

Internet Draft

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Fibre-Channel Zone Server MIB  
[draft-ietf-imss-fc-zs-mib-03.txt](#)

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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.

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## **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 T11.5 (<http://www.t11.org>); it is currently a work item of the IETF's IMSS working group.

This memo includes boilerplate which uses only one of the following terms, but is nevertheless required to mention all of the keywords in the following statement:

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](#)].

### **1.1. Change Log**

This section to be deleted before publication as an RFC.

#### **1.1.1. Initial version**

The initial version was submitted to T11.5 as T11/05-505v0 on 25 July 2005.

#### **1.1.2. Changes made in 19 January version**

The following changes were made for the version dated 19 January 2006, which was submitted to T11.5 as: T11/06-047v0.

- The MIB module for GS Server Sessions (T11-GS-SESSIONS-MIB) was changed to be the MIB module for Fibre Channel Fabric locks (T11-FC-FABRIC-LOCK-MIB). The t11GssSessionTable table was changed to be the t11FLockTable table, and the INDEX-ing changed to include GS\_Type and GS\_SubType values.
- Three reason code objects were added to the t11FLockTable to hold the reason code, the reason code explanation, and the reason vendor code if and when a lock request is rejected by an SW\_RJT.

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- The ability to commit Zone changes (which was in t11GssSessionTable) was not included in the t11FlockTable. Instead, it was added as a new object, t11ZsServerCommit, in the T11-FC-ZONE-SERVER-MIB.
- The descriptions of t11ZsTxChangeRequests, t11ZsRxChangeAccepts, t11ZsRxChangeRequests & t11ZsTxChangeAccepts were clarified to indicate they include Enhanced Commit Service requests/responses, and that they include requests/responses in both Basic & Enhanced modes.
- t11ZsServerDistributeFailReason was replaced by three objects t11ZsServerReasonCode, t11ZsServerReasonCodeExp and t11ZsServerReasonVendorCode to contain the individual codes separately.
- t11ZsRejectReasonVendorCode was added in the t11ZsNotifyControlTable and as an additional object in the t11ZsRequestRejectNotify notification.
- t11ZsRxGS5Requests and t11ZsTxGS5Rejects were renamed to t11ZsRxZsRequests and t11ZsTxZsRejects, their descriptions updated to be described as Zone Server requests/responses (rather than GS-5 requests/responses).

#### **1.1.3. Changes made in 5 March version**

The following changes were made for the version which was submitted to T11.5 as: T11/06-047v1, and to the IETF as: [draft-kzm-imss-fc-zs-mib-03.txt](#).

- Updated the DESCRIPTION of the t11FlockTable to mention locks via ACAs and locks via EACAs.
- Defined the t11FlockApplicationID to be used in the INDEX clause of the t11FlockTable, replacing t11FlockGsType and t11FlockGsSubType (which get deleted).
- Changed the 'gsClient' label of the t11FlockInitiatorType object to 'ssb' so as to accommodate FC-SP clients as well as GS-5 clients.
- Changed "Rx" to "In" and "Tx" to "Out" in the descriptors of Counter32's, e.g., changed t11ZsRxZsRequests to t11ZsInZsRequests.

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- Many editorial changes.

#### **1.1.4. 14 August 2006 version**

The following changes were made for the version was submitted to the IETF as: [draft-ietf-imss-fc-zs-mib-00.txt](#).

- Updated to use the assignment of 'D0'h (208 decimal) as the (pseudo) Application ID value as and when a Fabric is locked via an ACA request. This value is used to distinguish such a lock in the t11FLockTable from those established via EACA requests (which are defined to have an explicit Application ID).
- Changes to indicate the adoption of this memo as a work item of the IMSS Working Group.
- Added explicit statement to all Counter32's that they have no discontinuities other than those that all Counter32s have when sysUpTime=0.
- Updated references to FC-SW-4 to point at "ANSI INCITS 418-2006".

#### **1.1.5. 16 October 2006 version**

The following changes were made for the version was submitted to the IETF as: [draft-ietf-imss-fc-zs-mib-01.txt](#).

- Updated the value of the (pseudo) Application\_ID assigned to this MIB module, for use when a Fabric is locked via an ACA request, to be x'FF' (255). Added a paragraph in the Overview section explaining the use of this pseudo Application\_ID value and including a reference to the T11-approved letter documenting the assignment.
- Moved Copyright from one DESCRIPTION to another DESCRIPTION.
- Changed "IPSec" to "IPsec".
- In T11ZoningName, change "letter" to "ASCII letter".
- Omitted "Short" from [Section 3](#)'s title. Divided [section 3](#) up into several sub-sections with appropriate titles. Added a couple of paragraphs to the explanation of what a zone does and how it's enforced.

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- Added a DISPLAY-HINT for T11ZsZoneMemberType.
- Added a section on why the notifications don't need to be flow-controlled.
- Changed the value of t11FLockInitiator, which corresponds to t11FLockInitiatorType's value of 'snmp', to be an SNMP securityName.
- Added two new objects: t11FLockInitiatorIpAddrType and t11FLockInitiatorIpAddr to hold the IP address, if applicable and known, of the initiator.
- Expanded the DESCRIPTION of t11FLockTable to better explain when rows in this table exist, and that they are not retained over restarts.
- Changed 'rejected' to be 'rejectFailure' in t11FLockRejectReasonCode, t11FLockRejectReasonCodeExp and t11FLockRejectReasonVendorCode.
- Changed the syntax of t11FLockRejectReasonCodeExp and t11FLockRejectReasonVendorCode to allow a zero-length string.
- Changed the descriptors for two objects: t11ZsActiveBroadcast to t11ZsActiveZoneBroadcastZoning, and t11ZsActiveHardZoning to t11ZsActiveZoneHardZoning.
- Added text to the DESCRIPTIONs of the t11ZsSetZoneTable, t11ZsZoneMemberTable and t11ZsAttribBlockTable explaining their fate-sharing relationships with other tables.
- Fixed several typos.

#### **1.1.6. 8 January 2007 version**

The following changes were made for the version was submitted to the IETF as: [draft-ietf-imss-fc-zs-mib-02.txt](#).

- Inserted references to FC-SW-5 to replace the "TBD" for the reference to the assignment of an Application\_ID value for the benefit of this MIB module.
- fixed typos.

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- added IETF IMSS WG to the ORGANIZATION clause.
- Changed year in copyright dates to 2007.
- Included a reference to [RFC 3584](#).
- Updated the SIZE clause of t11ZsActiveAttribValue.
- Included a statement in t11ZsNotifyControlEntry on the persistency of read-write data in rows of the t11ZsNotifyControlTable.
- Removed the statement specifying the meaning of non-instantiated instances of t11FlockInitiatorIpAddrType & t11FlockInitiatorIpAddr, and clarified the meaning of "request" in the DESCRIPTION of t11FlockInitiatorIpAddr.

#### **[1.1.7](#). 24 January 2007 version**

The following changes were made for the version was submitted to the IETF as: [draft-ietf-imss-fc-zs-mib-03.txt](#).

- Removed all references to the incomplete FC-SW-5 specification so that this document can proceed without delay.

## **[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**

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### **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 which 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 a 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

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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., 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 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 [[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

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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 identification (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 setup 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.

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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 which 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 which 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

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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

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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 which 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 which are INDEX-ed 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

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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 t11ZsServerOperationMode object indicates whether a fabric's Zone Server is operating in Basic mode or in Enhanced mode. These two modes have a sufficient amount of commonality to make it worthwhile to have one set of MIB objects which are used for the subset of functionality which 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, t11ZsEnhancedModeGroup, 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.,

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- 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 `t11ZsServerDistribute` object. In contrast, in Enhanced mode, the distribution is an implicit part of the commit function which is initiated using the `t11ZsServerCommit` object. Thus, when operating in Enhanced mode, `t11ZsServerDistribute` has a fixed value, and when operating in Basic mode, `t11ZsServerCommit` has a fixed value.
- an example of "do not affect current operations" is: `t11ZsServerHardZoning` 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, `t11ZsActiveZoneHardZoning` specifies whether hard Zoning is enabled on a particular Zone.)

#### **5.6. Persistent Storage**

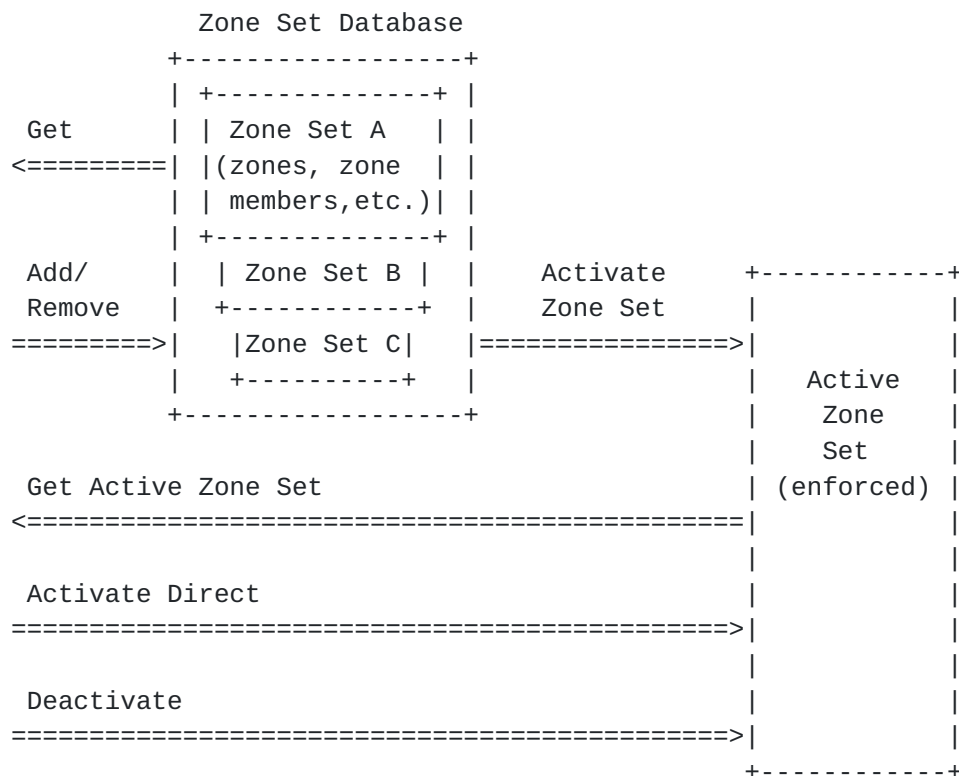
A Zone Server Database for a given fabric consists of the combination of many of the tables defined in this MIB module. In order to ensure that such a Database is consistent, this MIB module defines just one object (`t11ZsServerDatabaseStorageType`) with a syntax of `StorageType`, whose value for a given 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](#)]:

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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.

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### **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 which 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 behaviour, 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 which 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 NMS which 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 which 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. E.g., it's unreasonable to ask how many of the t11ZsDefZoneChangeNotify

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notifications can be generated in a time interval -- 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 which allow each type of notification (in the t11ZsNotificationGroup group) to be independently enabled or disabled. It also contains objects which 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 "200701080000Z"
  ORGANIZATION "For the initial versions, T11.
                For later versions, the IETF's IMSS Working Group."
  CONTACT-INFO
    "
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```



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 which 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.

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-- RFC Editor: replace yyyy with actual RFC number & remove this note itself for full legal notices."

REVISION "200701080000Z"

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## DESCRIPTION

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

-- RFC-Editor, replace yyyy with actual RFC number & remove this note

::= { mib-2 nnn } -- to be assigned by IANA

-- RFC Editor: replace nnn with IANA-assigned number & remove this note

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 setup a lock, or
- 3) a failed attempt, requested via SNMP, to setup 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 427-2006, 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 setup 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, entitled '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 either by an EACA or by 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 which 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 setup by some other means; in such a case, the value of t11FLockInitiatorType would change as and when the lock was setup 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 427-2006, 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,
    t11FLockInitiatorIpAddrType InetAddressType,
    t11FLockInitiatorIpAddr  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 which 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 which 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 which 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 which issued the Server Session Begin (SSB) which 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 which created this row. (If the row was created via SNMPv1 or SNMPv2c, then appropriate value of the snmpCommunitySecurityName is used.)"

#### REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5), ANSI INCITS 427-2006, [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.'

::= { t11FLockEntry 4 }

#### t11FLockInitiatorIpAddressType 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 t11FLockInitiatorIpAddress. If the IP address of the location of the initiator is unknown or not applicable, this object has the value: 'unknown'."

::= { t11FLockEntry 5 }

#### t11FLockInitiatorIpAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

#### DESCRIPTION

"This object specifies the IP address of the location of the initiator which established this lock via a request of the type given by the corresponding instance





of t11FLockInitiatorType. In cases where the corresponding instance of t11FLockInitiatorIpAddressType has the value: 'unknown', the value of this object is the zero-length string."

```
::= { t11FLockEntry 6 }
```

#### t11FLockStatus OBJECT-TYPE

```
SYNTAX          INTEGER {
                    active(1),
                    setUp(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.
'setup'           -- the 'managing' switch is currently
                    attempting to setup 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
                    setup the lock was rejected with
                    the reason codes given by:
                    t11FLockRejectReasonCode,
                    t11FLockRejectReasonCodeExp and
                    t11FLockRejectReasonVendorCode.
'otherFailure'    -- the 'managing' switch's attempt
                    to setup 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 'setUp'. 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 427-2006, [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 427-2006, 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 427-2006, [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 which 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 "200701080000Z"

```





ORGANIZATION "For the initial versions, T11.  
For later versions, the IETF's IMSS Working Group."

## CONTACT-INFO

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## 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 which 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 and until a 'commit'



operation. To model this behaviour, 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 which 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 which 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 de-activate it and/or activate a different one).

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```
-- RFC Editor: replace yyyy with actual RFC number & remove this note
REVISION "200701080000Z"
DESCRIPTION
    "Initial version of this MIB module, published as RFC yyyy."
-- RFC-Editor, replace yyyy with actual RFC number & remove this note
::= { mib-2 nnn } -- to be assigned by IANA
```

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-- RFC Editor: replace nnn with IANA-assigned number & remove this note

```
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 427-2006, 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

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'requestInProgress'  
- request in process  
'cmitInProgress'  
- 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 427-2006, [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)

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```
}
```

```
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 427-2006, 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 which 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
```

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## 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 which is INDEX-ed 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 427-2006, [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 which 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 which 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 completely successfully.  
'rejectFailure' - distribution/commit failed due to a 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 427-2006, [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 & 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 & 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 & 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 427-2006, [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 which 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 which 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' requests 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 which attempt to modify the copy database can not 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 427-2006, 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 which
    governs the behaviour 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 427-2006, 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 which
    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 427-2006, 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 427-2006, [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 which is INDEX-ed 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 is 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 can not 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 which is INDEX-ed 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 which 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 which 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 can not 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 which 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 which 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 fcmInstanceIndex 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 which reference a deleted row.

The StorageType of a row in this table is specified by the instance of t11ZsServerDatabaseStorageType which is INDEX-ed 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 which is INDEX-ed 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 can not 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 which reference a deleted row.

The StorageType of a row in this table is specified by the instance of t11ZsServerDatabaseStorageType which is INDEX-ed 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 an 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 which 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 can not 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 a 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 two 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 1 to 255 octet value 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 which





reference a deleted row.

The StorageType of a row in this table is specified by the instance of t11ZsServerDatabaseStorageType which is INDEX-ed 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 which 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 which is INDEX-ed 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 which 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 427-2006, 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 four bytes."

## REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),

ANSI INCITS 427-2006, [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 which 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 behaviour.

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/de-activation 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 de-activation, 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 which uniquely identifies this  
        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 which uniquely identifies this  
member amongst the members of a particular Zone  
in the active Zone Set on a particular fabric."

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```
::= { 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 which might apply zero, one, or more times to a Zone. Attributes which 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 which 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 427-2006, [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 four. For a Vendor Specific attribute value, the first 8 bytes contains the T10 Vendor ID as described in FC-GS-5."

REFERENCE

"Fibre Channel - Generic Services-5 (FC-GS-5),

ANSI INCITS 427-2006, [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  
which all Counter32's 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  
which all Counter32's 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 which all Counter32's 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 which all Counter32's 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 which all Counter32's 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 which all Counter32's 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 which all Counter32's 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 which all Counter32's 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 those received in Enhanced mode.

This counter has no discontinuities other than those which all Counter32's 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 those rejected in Enhanced mode.



This counter has no discontinuities other than those  
which all Counter32's 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  
fcmInstanceId and fcmSwitchIndex).  
  
The persistence across reboots of writable values in  
a row of this table is specified by the instance of  
t11ZsServerDatabaseStorageType which is INDEX-ed by  
the same values of fcmInstanceId, fcmSwitchIndex  
and t11ZsServerFabricIndex."  
INDEX { fcmInstanceId, 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 CT\_IU, as described in Table 2 of [[FC-GS-5](#)] (including the preamble), which was most recently rejected by the Zone 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 which 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 which implement the Zone Server."

MODULE MANDATORY-GROUPS {t11ZsBasicGroup,  
t11ZsNotificationControlGroup,  
t11ZsNotificationGroup }

GROUP t11ZsEnhancedModeGroup

DESCRIPTION

"This group is mandatory only for those systems with Zone Servers which 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 which 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,
```

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```
        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,
```

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```
        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 which 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
        behavioural changes."
    ::= { t11ZsMIBGroups 6 }

END
```



## **8. Acknowledgements**

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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.

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## **9. Normative References**

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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]**

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### **[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]

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## **11. IANA Considerations**

IANA is requested to make two MIB OID assignments, one for the T11-FC-ZONE-SERVER-MIB module, and one for the T11-FC-FABRIC-LOCK-MIB module, under the appropriate subtree(s).

## **12. 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 which 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.



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