (back)

to Basic mode.

Note that setting this object does not cause or require that the Fabric lock for the Zone Server be obtained. However, when this object has the value 'enhanced', any SNMP SetRequests that attempt to modify the copy database cannot be successful if the Fabric lock has not been obtained or has since been released."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, sections 6.4.10.1.1 and 6.4.10.1.2."

DEFVAL { basic }

::= { t11ZsServerEntry 13 }

t11ZsServerChangeModeResult OBJECT-TYPE

SYNTAX INTEGER {
 success(1),
 failure(2),
 inProgress(3),
 none(4)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"When this object has the value of 'success' or 'failure', the value indicates the outcome of the most recent request, invoked via t11ZsServerOperationMode, to change the mode of operation of the Zone Server. When such a request is in progress, this object has the value 'inProgress'. Prior to the first such request, the value of this object is 'none'."

::= { t11ZsServerEntry 14 }

t11ZsServerDefaultZoneSetting OBJECT-TYPE

SYNTAX INTEGER {
 permit(1),
 deny(2)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object controls the Enhanced Zoning flag that governs the behavior of the Default Zone on this Fabric.

If this object is set to 'permit', then the members of the Default Zone on this Fabric can communicate with each other.

If this object is set to 'deny', then the members of the Default Zone on this Fabric cannot communicate with each other."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.10.1.1."

DEFVAL { deny }

::= { t11ZsServerEntry 15 }

t11ZsServerMergeControlSetting OBJECT-TYPE

SYNTAX INTEGER {
allow(1),
restrict(2)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object controls the Enhanced Zoning flag that indicates the Merge Control Setting for this Fabric:

'allow' - a switch may join the Fabric only if its Zoning Database is able to merge with the Fabric's Zoning Database.
'restrict' - a switch may join the Fabric only if its Zoning Database is equal to the Fabric's Zoning Database."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.10.1.1."

DEFVAL { allow }

::= { t11ZsServerEntry 16 }

t11ZsServerDefZoneBroadcast OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object controls an Enhanced Zoning capability: it indicates whether Broadcast Zoning is enabled on the Default Zone on this Fabric. If this object is set to 'true', then it is enabled. If this object is set to 'false', then it is disabled.

If broadcast Zoning is enabled on a Default Zone, then broadcast frames generated by a member in that Default Zone will be restricted to members in that Default Zone."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.7.2.2."
 ::= { t11ZsServerEntry 17 }

--

-- The table of Zone Sets

--

t11ZsSetTable OBJECT-TYPE
SYNTAX SEQUENCE OF T11ZsSetEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table containing information on every Zone
Set in the Zone Set database of the Zone Servers
on each Fabric in one or more switches.

In Enhanced mode, changes to a database made via this
table are always made to the 'copy' database, but
values read from this table reflect the contents of
either the 'copy' database or the current (committed)
database as indicated by the corresponding value of
t11ZsServerReadFromDatabase."
 ::= { t11ZsConfiguration 2 }

t11ZsSetEntry OBJECT-TYPE
SYNTAX T11ZsSetEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Each entry contains information about a Zone Set
in the Zone Set database of a particular Fabric
(identified by the value of t11ZsServerFabricIndex)
on a particular switch (identified by values of
fcmInstanceIndex and fcmSwitchIndex).

A Zone Set can be created in an existing Zone Set
database, and can contain zero or more existing
Zones. As and when new Zones are created
(as rows in the t11ZsZoneTable), they can be added
to a Zone Set by creating an entry for each in the
t11ZsSetZoneTable. Deleting a row from this table
deletes the Zone Set from the Zone Set database
maintained by the Zone Server, but does not otherwise
affect the Zone Server.

The StorageType of a row in this table is specified by
the instance of t11ZsServerDatabaseStorageType that is

INDEXED by the same values of fcmInstanceIndex,
fcmSwitchIndex, and t11ZsServerFabricIndex."
INDEX { fcmInstanceIndex, fcmSwitchIndex,
t11ZsServerFabricIndex, t11ZsSetIndex }
::= { t11ZsSetTable 1 }

T11ZsSetEntry ::= SEQUENCE {
t11ZsSetIndex Unsigned32,
t11ZsSetName T11ZoningName,
t11ZsSetRowStatus RowStatus
}

t11ZsSetIndex OBJECT-TYPE
SYNTAX Unsigned32 (1..4294967295)
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The index of a Zone Set. This object uniquely
identifies a Zone Set in the Zone Set database
for a particular Fabric on a particular switch."
::= { t11ZsSetEntry 1 }

t11ZsSetName OBJECT-TYPE
SYNTAX T11ZoningName
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The name of this Zone Set. The t11ZsSetName should
be unique within a Fabric.

The Zone Set can be renamed at any time (i.e., even
when the row in an active state) by setting this object
to a new value."
::= { t11ZsSetEntry 2 }

t11ZsSetRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The status of this conceptual row.

This object cannot be set to 'active' unless the
corresponding value of t11ZsSetName is unique within
the Fabric's Zone Server database on this switch."
::= { t11ZsSetEntry 3 }

--

-- The table of Zones

--

t11ZsZoneTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11ZsZoneEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table gives information on all the Zones in the Zone Set database of the Zone Servers on each Fabric in one or more switches.

In Enhanced mode, changes to a database made via this table are always made to the 'copy' database, but values read from this table reflect the contents of either the 'copy' database or the current (committed) database as indicated by the corresponding value of t11ZsServerReadFromDatabase."

::= { t11ZsConfiguration 3 }

t11ZsZoneEntry OBJECT-TYPE

SYNTAX T11ZsZoneEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information about a Zone in the Zone Set database of a particular Fabric (identified by the value of t11ZsServerFabricIndex) on a particular switch (identified by values of fcmInstanceIndex and fcmSwitchIndex).

A Zone can be created in an existing Zone Set database, by first creating an entry in this table, and then adding members to it by creating entries in the t11ZsZoneMemberTable.

The StorageType of a row in this table is specified by the instance of t11ZsServerDatabaseStorageType that is INDEXed by the same values of fcmInstanceIndex, fcmSwitchIndex, and t11ZsServerFabricIndex."

INDEX { fcmInstanceIndex, fcmSwitchIndex,
t11ZsServerFabricIndex, t11ZsZoneIndex }

::= { t11ZsZoneTable 1 }

T11ZsZoneEntry ::= SEQUENCE {

t11ZsZoneIndex Unsigned32,

t11ZsZoneName T11ZoningName,

```

    t11ZsZoneAttribBlock      Unsigned32,
    t11ZsZoneRowStatus        RowStatus
}

t11ZsZoneIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "An index value that uniquely identifies this
        Zone within a particular Fabric's Zone Set database
        on a particular switch."
    ::= { t11ZsZoneEntry 1 }

t11ZsZoneName OBJECT-TYPE
    SYNTAX      T11ZoningName
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The name of this Zone.  The t11ZsZoneName should be
        unique within a Fabric.

        The Zone can be renamed by setting this object
        to a new value."
    ::= { t11ZsZoneEntry 2 }

t11ZsZoneAttribBlock OBJECT-TYPE
    SYNTAX      Unsigned32 (0..4294967295)
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "This object specifies the index value of the
        Zone Attribute Block that contains the Attributes
        of this Zone.

        In Enhanced mode, a value of zero indicates this
        Zone has no Zone Attributes.  In Basic mode, this
        object always has the value of zero."
    ::= { t11ZsZoneEntry 3 }

t11ZsZoneRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this conceptual row.

        This object cannot be set to 'active' unless the

```

corresponding value of t11ZsZoneName is unique within the Fabric's Zone Server database on this switch."
 ::= { t11ZsZoneEntry 4 }

--

-- The table specifying the Zones that belong to each Zone Set

--

t11ZsSetZoneTable OBJECT-TYPE
 SYNTAX SEQUENCE OF T11ZsSetZoneEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table specifies which Zones belong to which Zone Sets in the Zone Set database of the Zone Servers on each Fabric in one or more switches."
 ::= { t11ZsConfiguration 4 }

t11ZsSetZoneEntry OBJECT-TYPE
 SYNTAX T11ZsSetZoneEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "Each entry specifies that a particular Zone (identified by the value of t11ZsZoneIndex) is one of the Zones that form a particular Zone Set (identified by the value of t11ZsSetIndex) in the Zone Set database of a particular Fabric (identified by the value of t11ZsServerFabricIndex) on a particular switch (identified by values of fcmInstanceId and fcmSwitchIndex)."

When a row in this table exists, it references one row in the t11ZsSetTable and one row in the t11ZsZoneTable. The agent must ensure that both such rows when referenced by an active row in this table, do exist and have a status of 'active', either by refusing to create new rows in this table, or by automatically deleting rows in this table.

An 'active' row in this table references one row in the t11ZsSetTable and one in the t11ZsZoneTable. The agent must ensure that all such referenced rows exist with a status of 'active', either by refusing to create new active rows in this table, or by automatically deleting any rows in this table that reference a deleted row.

The StorageType of a row in this table is specified by the instance of t11ZsServerDatabaseStorageType that is

```

        INDEXed by the same values of fcmInstanceIndex,
        fcmSwitchIndex, and t11ZsServerFabricIndex."
INDEX    { fcmInstanceIndex, fcmSwitchIndex,
           t11ZsServerFabricIndex,
           t11ZsSetIndex, t11ZsZoneIndex }
 ::= { t11ZsSetZoneTable 1 }

T11ZsSetZoneEntry ::= SEQUENCE {
    t11ZsSetZoneRowStatus      RowStatus
}

t11ZsSetZoneRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this conceptual row."
    ::= { t11ZsSetZoneEntry 1 }

--
-- The table of Zone Aliases
--

t11ZsAliasTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11ZsAliasEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This table contains information about the Zone Aliases
        in the Zone Set database of the Zone Servers on each
        Fabric in one or more switches.

        In Enhanced mode, changes to a database made via this
        table are always made to the 'copy' database, but
        values read from this table reflect the contents of
        either the 'copy' database or the current (committed)
        database as indicated by the corresponding value of
        t11ZsServerReadFromDatabase."
    ::= { t11ZsConfiguration 5 }

t11ZsAliasEntry OBJECT-TYPE
    SYNTAX      T11ZsAliasEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Each entry contains information about a Zone Alias in
        the Zone Set database of a particular Fabric
        (identified by the value of t11ZsServerFabricIndex) on

```

a particular switch (identified by values of fcmInstanceIndex and fcmSwitchIndex).

A Zone Member is added to a Zone Alias by creating an entry in the t11ZsZoneMemberTable pointing to a row of this table via t11ZsAliasIndex, i.e.,:

- t11ZsZoneMemberParentType = 'alias',
- t11ZsZoneMemberParentIndex = Alias's t11ZsAliasIndex,
- t11ZsZoneMemberFormat != '05 - Alias Name', and
- t11ZsZoneMemberID = Member's identifier.

A Zone Alias is added to a Zone by creating an entry in the t11ZsZoneMemberTable pointing to a row of this table via t11ZsAliasName, i.e.,:

- t11ZsZoneMemberParentType = 'zone', and
- t11ZsZoneMemberParentIndex = Zone's t11ZsZoneIndex,
- t11ZsZoneMemberFormat = '05 - Alias Name',
- t11ZsZoneMemberID = Alias's t11ZsAliasName.

The StorageType of a row in this table is specified by the instance of t11ZsServerDatabaseStorageType that is INDEXed by the same values of fcmInstanceIndex, fcmSwitchIndex, and t11ZsServerFabricIndex."

```
INDEX { fcmInstanceIndex, fcmSwitchIndex,
        t11ZsServerFabricIndex, t11ZsAliasIndex }
 ::= { t11ZsAliasTable 1 }
```

```
T11ZsAliasEntry ::= SEQUENCE {
    t11ZsAliasIndex      Unsigned32,
    t11ZsAliasName       T11ZoningName,
    t11ZsAliasRowStatus  RowStatus
}
```

```
t11ZsAliasIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An index value which uniquely identifies this Zone
         Alias within the Zone Set database of a particular
         Fabric on a particular switch."
    ::= { t11ZsAliasEntry 1 }
```

```
t11ZsAliasName OBJECT-TYPE
    SYNTAX      T11ZoningName
    MAX-ACCESS  read-create
```

STATUS current

DESCRIPTION

"The name of this Zone Alias. The name of the Zone Alias should be unique within a Fabric.

The Zone Alias can be renamed by setting this object to a new value if and when it is not in a Zone, i.e., if and only if the current name is not the value of any t11ZsZoneMemberID in the same Zone Set database."

::= { t11ZsAliasEntry 2 }

t11ZsAliasRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this conceptual row.

This object cannot be set to 'active' unless the corresponding value of t11ZsAliasName is unique within the Fabric's Zone Server database on this switch."

::= { t11ZsAliasEntry 3 }

--

-- The table of Zone Members

--

t11ZsZoneMemberTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11ZsZoneMemberEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains all members of a Zone/Zone Alias and information about those members in the Zone Set database of the Zone Servers on each Fabric in one or more switches.

In Enhanced mode, changes to a database made via this table are always made to the 'copy' database, but values read from this table reflect the contents of either the 'copy' database or the current (committed) database as indicated by the corresponding value of t11ZsServerReadFromDatabase."

::= { t11ZsConfiguration 6 }

t11ZsZoneMemberEntry OBJECT-TYPE

SYNTAX T11ZsZoneMemberEntry

MAX-ACCESS not-accessible

STATUS current
DESCRIPTION

"Each entry represents the relationship between a member and (one of) its 'parent(s)', i.e., a Zone or Zone Alias to which the member belongs, within a particular Fabric (identified by the value of t11ZsServerFabricIndex) on a particular switch (identified by values of fcmInstanceIndex and fcmSwitchIndex).

A Zone member (other than an alias) is added to a Zone by creating an entry in this table having:

- t11ZsZoneMemberParentType = 'zone', and
- t11ZsZoneMemberParentIndex = Zone's t11ZsZoneIndex,
- t11ZsZoneMemberFormat != '05 - Alias Name',
- t11ZsZoneMemberID = Member's identifier.

An 'active' row in this table references rows in other tables. The agent must ensure that all such referenced rows exist with a status of 'active', either by refusing to create new active rows in this table, or by automatically deleting any rows in this table that reference a deleted row.

The StorageType of a row in this table is specified by the instance of t11ZsServerDatabaseStorageType that is INDEXed by the same values of fcmInstanceIndex, fcmSwitchIndex, and t11ZsServerFabricIndex."

```
INDEX { fcmInstanceIndex, fcmSwitchIndex,
        t11ZsServerFabricIndex, t11ZsZoneMemberParentType,
        t11ZsZoneMemberParentIndex, t11ZsZoneMemberIndex }
 ::= { t11ZsZoneMemberTable 1 }
```

```
T11ZsZoneMemberEntry ::= SEQUENCE {
    t11ZsZoneMemberParentType    INTEGER,
    t11ZsZoneMemberParentIndex   Unsigned32,
    t11ZsZoneMemberIndex         Unsigned32,
    t11ZsZoneMemberFormat        T11ZsZoneMemberType,
    t11ZsZoneMemberID            OCTET STRING,
    t11ZsZoneMemberRowStatus     RowStatus
}
```

t11ZsZoneMemberParentType OBJECT-TYPE

```
SYNTAX INTEGER {
    zone(1), -- member belongs to a Zone
    alias(2) -- member belongs to a Zone Alias
}
```

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"This object determines whether this member belongs
 to a Zone or Zone Alias."

::= { t11ZsZoneMemberEntry 1 }

t11ZsZoneMemberParentIndex OBJECT-TYPE
 SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"This object contains the index value of the Zone or
 Zone Alias to which this member belongs."

If the value of the corresponding instance of
 t11ZsZoneMemberParentType is 'zone', then this object
 will contain the value of the t11ZsZoneIndex object of
 the Zone to which this member belongs.

If the value of the corresponding instance of
 t11ZsZoneMemberParentType is 'alias', then this object
 will contain the value of the t11ZsAliasIndex object
 of the Zone Alias to which this member belongs."

::= { t11ZsZoneMemberEntry 2 }

t11ZsZoneMemberIndex OBJECT-TYPE
 SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"An index value that uniquely identifies this Zone
 Member amongst all Zone Members in the Zone Set
 database of a particular Fabric on a particular switch."

::= { t11ZsZoneMemberEntry 3 }

t11ZsZoneMemberFormat OBJECT-TYPE
 SYNTAX T11ZsZoneMemberType

MAX-ACCESS read-create
 STATUS current
 DESCRIPTION

"This object identifies the format of the
 Zone/Zone Alias member's identifier contained in
 t11ZsZoneMemberID."

This object cannot be modified while the corresponding
 value of t11ZsZoneMemberRowStatus object is 'active'."

::= { t11ZsZoneMemberEntry 4 }

t11ZsZoneMemberID OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1..255))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object contains the Member Identifier of the Zone or Alias. The interpretation of this object depends on the value of the corresponding instance of t11ZsZoneMemberFormat:

- if t11ZsZoneMemberFormat is 'N_Port_Name', then this object contains an N_Port_Name.
- if t11ZsZoneMemberFormat is 'Domain_ID and physical port', then this object contains a 4-octet value in network byte order. The first octet is zero, the second octet contains the Domain_ID, and the last 2 octets contain the physical port number.
- if t11ZsZoneMemberFormat is 'N_Port_ID', then this object contains the 3-octet Nx_Port FC_ID.
- if t11ZsZoneMemberFormat is 'Alias Name', then this object contains the value of t11ZsAliasName for some Alias in the same Zone Set database.
- if t11ZsZoneMemberFormat is 'Node_Name', then this object contains an 8-octet Node_Name.
- if t11ZsZoneMemberFormat is 'F_Port_Name', then this object contains an 8-octet F_Port_Name.
- if t11ZsZoneMemberFormat is one of the 'Vendor Specific' values, then this object contains a value of 1 to 255 octets in a format defined by the relevant vendor.

This object cannot be modified while the corresponding value of t11ZsZoneMemberRowStatus object is 'active'."

::= { t11ZsZoneMemberEntry 5 }

t11ZsZoneMemberRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this conceptual row.

The corresponding instances of t11ZsZoneMemberID and t11ZsZoneMemberFormat objects must be set before or concurrently with setting this object to 'active'."

```
::= { t11ZsZoneMemberEntry 6 }
```

```
--
-- The table of Zone Attribute Blocks
--
```

t11ZsAttribBlockTable OBJECT-TYPE

```
SYNTAX          SEQUENCE OF T11ZsAttribBlockEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
```

"This table gives information on all the Zone Attributes in the Zone Set database of the Zone Servers on each Fabric in one or more switches.

In Enhanced mode, changes to a database made via this table are always made to the 'copy' database, but values read from this table reflect the contents of either the 'copy' database or the current (committed) database as indicated by the corresponding value of t11ZsServerReadFromDatabase."

```
::= { t11ZsConfiguration 7 }
```

t11ZsAttribBlockEntry OBJECT-TYPE

```
SYNTAX          T11ZsAttribBlockEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
```

"Each entry contains information about a Zone Attribute Block (of Zone Attributes) in the Zone Set database of a particular Fabric (identified by the value of t11ZsServerFabricIndex) on a particular switch (identified by values of fcmInstanceIndex and fcmSwitchIndex).

An 'active' row in this table references a row in the t11ZsAttribBlockTable. The agent must ensure that the referenced rows exists with a status of 'active', either by refusing to create new active rows in this table, or by automatically deleting any rows in this table that reference a deleted row.

The StorageType of a row in this table is specified by the instance of t11ZsServerDatabaseStorageType that is INDEXed by the same values of fcmInstanceIndex,

```

        fcmSwitchIndex, and t11ZsServerFabricIndex."
INDEX    { fcmInstanceIndex, fcmSwitchIndex,
            t11ZsServerFabricIndex, t11ZsAttribBlockIndex }
 ::= { t11ZsAttribBlockTable 1 }

T11ZsAttribBlockEntry ::= SEQUENCE {
    t11ZsAttribBlockIndex      Unsigned32,
    t11ZsAttribBlockName       T11ZoningName,
    t11ZsAttribBlockRowStatus   RowStatus
}

t11ZsAttribBlockIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "An index value that uniquely identifies this Zone
        Attribute within the Zone Set database of a particular
        Fabric on a particular switch."
    ::= { t11ZsAttribBlockEntry 1 }

t11ZsAttribBlockName OBJECT-TYPE
    SYNTAX      T11ZoningName
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The name of this Zone Attribute Block, which should
        be unique within the Fabric."
    ::= { t11ZsAttribBlockEntry 2 }

t11ZsAttribBlockRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this conceptual row."
    ::= { t11ZsAttribBlockEntry 3 }

```

```
--
-- The table of Zone Attributes
--

t11ZsAttribTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11ZsAttribEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This table gives information on the Zone Attributes
        within the Zone Attribute Blocks in the Zone Set
        database of the Zone Servers on each Fabric in one
        or more switches.

        In Enhanced mode, changes to a database made via this
        table are always made to the 'copy' database, but
        values read from this table reflect the contents of
        either the 'copy' database or the current (committed)
        database as indicated by the corresponding value of
        t11ZsServerReadFromDatabase."
    ::= { t11ZsConfiguration 8 }

t11ZsAttribEntry OBJECT-TYPE
    SYNTAX      T11ZsAttribEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Each entry contains information about a Zone
        Attribute in a Zone Attribute Block (identified by
        t11ZsAttribBlockIndex) in the Zone Set database of
        a particular Fabric (identified by the value of
        t11ZsServerFabricIndex) on a particular switch
        (identified by values of fcmInstanceIndex and
        fcmSwitchIndex).

        An entry in this table cannot be created prior to
        its associated entry in the t11ZsAttribBlockTable.

        The StorageType of a row in this table is specified by
        the instance of t11ZsServerDatabaseStorageType that is
        INDEXed by the same values of fcmInstanceIndex,
        fcmSwitchIndex, and t11ZsServerFabricIndex."
    INDEX      { fcmInstanceIndex, fcmSwitchIndex,
                  t11ZsServerFabricIndex,
                  t11ZsAttribBlockIndex, t11ZsAttribIndex }
    ::= { t11ZsAttribTable 1 }

T11ZsAttribEntry ::= SEQUENCE {
```

```

t11ZsAttribIndex      Unsigned32,
t11ZsAttribType        Unsigned32,
t11ZsAttribValue       OCTET STRING,
t11ZsAttribRowStatus   RowStatus
}

t11ZsAttribIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "An index value that uniquely identifies this
        Zone Attribute within its Zone Attribute Block in
        the Zone Set database of a particular Fabric on a
        particular switch."
    ::= { t11ZsAttribEntry 1 }

t11ZsAttribType OBJECT-TYPE
    SYNTAX      Unsigned32 (0..65535)
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The type of attribute:

        0001          - Protocol
        0002          - Broadcast Zone
        0003          - Hard Zone
        00E0 (hex) - Vendor Specific."
    REFERENCE
        "Fibre Channel - Generic Services-5 (FC-GS-5),
        ANSI INCITS 427-2007, section 6.4.8.3.8, Table 249."
    ::= { t11ZsAttribEntry 2 }

t11ZsAttribValue OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (4..252))
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The value of the attribute, formatted as specified
        in FC-GS-5 for the type given by the corresponding
        instance of t11ZsAttribType.

        Note that FC-GS-5 requires that the length of this
        value is a multiple of 4 bytes."
    REFERENCE
        "Fibre Channel - Generic Services-5 (FC-GS-5),
        ANSI INCITS 427-2007, section 6.4.8.3.8."
    ::= { t11ZsAttribEntry 3 }

```

```

t11ZsAttribRowStatus OBJECT-TYPE
    SYNTAX          RowStatus
    MAX-ACCESS      read-create
    STATUS          current
    DESCRIPTION
        "The status of this conceptual row."
    ::= { t11ZsAttribEntry 4 }

--
-- Activating a Zone Set
--

t11ZsActivateTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF T11ZsActivateEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This table provides a mechanism to allow a Zone Set
         to be activated on a Fabric."
    ::= { t11ZsConfiguration 9 }

t11ZsActivateEntry OBJECT-TYPE
    SYNTAX          T11ZsActivateEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Each entry reflects the state of the activation of a
         Zone Set by a particular switch (identified by values
         of fcmInstanceIndex and fcmSwitchIndex) on a particular
         Fabric (identified by the value of
         t11ZsServerFabricIndex)."
    INDEX          { fcmInstanceIndex, fcmSwitchIndex,
                    t11ZsServerFabricIndex }
    ::= { t11ZsActivateTable 1 }

T11ZsActivateEntry ::= SEQUENCE {
    t11ZsActivateRequest      Unsigned32,
    t11ZsActivateDeactivate   INTEGER,
    t11ZsActivateResult       INTEGER,
    t11ZsActivateFailCause    SnmpAdminString,
    t11ZsActivateFailDomainId FcDomainIdOrZero
}

t11ZsActivateRequest OBJECT-TYPE
    SYNTAX          Unsigned32 (0..4294967295)
    MAX-ACCESS      read-write
    STATUS          current
    DESCRIPTION

```

"Setting this object to a value is a request for a Zone Set to be activated on the Fabric that is represented by this row. The Zone Set to be activated is the one for which t11ZsSetIndex has the same value.

If a Zone Set is already active on a Fabric when a request is made to activate a different one on that Fabric, then the existing Zone Set is automatically deactivated and the specified Zone Set is activated in its place.

The value of this object when read is always 0."

```
::= { t11ZsActivateEntry 1 }
```

t11ZsActivateDeactivate OBJECT-TYPE

```
SYNTAX      INTEGER {
                deactivate(1),
                noop(2)
            }
```

```
MAX-ACCESS  read-write
```

```
STATUS      current
```

DESCRIPTION

"Setting this object to 'deactivate' is a request to deactivate the currently active Zone Set on a Fabric.

Note that the deactivation of the active Zone Set allows all ports to communicate or no ports to communicate, depending on the current Default Zone behavior.

No action is taken if this object is set to 'noop'.

When read, the value of this object is always 'noop'."

```
::= { t11ZsActivateEntry 2 }
```

t11ZsActivateResult OBJECT-TYPE

```
SYNTAX      INTEGER {
                activateSuccess(1),
                activateFailure(2),
                deactivateSuccess(3),
                deactivateFailure(4),
                inProgress(5),
                none(6)
            }
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

DESCRIPTION

"This object indicates the outcome of the most recent activation/deactivation using this entry.

When the value of this object is 'inProgress', the values of the corresponding instances of t11ZsActivateRequest and t11ZsActivateDeactivate cannot be modified.

The value 'none' indicates activation/deactivation has not been attempted since the last restart of the management system."

```
::= { t11ZsActivateEntry 3 }
```

t11ZsActivateFailCause OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE (0..64))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A textual message indicating the reason for the most recent failure of a Zone Set activation or deactivation, or the zero-length string if no information is available (e.g., because the corresponding instance of t11ZsActivateResult has the value 'none').

When the corresponding instance of t11ZsActivateResult is either 'activateFailure' or 'deactivateFailure', the value of this object indicates the reason for that failure."

```
::= { t11ZsActivateEntry 4 }
```

t11ZsActivateFailDomainId OBJECT-TYPE

SYNTAX FcDomainIdOrZero

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"If the failure cause (as indicated by t11ZsSetFailCause) was specific to a particular device, this object contains the Domain_ID of that device. Otherwise, this object contains zero."

```
::= { t11ZsActivateEntry 5 }
```



```

--
-- t11ZsActiveTable
--

t11ZsActiveTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11ZsActiveEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A table containing information on the currently
        enforced/active Zone Set on each Fabric.
        An active Zone Set cannot be modified.
        This table will be empty when no Zone Set is
        activated."
    ::= { t11ZsConfiguration 10 }

t11ZsActiveEntry OBJECT-TYPE
    SYNTAX      T11ZsActiveEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Each entry represents an active Zone Set of a
        particular Fabric (identified by the value of
        t11ZsServerFabricIndex), according to a particular
        switch (identified by values of fcmInstanceIndex and
        fcmSwitchIndex)."
```

INDEX { fcmInstanceIndex, fcmSwitchIndex,
t11ZsServerFabricIndex }

```

    ::= { t11ZsActiveTable 1 }

T11ZsActiveEntry ::= SEQUENCE {
    t11ZsActiveZoneSetName      T11ZoningName,
    t11ZsActiveActivateTime     TimeStamp
}

t11ZsActiveZoneSetName OBJECT-TYPE
    SYNTAX      T11ZoningName
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The name of this Zone Set on this Fabric."
    ::= { t11ZsActiveEntry 1 }

t11ZsActiveActivateTime OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION

```

```

        "The value of sysUpTime at which this entry was most
        recently activated.  If this row was activated prior to
        the last re-initialization of the local network management
        system, then this object will contain a zero value."
 ::= { t11ZsActiveEntry 2 }

--
-- Zones in the Active/Enforced Zone Set
--

t11ZsActiveZoneTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11ZsActiveZoneEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table contains all the Zones that are present in
        the active Zone Sets on all Fabrics."
 ::= { t11ZsConfiguration 11 }

t11ZsActiveZoneEntry OBJECT-TYPE
    SYNTAX      T11ZsActiveZoneEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Each entry represents a Zone in the active Zone Set
        of a particular Fabric (identified by the value of
        t11ZsServerFabricIndex), according to a particular
        switch (identified by values of fcmInstanceIndex and
        fcmSwitchIndex)."
```

INDEX { fcmInstanceIndex, fcmSwitchIndex,
t11ZsServerFabricIndex, t11ZsActiveZoneIndex }

```

 ::= { t11ZsActiveZoneTable 1 }

T11ZsActiveZoneEntry ::= SEQUENCE {
    t11ZsActiveZoneIndex      Unsigned32,
    t11ZsActiveZoneName       T11ZoningName,
    t11ZsActiveZoneBroadcastZoning TruthValue,
    t11ZsActiveZoneHardZoning TruthValue
}

t11ZsActiveZoneIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An index value that uniquely identifies this Zone
        within the active Zone Set on a particular Fabric."
 ::= { t11ZsActiveZoneEntry 1 }

```

t11ZsActiveZoneName OBJECT-TYPE

SYNTAX T11ZoningName
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The name of this Zone."
::= { t11ZsActiveZoneEntry 2 }

t11ZsActiveZoneBroadcastZoning OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates whether broadcast Zoning is enabled on this Zone. If broadcast Zoning is enabled, then broadcast frames generated by a member in this Zone will be restricted to members in this Zone."

"This object is only instantiated in Enhanced mode."
::= { t11ZsActiveZoneEntry 3 }

t11ZsActiveZoneHardZoning OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates whether hard Zoning is enabled on this Zone."

"This object is only instantiated in Enhanced mode."
::= { t11ZsActiveZoneEntry 4 }

--

-- Zone Members in the Active/Enforced Zone Set

--

t11ZsActiveZoneMemberTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11ZsActiveZoneMemberEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"This table contains all members of all Zones within the active Zone Set on any Fabric."
::= { t11ZsConfiguration 12 }

t11ZsActiveZoneMemberEntry OBJECT-TYPE

SYNTAX T11ZsActiveZoneMemberEntry
MAX-ACCESS not-accessible

```

STATUS          current
DESCRIPTION
    "Each entry represents a member of a Zone in the active
    Zone Set of a particular Fabric (identified by the value
    t11ZsServerFabricIndex), according to a particular
    switch (identified by values of fcmInstanceIndex and
    fcmSwitchIndex)."
```

```

INDEX { fcmInstanceIndex, fcmSwitchIndex,
        t11ZsServerFabricIndex,
        t11ZsActiveZoneIndex, t11ZsActiveZoneMemberIndex }
 ::= { t11ZsActiveZoneMemberTable 1 }
```

```

T11ZsActiveZoneMemberEntry ::= SEQUENCE {
    t11ZsActiveZoneMemberIndex      Unsigned32,
    t11ZsActiveZoneMemberFormat     T11ZsZoneMemberType,
    t11ZsActiveZoneMemberID         OCTET STRING
}
```

```

t11ZsActiveZoneMemberIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "An index value that uniquely identifies this
        member amongst the members of a particular Zone
        in the active Zone Set on a particular Fabric."
    ::= { t11ZsActiveZoneMemberEntry 1 }
```

```

t11ZsActiveZoneMemberFormat OBJECT-TYPE
    SYNTAX      T11ZsZoneMemberType
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "This object identifies the identifier format of the
        corresponding instance of t11ZsActiveZoneMemberID."
    ::= { t11ZsActiveZoneMemberEntry 2 }
```

```

t11ZsActiveZoneMemberID OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (1..255))
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "This value of this object identifies the member
        using the format specified in the corresponding
        instance of t11ZsActiveZoneMemberFormat."
    ::= { t11ZsActiveZoneMemberEntry 3 }
```

```
--
-- Zone Attributes in the Active/Enforced Zone Set
--
```

t11ZsActiveAttribTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11ZsActiveAttribEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains information about some of the Attributes of the Zones within the active Zone Set on each Fabric.

This table contains all the types of attributes that might apply zero, one, or more times to a Zone. Attributes that apply once and only to a Zone are specified in the t11ZsActiveZoneTable.

This table will always be empty in Basic mode. It will also be empty if there are no Zones in any active Zone Set having any of the applicable types of attributes."

::= { t11ZsConfiguration 13 }

t11ZsActiveAttribEntry OBJECT-TYPE

SYNTAX T11ZsActiveAttribEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains an Attribute of a particular Zone in the active Zone Set of a particular Fabric (identified by the value of t11ZsServerFabricIndex), according to a particular switch (identified by values of fcmInstanceIndex and fcmSwitchIndex)."

INDEX { fcmInstanceIndex, fcmSwitchIndex,
t11ZsServerFabricIndex,
t11ZsActiveZoneIndex, t11ZsActiveAttribIndex }

::= { t11ZsActiveAttribTable 1 }

T11ZsActiveAttribEntry ::= SEQUENCE {

t11ZsActiveAttribIndex Unsigned32,

t11ZsActiveAttribType Unsigned32,

t11ZsActiveAttribValue OCTET STRING

}

t11ZsActiveAttribIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An index value that uniquely identifies this attribute amongst the other attributes for a particular Zone in the active Zone Set on a particular Fabric."

::= { t11ZsActiveAttribEntry 1 }

t11ZsActiveAttribType OBJECT-TYPE

SYNTAX Unsigned32 (0..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The type of attribute:

0001 - Protocol

00E0 (hex) - Vendor Specific

Note that type 2 (Hard) and type 3 (Broadcast) do not need to be represented here, because they are represented by t11ZsActiveZoneBroadcastZoning and t11ZsActiveZoneHardZoning."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.8.3.8, Table 249."

::= { t11ZsActiveAttribEntry 2 }

t11ZsActiveAttribValue OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0..252))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of the attribute, formatted according to its type as indicated by the corresponding instance of t11ZsActiveAttribType."

As specified in FC-GS-5, the length of an attribute value is at least 4 bytes, and if necessary, the value is appended with zero bytes so that the length is a multiple of 4. For a Vendor-Specific attribute value, the first 8 bytes contain the T10 Vendor ID as described in FC-GS-5."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2007, section 6.4.8.3.8."

::= { t11ZsActiveAttribEntry 3 }

```
--
-- Zone Server Statistics
--

t11ZsStatsTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF T11ZsStatsEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "A table of statistics maintained by Zone Servers."
    ::= { t11ZsStatistics 1 }

t11ZsStatsEntry OBJECT-TYPE
    SYNTAX          T11ZsStatsEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "A set of statistics for a Zone Server on a
        particular Fabric (identified by the value of
        t11ZsServerFabricIndex) on a particular switch
        (identified by values of fcmInstanceIndex and
        fcmSwitchIndex)."
```

INDEX	{ fcmInstanceIndex, fcmSwitchIndex,
	t11ZsServerFabricIndex }

```
    ::= { t11ZsStatsTable 1 }

T11ZsStatsEntry ::= SEQUENCE {
    t11ZsOutMergeRequests      Counter32,
    t11ZsInMergeAccepts       Counter32,
    t11ZsInMergeRequests      Counter32,
    t11ZsOutMergeAccepts      Counter32,
    t11ZsOutChangeRequests    Counter32,
    t11ZsInChangeAccepts      Counter32,
    t11ZsInChangeRequests     Counter32,
    t11ZsOutChangeAccepts     Counter32,
    t11ZsInZsRequests         Counter32,
    t11ZsOutZsRejects         Counter32
}

t11ZsOutMergeRequests OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The number of Merge Request Frames sent by this Zone
        Server to other Zone Servers in the same Fabric.

        This counter has no discontinuities other than those
```

that all Counter32s have when sysUpTime=0."
 ::= { t11ZsStatsEntry 1 }

t11ZsInMergeAccepts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Merge Accept Frames received by this Zone Server from other Zone Servers in the same Fabric.

This counter has no discontinuities other than those that all Counter32s have when sysUpTime=0."

::= { t11ZsStatsEntry 2 }

t11ZsInMergeRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Merge Request Frames received by this Zone Server from other Zone Servers in the same Fabric.

This counter has no discontinuities other than those that all Counter32s have when sysUpTime=0."

::= { t11ZsStatsEntry 3 }

t11ZsOutMergeAccepts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Merge Accept Frames sent by this Zone Server to other Zone Servers in the same Fabric.

This counter has no discontinuities other than those that all Counter32s have when sysUpTime=0."

::= { t11ZsStatsEntry 4 }

t11ZsOutChangeRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of change requests sent (via the Fabric Management Session Protocol) by this Zone Server to other Zone Servers in the same Fabric.

This includes Acquire Change Authorization requests, Stage Fabric Config Update requests, Update Fabric Config requests and Release Change Authorization requests. It also includes the corresponding types of requests defined by the Enhanced Commit Service.

This counter has no discontinuities other than those that all Counter32s have when sysUpTime=0."

REFERENCE

"Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, sections 10.6 and 13."

::= { t11ZsStatsEntry 5 }

t11ZsInChangeAccepts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SW_ACC messages received from other Zone Servers in the same Fabric (according to the Fabric Management Session Protocol) in response to change requests by this Zone Server.

This includes SW_ACC messages received in response to Acquire Change Authorization requests, to Stage Fabric Config Update requests, to Update Fabric Config requests, and to Release Change Authorization requests. It also includes responses to the corresponding types of requests defined for the Enhanced Commit Service.

This counter has no discontinuities other than those that all Counter32s have when sysUpTime=0."

REFERENCE

"Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, sections 10.6 and 13."

::= { t11ZsStatsEntry 6 }

t11ZsInChangeRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of change requests received (via the Fabric Management Session Protocol) by this Zone Server from other Zone Servers in the same Fabric.

This includes Acquire Change Authorization requests, Stage Fabric Config Update requests, Update Fabric Config requests

and Release Change Authorization requests. It also includes the corresponding types of requests defined by the Enhanced Commit Service.

This counter has no discontinuities other than those that all Counter32s have when sysUpTime=0."

REFERENCE

"Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, sections 10.6 and 13."
::= { t11ZsStatsEntry 7 }

t11ZsOutChangeAccepts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SW_ACC messages sent by this Zone Server (according to the Fabric Management Session Protocol) in response to change requests from other Zone Servers in the same Fabric.

This includes SW_ACC messages sent in response to Acquire Change Authorization requests, to Stage Fabric Config Update requests, to Update Fabric Config requests and to Release Change Authorization requests. It also includes responses to the corresponding types of requests defined for the Enhanced Commit Service.

This counter has no discontinuities other than those that all Counter32s have when sysUpTime=0."

REFERENCE

"Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, sections 10.6 and 13."
::= { t11ZsStatsEntry 8 }

t11ZsInZsRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Zone Server requests received by this Zone Server on this Fabric, both those received in Basic mode and in Enhanced mode.

This counter has no discontinuities other than those that all Counter32s have when sysUpTime=0."

::= { t11ZsStatsEntry 9 }

t11ZsOutZsRejects OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Zone Server requests rejected by this Zone Server on this Fabric, both those rejected in Basic mode and in Enhanced mode.

This counter has no discontinuities other than those that all Counter32s have when sysUpTime=0."

::= { t11ZsStatsEntry 10 }

--

-- Notification Control Table

--

t11ZsNotifyControlTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11ZsNotifyControlEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of control information for notifications generated due to Zone Server events."

::= { t11ZsConfiguration 14 }

t11ZsNotifyControlEntry OBJECT-TYPE

SYNTAX T11ZsNotifyControlEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains notification control information specific to a Zone Server for a particular Fabric (identified by the value of t11ZsServerFabricIndex) on a particular switch (identified by values of fcmInstanceIndex and fcmSwitchIndex).

The persistence across reboots of writable values in a row of this table is specified by the instance of t11ZsServerDatabaseStorageType that is INDEXed by the same values of fcmInstanceIndex, fcmSwitchIndex, and t11ZsServerFabricIndex."

INDEX { fcmInstanceIndex, fcmSwitchIndex,
t11ZsServerFabricIndex }

::= { t11ZsNotifyControlTable 1 }

T11ZsNotifyControlEntry ::= SEQUENCE {

t11ZsNotifyRequestRejectEnable TruthValue,

```

t11ZsNotifyMergeFailureEnable      TruthValue,
t11ZsNotifyMergeSuccessEnable      TruthValue,
t11ZsNotifyDefZoneChangeEnable     TruthValue,
t11ZsNotifyActivateEnable          TruthValue,
t11ZsRejectCtCommandString         OCTET STRING,
t11ZsRejectRequestSource           FcNameIdOrZero,
t11ZsRejectReasonCode              T11NsGs4RejectReasonCode,
t11ZsRejectReasonCodeExp           T11ZsRejectReasonExplanation,
t11ZsRejectReasonVendorCode        OCTET STRING
}

```

t11ZsNotifyRequestRejectEnable OBJECT-TYPE

```

SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object specifies whether t11ZsRequestRejectNotify
    notifications should be generated by the Zone Server
    for this Fabric."
 ::= { t11ZsNotifyControlEntry 1 }

```

t11ZsNotifyMergeFailureEnable OBJECT-TYPE

```

SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object specifies whether t11ZsMergeFailureNotify
    notifications should be generated by the Zone Server
    for this Fabric."
 ::= { t11ZsNotifyControlEntry 2 }

```

t11ZsNotifyMergeSuccessEnable OBJECT-TYPE

```

SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object specifies whether t11ZsMergeSuccessNotify
    notifications should be generated by the Zone Server
    for this Fabric."
 ::= { t11ZsNotifyControlEntry 3 }

```

t11ZsNotifyDefZoneChangeEnable OBJECT-TYPE

```

SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object specifies whether t11ZsDefZoneChangeNotify
    notifications should be generated by the Zone Server

```

```

        for this Fabric."
 ::= { t11ZsNotifyControlEntry 4 }

```

t11ZsNotifyActivateEnable OBJECT-TYPE

```

SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object specifies whether t11ZsActivateNotify
    notifications should be generated by the Zone Server
    for this Fabric."
 ::= { t11ZsNotifyControlEntry 5 }

```

t11ZsRejectCtCommandString OBJECT-TYPE

```

SYNTAX      OCTET STRING (SIZE (0..255))
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The binary content of the Zone Server request,
    formatted as an octet string (in network byte order)
    containing the Common Transport Information Unit
    (CT_IU), as described in Table 2 of FC-GS-5 (including
    the preamble), which was most recently rejected by the
    Fabric Configuration Server for this Fabric.

```

This object contains the zero-length string
if and when the CT-IU's content is unavailable.

When the length of this object is 255 octets, it
contains the first 255 octets of the CT-IU (in
network byte order)."

```

 ::= { t11ZsNotifyControlEntry 6 }

```

t11ZsRejectRequestSource OBJECT-TYPE

```

SYNTAX      FcNameIdOrZero
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The WWN that was the source of the CT_IU
    contained in the corresponding instance of
    t11ZsRejectCtCommandString."
 ::= { t11ZsNotifyControlEntry 7 }

```

t11ZsRejectReasonCode OBJECT-TYPE

```

SYNTAX      T11NsGs4RejectReasonCode
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION

```

```
        "The reason code corresponding to the most recent
        rejection of a request by the Zone Server for
        this Fabric."
 ::= { t11ZsNotifyControlEntry 8 }

t11ZsRejectReasonCodeExp OBJECT-TYPE
    SYNTAX      T11ZsRejectReasonExplanation
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "When the value of t11ZsRejectReasonCode is
        'Unable to perform command request', this
        object contains the corresponding reason code
        explanation."
 ::= { t11ZsNotifyControlEntry 9 }

t11ZsRejectReasonVendorCode      OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (1))
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "When the value of t11ZsRejectReasonCode is
        'Vendor Specific Error', this object contains
        the corresponding vendor-specific reason code."
 ::= { t11ZsNotifyControlEntry 10 }

t11ZsFabricIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (0..4096)
    MAX-ACCESS   accessible-for-notify
    STATUS       current
    DESCRIPTION
        "This object contains either a value of
        T11FabricIndex to identify the Fabric on which
        some occurrence has caused a notification to be
        generated, or it has the value 4096 to indicate
        all applicable Fabrics."
 ::= { t11ZsConfiguration 15 }
```

`-- Notifications``t11ZsRequestRejectNotify NOTIFICATION-TYPE`

```

OBJECTS      { t11FamLocalSwitchWwn,
                t11ZsRejectRequestSource,
                t11ZsRejectCtCommandString,
                t11ZsRejectReasonCode,
                t11ZsRejectReasonCodeExp,
                t11ZsRejectReasonVendorCode }
STATUS       current

```

`DESCRIPTION`

"This notification is generated whenever a Zone Server (indicated by the value of t11FamLocalSwitchWwn) rejects a request.

The value of t11ZsRejectCtCommandString indicates the rejected request, and the values of t11ZsRejectReasonCode, t11ZsRejectReasonCodeExp and t11ZsRejectReasonVendorCode indicate the reason for the rejection. The value of t11ZsRequestClient indicates the source of the request."

```
 ::= { t11ZsMIBNotifications 1 }
```

`t11ZsMergeFailureNotify NOTIFICATION-TYPE`

```

OBJECTS      { ifIndex, t11ZsFabricIndex }
STATUS       current

```

`DESCRIPTION`

"This notification indicates that a Zone merge failure has occurred on the Fabric indicated by the value of t11ZsFabricIndex, on the interface indicated by the value of ifIndex.

If multiple Virtual Fabrics are configured on an interface, and all have a Zone merge failure at the same time, then just one notification is generated and t11ZsFabricIndex has the value 4096."

```
 ::= { t11ZsMIBNotifications 2 }
```

`t11ZsMergeSuccessNotify NOTIFICATION-TYPE`

```

OBJECTS      { ifIndex, t11ZsFabricIndex }
STATUS       current

```

`DESCRIPTION`

"This notification indicates that a successful Zone merge has occurred on the Fabric indicated by the value of t11ZsFabricIndex, on the interface indicated by the value of ifIndex.

If multiple Virtual Fabrics are configured on an interface, and all have a successful Zone Merge

at the same time, then just one notification is generated and t11ZsFabricIndex has the value 4096."
 ::= { t11ZsMIBNotifications 3 }

t11ZsDefZoneChangeNotify NOTIFICATION-TYPE

OBJECTS { t11ZsServerDefaultZoneSetting }

STATUS current

DESCRIPTION

"This notification indicates that the value of a Default Zone Setting has changed. The value of t11ZsServerDefaultZoneSetting contains the value after the change."

::= { t11ZsMIBNotifications 4 }

t11ZsActivateNotify NOTIFICATION-TYPE

OBJECTS { t11FamLocalSwitchWwn, t11ZsActivateResult }

STATUS current

DESCRIPTION

"This notification is generated whenever a switch (indicated by the value of t11FamLocalSwitchWwn) activates/deactivates a Zone Set on a Fabric. The t11ZsActivateResult object denotes the outcome of the activation/deactivation."

::= { t11ZsMIBNotifications 5 }

-- Conformance

t11ZsMIBCompliances OBJECT IDENTIFIER ::= { t11ZsMIBConformance 1 }

t11ZsMIBGroups OBJECT IDENTIFIER ::= { t11ZsMIBConformance 2 }

t11ZsMIBCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for entities that implement the Zone Server."

MODULE MANDATORY-GROUPS {t11ZsBasicGroup,
 t11ZsNotificationControlGroup,
 t11ZsNotificationGroup }

GROUP t11ZsEnhancedModeGroup

DESCRIPTION

"This group is mandatory only for those systems with Zone Servers that support Enhanced Mode."

GROUP t11ZsActivateGroup

DESCRIPTION

"Only entities that provide write access for activating a Zone Set support need to support

this group."

GROUP t11ZsStatisticsGroup

DESCRIPTION

"These counters, containing Zone Server statistics, are mandatory only for those systems that count such events."

OBJECT t11ZsSetRowStatus

SYNTAX INTEGER { active(1) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11ZsZoneRowStatus

SYNTAX INTEGER { active(1) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11ZsSetZoneRowStatus

SYNTAX INTEGER { active(1) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11ZsAliasRowStatus

SYNTAX INTEGER { active(1) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11ZsZoneMemberRowStatus

SYNTAX INTEGER { active(1) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11ZsAttribBlockRowStatus

SYNTAX INTEGER { active(1) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11ZsAttribRowStatus

SYNTAX INTEGER { active(1) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11ZsServerDatabaseStorageType
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11ZsServerDistribute
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11ZsServerCommit
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11ZsServerReadFromDatabase
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11ZsServerOperationMode
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11ZsServerDefaultZoneSetting
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11ZsServerMergeControlSetting
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11ZsServerDefZoneBroadcast
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11ZsSetName
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11ZsZoneName

MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsZoneAttribBlock
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsAliasName
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsZoneMemberFormat
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsZoneMemberID
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsAttribBlockName
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsAttribType
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsAttribValue
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsActivateRequest
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsActivateDeactivate
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11ZsNotifyRequestRejectEnable
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT t11ZsNotifyMergeFailureEnable
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT t11ZsNotifyMergeSuccessEnable
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT t11ZsNotifyDefZoneChangeEnable
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT t11ZsNotifyActivateEnable
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

::= { t11ZsMIBCompliances 1 }

-- Units of Conformance

t11ZsBasicGroup OBJECT-GROUP
 OBJECTS { t11ZsServerCapabilityObject,
 t11ZsServerDatabaseStorageType,
 t11ZsServerDistribute,
 t11ZsServerResult,
 t11ZsServerReasonCode,
 t11ZsServerReasonCodeExp,
 t11ZsServerReasonVendorCode,
 t11ZsServerLastChange,
 t11ZsServerHardZoning,
 t11ZsServerReadFromDatabase,
 t11ZsServerOperationMode,
 t11ZsSetName,
 t11ZsSetRowStatus,
 t11ZsZoneName,
 t11ZsZoneAttribBlock,
 t11ZsZoneRowStatus,
 t11ZsSetZoneRowStatus,
 t11ZsZoneMemberFormat,

```

        t11ZsZoneMemberID,
        t11ZsZoneMemberRowStatus,
        t11ZsActiveZoneSetName,
        t11ZsActiveActivateTime,
        t11ZsActiveZoneName,
        t11ZsActiveZoneMemberFormat,
        t11ZsActiveZoneMemberID
    }
STATUS    current
DESCRIPTION
    "A collection of objects for displaying and updating
    the Zone configuration of a Zone Server capable of
    operating in Basic mode."
 ::= { t11ZsMIBGroups 1 }

t11ZsEnhancedModeGroup OBJECT-GROUP
OBJECTS   { t11ZsServerCommit,
            t11ZsServerChangeModeResult,
            t11ZsServerDefaultZoneSetting,
            t11ZsServerMergeControlSetting,
            t11ZsServerDefZoneBroadcast,
            t11ZsAliasName,
            t11ZsAliasRowStatus,
            t11ZsAttribBlockName,
            t11ZsAttribBlockRowStatus,
            t11ZsAttribType,
            t11ZsAttribValue,
            t11ZsAttribRowStatus,
            t11ZsActiveZoneBroadcastZoning,
            t11ZsActiveZoneHardZoning,
            t11ZsActiveAttribType,
            t11ZsActiveAttribValue
          }
STATUS    current
DESCRIPTION
    "A collection of additional objects for displaying
    and updating the Zone configuration of a Zone Server
    capable of operating in Enhanced mode."
 ::= { t11ZsMIBGroups 2 }

t11ZsStatisticsGroup OBJECT-GROUP
OBJECTS   { t11ZsOutMergeRequests,
            t11ZsInMergeAccepts,
            t11ZsInMergeRequests,
            t11ZsOutMergeAccepts,
            t11ZsOutChangeRequests,
            t11ZsInChangeAccepts,
            t11ZsInChangeRequests,

```

```

        t11ZsOutChangeAccepts,
        t11ZsInZsRequests,
        t11ZsOutZsRejects
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects for collecting Zone Server
        statistics information."
    ::= { t11ZsMIBGroups 3 }

t11ZsNotificationControlGroup OBJECT-GROUP
    OBJECTS { t11ZsNotifyRequestRejectEnable,
               t11ZsNotifyMergeFailureEnable,
               t11ZsNotifyMergeSuccessEnable,
               t11ZsNotifyDefZoneChangeEnable,
               t11ZsNotifyActivateEnable,
               t11ZsRejectCtCommandString,
               t11ZsRejectRequestSource,
               t11ZsRejectReasonCode,
               t11ZsRejectReasonCodeExp,
               t11ZsRejectReasonVendorCode,
               t11ZsFabricIndex
            }
    STATUS      current
    DESCRIPTION
        "A collection of notification control and
        notification information objects for monitoring
        Zone Server request rejection and Zone merge
        failures."
    ::= { t11ZsMIBGroups 4 }

t11ZsActivateGroup OBJECT-GROUP
    OBJECTS { t11ZsActivateRequest,
               t11ZsActivateDeactivate,
               t11ZsActivateResult,
               t11ZsActivateFailCause,
               t11ZsActivateFailDomainId
            }
    STATUS      current
    DESCRIPTION
        "A collection of objects that allow a Zone Set to
        be activated via SNMP SetRequests and provide the
        status and result of such an activation."
    ::= { t11ZsMIBGroups 5 }

t11ZsNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS { t11ZsRequestRejectNotify,
                    t11ZsMergeFailureNotify,

```

```

        t11ZsMergeSuccessNotify,
        t11ZsDefZoneChangeNotify,
        t11ZsActivateNotify }
STATUS          current
DESCRIPTION
    "A collection of notification(s) for monitoring
    Zone Server request rejection, Zone merge
    failures and successes, and Default Zoning
    behavioral changes."
 ::= { t11ZsMIBGroups 6 }

```

END

8. IANA Considerations

IANA has assigned two MIB OIDs: one for the T11-FC-FABRIC-LOCK-MIB module (159) and one for the T11-FC-ZONE-SERVER-MIB module (160), under the mib-2 subtree.

9. Security Considerations

There are many management objects defined in these MIB modules with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

Specifically, unauthorized write access to *any* of the writable objects in these MIB modules could cause unauthorized manipulation of the Zoning information on a Zone Server, and/or the activation of an unauthorized Active Zone Set in a Fabric. This could result in allowing unauthorized connectivity, and/or denying authorized connectivity, between hosts connected to the Fibre Channel network. It could also cause the suppression of notifications (e.g., of unauthorized operations), or the disruption of network operations due to the generation of unwanted notifications.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP.

Unauthorized read access to any of the readable objects in the t11ZsServerTable, t11ZsActiveZoneTable, t11ZsActiveZoneMemberTable, or t11ZsActiveAttribTable tables would reveal information about the

currently authorized connectivity between hosts connected to the Fibre Channel network.

Unauthorized read access to any of the readable objects in the `t11ZsSetTable`, `t11ZsZoneTable`, `t11ZsSetZoneTable`, `t11ZsAliasTable`, `t11ZsZoneMemberTable`, `t11ZsAttribBlockTable`, or `t11ZsAttribTable` tables would reveal information about potential/alternative connectivity that could be authorized between hosts connected to the Fibre Channel network.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementors consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

10. Acknowledgements

This document was originally developed and approved by the INCITS Task Group T11.5 (<http://www.t11.org>) as the SM-ZSM project. We wish to acknowledge the many contributions and comments from the INCITS Technical Committee T11, especially from the following:

T11 Chair: Robert Snively, Brocade
T11 Vice Chair: Claudio DeSanti, Cisco Systems
T11.5 Chair: Roger Cummings, Symantec
T11.5 Vice Chair: Scott Kipp, McData
and T11.5 members.

The document was subsequently a work item of the IETF's IMSS Working Group, chaired by David Black (EMC Corporation). We thank Bert Wijnen (Lucent Technologies) for his thorough review of the document. We also wish to acknowledge Dan Romascanu (Avaya), the IETF Area Director, for his comments and assistance.

11. Normative References

- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.
- [RFC3411] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks", STD 58, RFC 3411, December 2002.
- [RFC3584] Frye, R., Levi, D., Routhier, S., and B. Wijnen, "Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework", RFC 3584, August 2003.
- [FC-GS-5] "Fibre Channel - Generic Services - 5 (FC-GS-5)", ANSI INCITS 427-2007, <http://www.t11.org/t11/stat.nsf/upnum/1677-d>, 2007.
- [FC-GS-4] "Fibre Channel - Generic Services - 4 (FC-GS-4)", ANSI INCITS 387-2004, <http://www.t11.org/t11/stat.nsf/upnum/1505-d>, August 2004.
- [FC-SW-4] "Fibre Channel - Switch Fabric - 4 (FC-SW-4)", ANSI INCITS 418-2006, <http://www.t11.org/t11/stat.nsf/upnum/1674-d>, December 2006.
- [FC-FS] "Fibre Channel - Framing and Signaling (FC-FS)", ANSI INCITS 373-2003, April 2003.
- [RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", RFC 4001, February 2005.

- [RFC4044] McCloghrie, K., "Fibre Channel Management MIB", RFC 4044, May 2005.
- [RFC4438] DeSanti, C., Gaonkar, V., Vivek, H., McCloghrie, K., and S. Gai, "Fibre-Channel Name Server MIB", RFC 4438, March 2006.
- [RFC4439] DeSanti, C., Gaonkar, V., McCloghrie, K., and S. Gai, "Fibre-Channel Fabric Address Manager MIB", RFC 4439, March 2006.
- [APPL-ID] Steven Wilson (FC-SW-5, Editor), "FC-SW-5 Letter to T11.5", ANSI INCITS T11/06-679v0, <http://www.t11.org/ftp/t11/pub/fc/sw-5/06-679v0.pdf>, 21 September 2006. Approved by the T11 and T11.5 plenary meetings on October 5, 2006.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

12. Informative References

- [RFC2741] Daniele, M., Wijnen, B., Ellison, M., and D. Francisco, "Agent Extensibility (AgentX) Protocol Version 1", RFC 2741, January 2000.
- [RFC3410] Case, J., Mundy, R., Partain, D. and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.

Authors' Addresses

Claudio DeSanti
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134 USA
Phone: +1 408 853-9172
EMail: cds@cisco.com

H.K. Vivek
Cisco Systems, Inc.
71 Millers Rd
Bangalore, India
Phone: +91 80 2289933x5117
EMail: hvivek@cisco.com

Keith McCloghrie
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134 USA
Phone: +1 408 526-5260
EMail: kzm@cisco.com

Silvano Gai
Nuova Systems
3 West Plumeria Drive
San Jose, CA 95134
Phone: +1 408 387-6123
EMail: sgai@nuovasystems.com

Full Copyright Statement

Copyright (C) The IETF Trust (2007).

This document is subject to the rights, licenses and restrictions contained in BCP 78, and except as set forth therein, the authors retain all their rights.

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY, THE IETF TRUST AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Intellectual Property

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in BCP 78 and BCP 79.

Copies of IPR disclosures made to the IETF Secretariat and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at ietf-ipr@ietf.org.

Acknowledgement

Funding for the RFC Editor function is currently provided by the Internet Society.

