

MIB for Fibre-Channel Security Protocols (FC-SP)

Status of This Memo

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

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 FC-SP, the Security Protocols defined for Fibre Channel.

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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 concerning the Fibre Channel Security Protocols (FC-SP), as specified in [FC-SP]. The FC-SP standard includes the definition of protocols to authenticate Fibre Channel entities, protocols to set up session keys, protocols to negotiate the parameters required to ensure frame-by-frame integrity and confidentiality, and protocols to establish and distribute policies across a Fibre Channel Fabric.

This memo was initially developed by the INCITS T11 committee (<http://www.t11.org>), which subsequently approved it for forwarding to the IETF.

This memo uses one of the following terms:

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

2. The Internet-Standard Management Framework

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

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

3. Overview of Fibre Channel

3.1. Introduction

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-2]. WWNs are expected to be persistent across agent and unit resets.

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

3.2. Zoning

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

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

Hard zoning and soft zoning are two different means of realizing this. Hard zoning is enforced in the Fabric (i.e., Switches), whereas soft zoning is enforced at the endpoints (e.g., Host Bus Adapters) 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 Addresses (e.g., the Name Server).

Administrators create Zones to increase network security, and prevent data loss or corruption, by controlling access between devices or user groups.

3.3. Virtual Fabrics

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

3.4. Security

The Fibre Channel Security Protocols (FC-SP) standard [FC-SP] describes the protocols used to implement security in a Fibre Channel Fabric, including the definition of:

- protocols to authenticate Fibre Channel entities,
- protocols to set up session keys,
- protocols to negotiate the parameters required to ensure frame-by-frame integrity and confidentiality, and
- protocols to establish and distribute (security) policies across a Fibre Channel Fabric.

3.4.1. Authentication

Two entities may negotiate whether authentication is required and which Authentication Protocol is to be used. Authentication can be used in Switch-to-Switch, Node-to-Switch, and Node-to-Node communication. The defined Authentication Protocols are able to perform mutual authentication with optional shared key establishment. The shared key computed at the end of an Authentication Transaction may be used to establish Security Associations.

The Fabric security architecture is defined for several authentication infrastructures. Secret-based, certificate-based, and password-based authentication infrastructures are accommodated. Specific authentication protocols that directly leverage these three authentication infrastructures are defined.

With a secret-based infrastructure, entities within the Fabric environment that establish a security relationship share a common secret or centralize the secret administration in an external (e.g., RADIUS [RFC2865], Diameter [RFC3588], or Terminal Access Controller Access Control System (TACACS) [RFC1492]) server. Entities may mutually authenticate with other entities by using the Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) [FC-SP]. Security Associations may be set up using the session key computed at the end of the DH-CHAP transaction.

With a certificate-based infrastructure, entities within the Fabric environment are certified by a trusted Certificate Authority (CA). The resulting certificates bind each entity to a public-private key pair that may be used to mutually authenticate with other certified entities via the Fibre Channel Certificate Authentication Protocol (FCAP) [FC-SP]. Security Associations may be set up by using these entity certificates and associated keys or by using the session key computed at the end of the FCAP transaction.

With a password-based infrastructure, entities within the Fabric environment that establish a security relationship have knowledge of the password-based credential material of other entities. Entities may use this credential material to mutually authenticate with other entities using the Fibre Channel Password Authentication Protocol (FCPAP) [FC-SP]. Security Associations may be set up using the session key computed at the end of the FCPAP transaction.

In addition to DH-CHAP, FCAP, and FCPAP, one other Authentication Protocol is defined: Internet Key Exchange Protocol version 2-AUTH (IKEv2-AUTH), which refers to the use of an SA Management Transaction of the Security Association Management Protocol (see below) to perform two functions: not only SA management but also authentication. The credentials used in an IKEv2-AUTH transaction are either strong shared secrets or certificates.

3.4.2. Security Associations

A subset of the IKEv2 protocol [RFC4306] suitable for Fibre Channel is defined as the (Fibre Channel) Security Association Management protocol [RFC4595]. This protocol -- which is *not* IPsec -- provides the means to establish Security Associations (SAs) between Fibre Channel entities. Traffic Selectors are defined to specify

which type of traffic has to be protected by which SA, and what the characteristics of the protection are. Two mechanisms are available to protect specific classes of traffic:

- ESP_Header is used to protect FC-2 frames (see [FC-FS-2] and the conceptually similar mechanisms in [RFC4303]), and
- CT_Authentication is used to protect CT_IUs (Common Transport Information Units) [FC-GS-5].

An entity protecting specific classes of traffic maintains an internal Security Association Database (SADB) that contains the currently active Security Associations and Traffic Selectors.

Each active SA has a Security Association entry in the SADB. Each SA entry includes the SA's SPI (the Security Parameters Index, which is included in frames transmitted on the SA), a Sequence Number counter, and the parameters for the selected transforms (e.g., encryption algorithm, integrity algorithm, mode of operation of the algorithms, keys).

Each active Traffic Selector has an entry in the SADB that indicates whether it is used for ingress traffic or for egress traffic. These Traffic Selector entries are ordered such that they are searched (when checking for a match) in the given order. Two types of Traffic Selector entries may be present:

- Traffic Selector entries identifying FC-2 frames or CT_IUs to be bypassed or discarded; and
- Traffic Selector entries identifying FC-2 frames or CT_IUs to be protected or verified. These entries point to the corresponding SA entry defining the parameters and the security processing to be performed.

SAs are unidirectional, but they always exist as an SA pair of the same type, one in each direction.

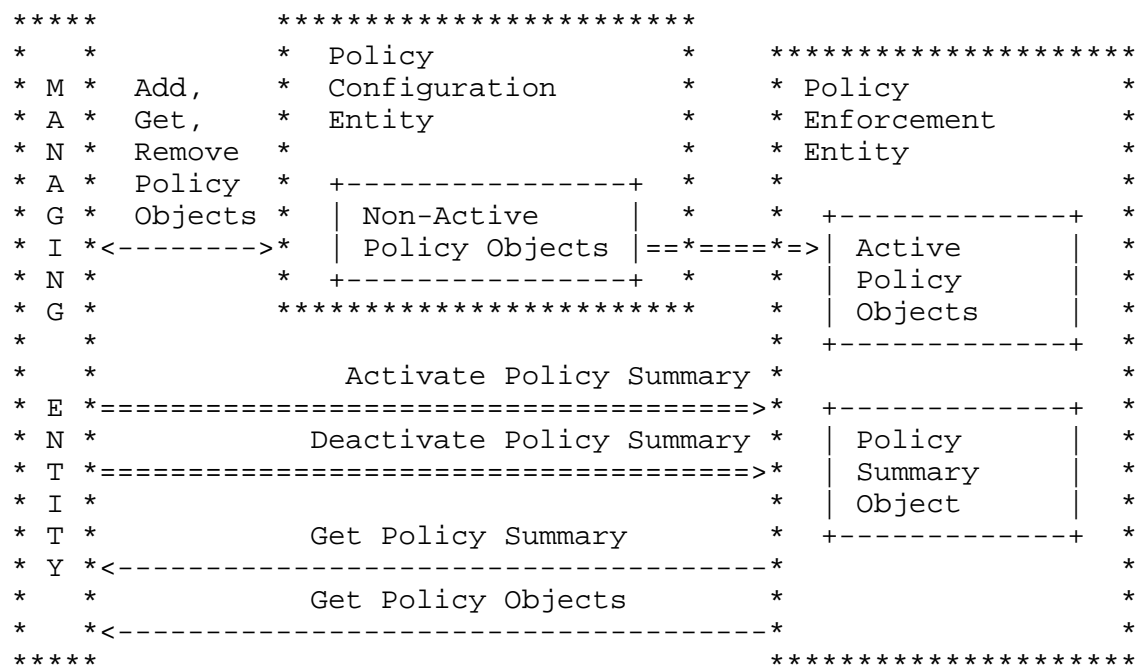
3.4.3. Fabric Security Policies

Two separate approaches to defining Policies are adopted in FC-SP, but both approaches follow the same general concept for their Policy model. One is the definition of a Policy Model for Fabric Policies that focus on Security. These Security Policies specify the membership and connectivity allowed within a Fabric, and also which IP hosts are allowed to manage a Fabric.

The other approach is to define a variant of the Enhanced Zoning model defined in [FC-SW-4] and [FC-GS-5], such that the variant specifies extensions for use in a secure environment. This variant of Zoning, denoted as "FC-SP Zoning", follows the same general concepts of the Policy model for Security Policies, but keeps Zoning management and enforcement completely independent from the management and enforcement of other policies.

3.4.4. Policy Model

Figure 25 of [FC-SP] depicts FC-SP's policy management model like this:



Note that the arrows in the picture above are used to indicate the movement of "data", rather than the direction of "messages", e.g., for a "Get" (with no data) in one direction which invokes a "Response" (typically with data) in the reverse direction, the diagram has arrows only for the "with data" direction.

3.4.5. Policy Objects

The Policies to be enforced by a Fabric are specified in a set of Policy Objects. The various types of Policy Objects are:

- The Policy Summary Object is a list of pointers to other Policy Objects, one pointer per each other active Policy Object. Each pointer in a Policy Summary Object is paired with a cryptographic hash of the referenced Policy Object.
- The Switch Membership List Object is a Fabric-wide Policy Object that defines which Switches are allowed to be part of a Fabric.
- The Node Membership List Object is a Fabric-wide Policy Object that defines which Nodes are allowed to be connected to a Fabric.
- The IP Management List Object is a Fabric-wide Policy Object that describes which IP hosts are allowed to manage a Fabric.
- A Switch Connectivity Object is a per-Switch Policy Object that describes the topology restrictions for a specific Switch; it specifies the other Switches or Nodes to which the particular Switch may be connected at the Node level and/or at the Port level.
- Attribute Objects are Fabric-wide Policy Objects that define optional attributes to be associated with Switches or Nodes. They allow the extension of this policy model by defining new attributes as required.

Note that the administratively specified name for a Fabric is contained in the Switch Membership List Object (not in the Policy Summary Object).

When FC-SP is in use, each Fabric has a set of active Policy Objects:

- one Policy Summary Object,
- one Switch Membership List Object,
- one Node Membership List Object,
- one IP Management List Object,
- zero or more Switch Connectivity Objects, and
- zero or more Attribute Objects.

The active Policy Objects specify the Policies currently being enforced. In addition, policies not currently being enforced are contained in non-active Policy Objects. To change the active Policy Objects, the non-active Policy Objects are edited as necessary and a new Policy Summary Object that includes/references the changed Policy Objects is activated.

3.4.5.1. Policy Object Names

Every Policy Object has a name. In a Fabric's database of Policy Objects, a Policy Object Name is specified as a type/length/value (see section 7.2 of [FC-SP]). The possible types are:

- Node_Name
- Restricted Node_Name
- Port_Name
- Restricted Port_Name
- Wildcard
- Negated Wildcard
- Alphanumeric Name
- IPv6 Address Range
- IPv4 Address Range

3.4.6. Three Kinds of Switches

For a Fabric composed of n Switches and m Nodes, the potential complexity of Switch Connectivity Objects is $O(n^2)$ to describe Switch to Switch connections, and $O(n*m)$ for Switch to Node connections. To provide better scaling, the Switch Connectivity Objects are not Fabric-wide information, but are distributed only to where they are needed. To support this, the policy model supports three kinds of Switches in a Fabric:

- Server Switches, which maintain the Fabric-wide Policy Objects, all the Switch Connectivity Objects, and a full copy of the FC-SP Zoning Database;
- Autonomous Switches, which maintain the Fabric-wide Policy Objects, their own Switch Connectivity Object, and a full copy of the FC-SP Zoning Database; and

- Client Switches, which maintain the Fabric-wide Policy Objects, their own Switch Connectivity Object, and a subset of the FC-SP Active Zone Set (which is the configurations of zones currently being enforced by a Fabric, see section 10.4.3.3 of [FC-SW-4]).

3.4.7. Security Policy Management

Security Policy can be changed in a server session [FC-GS-5] with a Security Policy Server. All write access to a Security Policy Server occurs within a server session. While read access to a Security Policy Server may occur at any time, the consistency of the returned data is guaranteed only inside a server session.

The Enhanced Commit Service [FC-SW-4] is used to perform Fabric operations as and when necessary (see table 144 of [FC-SP]). Many of these operations are named as if they were acronyms, e.g., SSB for Server Session Begin; SSE for Server Session End; SW_ILS for Switch Fabric Internal Link Services; EACA for Enhanced Acquire Change Authorization; ERCA for Enhanced Release Change Authorization; SFC for Stage Fabric Configuration.

Each server session begins and ends, with a SSB request and a SSE request respectively, sent to a Security Policy Server. In the Fabric, the SSB requests a lock of the Fabric via an EACA SW_ILS, while the SSE requests a release of the lock via the ERCA SW_ILS [FC-SW-4]. Active and non-active Policy Objects are persistent in that they survive after the end of a server session.

3.4.8. FC-SP Zoning

To preserve backward compatibility with existing Zoning definitions and implementations, FC-SP Zoning is defined as a variant of the Enhanced Zoning model defined in [FC-SW-4] and [FC-GS-5] that follows the general concepts of the Policy model for Security Policy Management, but keeps Zoning management and enforcement completely independent.

FC-SP Zoning allows for some Switches to retain less than a complete replicated copy of the Zoning Database, as follows:

- Server Switches maintain the policies data structures for all Switches in the Fabric plus a replica of the Zoning data structures;
- Autonomous Switches maintain only the subset of policies data structures relevant for their operations plus a replica of the Zoning Database; and

- Client Switches maintain only the subset of policies data structures and the subset of the Active Zone Set relevant for their operations.

When Client Switches are deployed in a Fabric, at least one Server Switch must also be deployed in the same Fabric. A client-server protocol allows Client Switches to dynamically retrieve the Zoning information they may require from the Server Switches.

A management application manages the Fabric Zoning configuration through the Fabric Zone Server, while other policies are managed through the Security Policy Server. A new Zoning Check Protocol replaces the Zone Merge Protocol [FC-SW-4], and new command codes are defined for the SFC SW_ILS to distribute the FC-SP Zoning configuration on a Fabric. The Zoning definitions are ordered to allow for the computation of a hash of the Active Zone Set and a hash of the Zone Set Database, plus other optional security data (e.g., for integrity protection of Zoning information).

4. Document Overview

This document defines five MIB modules that together provide the means for monitoring the operation of, and configuring some parameters of, one or more instances of the FC-SP protocols.

4.1. Fibre Channel Management Instance

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

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

4.2. Entity Name

A central capability of FC-SP is the use of an Authentication Protocol. The purpose of each of the possible Authentication Protocols is to allow a Fibre Channel entity to be assured of the identity of each entity with which it is communicating. Examples of such entities are Fibre Channel Switches and Fibre Channel Nx_Ports.

Each entity is identified by a name. The FC-MGMT-MIB [RFC4044] defines MIB objects for such names:

- for entities that are Fibre Channel Switches, the definition of a Fibre Channel management instance allows multiple Switches to be managed by the same Fibre Channel management instance. In this case, each entity is a Switch and has the name given by the MIB object, fcmSwitchWWN.
- for entities other than Fibre Channel Switches, a Fibre Channel management instance can manage only one entity, and the name of the entity is given by the MIB object, fcmInstanceWwn.

4.3. Fabric Index

With multiple Fabrics, each Fabric has its own instances of the Fabric-related management instrumentation. Thus, these MIB modules define all Fabric-related information in tables that are INDEX-ed by an arbitrary integer, named a "Fabric Index". The syntax of a Fabric Index is T11FabricIndex, imported from 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.

4.4. Interface Index

Several of the MIB modules defined in this document use the InterfaceIndexOrZero syntax in order to allow information to be specified/instantiated on a per-port/interface basis, e.g., for: statistics, Traffic Selectors, Security Associations, etc. This allows the same object to be used either when there is a separate row for each of multiple ports/interfaces, or when multiple interfaces are represented by a single row. The use of a zero value supports the simpler cases of: a) when there is only one port/interface, b) where the implementation chooses to aggregate the information for multiple ports/interfaces. The minimum (for compliance) requirement is to implement any one of the above cases.

When a Fabric Index and an object with the InterfaceIndexOrZero syntax are used together in a single INDEX clause, the InterfaceIndexOrZero object is listed before the Fabric Index in order to simplify management queries that retrieve information concerning multiple Fabrics connected to the same port/interface.

4.5. Syntax for Policy Object Names

T11FcSpPolicyNameType and T11FcSpPolicyName are two Textual Conventions defined in this document (in the T11-FC-SP-TC-MIB module) to represent the types and values of Policy Object Names (see section 3.4.5.1 above). However, two of the nine possible types are IPv4 Address Range and IPv6 Address Range. It is standard practice in MIB modules to represent all IP addresses using the standard Textual Conventions defined in [RFC4001] for IP addresses: specifically, InetAddressType and InetAddress. This document adheres to such standard practice to the following extent:

- for MIB objects representing a Policy Object Name that can *only* be an IPv4 Address Range or an IPv6 Address Range, then those MIB objects are defined as a 3-tuple: (InetAddressType, InetAddress, InetAddress), in which the first address is the low end of the range, the second address is the high end of the range, and both addresses are of the type given by InetAddressType.
- for MIB objects representing a Policy Object Name that is (possibly) of a different type, i.e., it is not (necessarily) an IPv4 or IPv6 Address Range, then those MIB objects are defined as a 2-tuple: (T11FcSpPolicyNameType, T11FcSpPolicyName), in which the first object represents the type of Policy Object Name and the second object represents the value of the Policy Object Name. For MIB objects defined in this manner, if and when they represent a range of IP addresses: a) the value of T11FcSpPolicyNameType differentiates between an IPv4 Address Range and an IPv6 Address Range; and b) the value of T11FcSpPolicyName is one string containing the concatenation of the two addresses that are the low and high addresses of the range. This is the same format as used within FC-SP Policy Objects [FC-SP].

4.6. Certificates, CAs, and CRLs

In order to authenticate with the FCAP protocol, each entity, identified by a unique Name, is provided with: a digital certificate associated with that Name, the private/public key pair that corresponds to the certificate, and with the Root Certificate (the certificate of the signing Certification Authority). To authenticate another entity, an entity is required to be provided with the certificate of the associated Certification Authority.

FCAP requires entities to support at least four Root Certificates against which received corresponding certificates can be validated. Support for certificate chains and verification of certificate chains

containing more than one certificate is optional. Entities need to be able to access a Certificate Revocation List (CRL) for each configured Root Certificate, if one is available from the CA. Certificates on the CRL are considered invalid.

The management of certificates, Certification Authorities, and Certificate Revocation Lists is the same in Fibre Channel networks as it is in other networks. Therefore, this document does not define any MIB objects for such management.

4.7. Traffic Selectors

When Traffic Selectors are compared against an ingress or egress frame in order to determine the security processing to be applied to that frame, there are circumstances in which multiple Traffic Selectors, specifying different actions, can match with the frame. Specifically, when matching against an egress frame to decide which active Security Association to transmit on, or, against an ingress frame unprotected by FC-SP, i.e., without an SPI value in it, to decide which action ('drop' or 'bypass') to apply. For these cases, the MIB includes a unique precedence value for each Traffic Selector such that the one with the numerically lowest precedence value is determined to be the one that matches. In contrast, ingress frames on active Security Associations (i.e., protected by FC-SP) are compared against the set of traffic selectors negotiated when the Security Association was set up and identified by the SPI value contained in the frame; the action taken depends on whether any Traffic Selector matches, but not on which one.

This difference between ingress and egress Traffic Selectors on active Security Associations is reflected in having separate MIB tables defined for them: the table for Traffic Selectors on egress SAs, `t11FcSpSaTSelNegOutTable`, has a precedence value in its INDEX clause; whereas the table for Traffic Selectors on ingress SAs, `t11FcSpSaTSelNegInTable`, has an arbitrary integer value in its INDEX clause. For 'drop' and 'bypass' Traffic Selectors, one table, `t11FcSpSaTSelDrByTable`, having a precedence value in its INDEX clause, is sufficient for both ingress and egress traffic.

4.8. The MIB Modules

4.8.1. The T11-FC-SP-TC-MIB Module

This MIB module defines Textual Conventions that are being, or have the potential to be, used in more than one MIB module. The module also defines Object Identifiers to identify the Cryptographic Algorithms listed in [FC-SP] so that they can be used as the value of various MIB objects that specify the algorithms being/to be used by an FC-SP implementation.

4.8.2. The T11-FC-SP-AUTHENTICATION-MIB Module

This MIB module specifies the management information required to manage FC-SP Authentication Protocols. It defines three tables:

- t11FcSpAuEntityTable -- a table of Fibre Channel entities that can be authenticated using FC-SP's Authentication Protocols, including the names, capabilities, and basic configuration parameters of the entities.
- t11FcSpAuIfStatTable -- this table has two purposes: to be a list of the mappings of a FC-SP Authentication entity onto an interface and to contain Authentication Protocol per-interface statistics.
- t11FcSpAuRejectTable -- a table of FC-SP Authentication Protocol transactions that were recently rejected.

It also defines two notifications: one for sending a reject in response to an AUTH message and another for receiving a reject in response to an AUTH message.

4.8.3. The T11-FC-SP-ZONING-MIB Module

This MIB module specifies the extensions to the T11-FC-ZONE-SERVER-MIB module [RFC4936] for the management of FC-SP Zoning Servers. Specifically, it augments three tables defined in T11-FC-ZONE-SERVER-MIB:

- t11FcSpZsServerTable -- to this table, it adds FC-SP Zoning information defined for Zone Servers.
- t11ZsStatsTable -- to this table, it adds FC-SP Zoning statistics for Zone Servers.
- t11ZsNotifyControlTable -- to this table, it adds control information for FC-SP Zoning notifications.

It also defines two FC-SP Zoning notifications: one for success and one for failure in the joining of two Fabrics.

4.8.4. The T11-FC-SP-POLICY-MIB Module

This MIB module specifies management information that is used to manage FC-SP policies. The MIB module has five parts:

- Active Policy Objects - read-only MIB objects representing the set of active Policy Objects for each Fabric;
- Activate/Deactivate Operations - read-write MIB objects for invoking operations, either 1) to activate policies that are specified as a set of non-active Policy Objects, or 2) to deactivate the currently active policies; also included are objects giving the status of invoked operations;
- Non-Active Policy Objects - read-create MIB objects to create and modify non-active Policy Objects;
- Statistics for FC-SP Security Policy Servers;
- The definition and control of notifications for the success or failure of the activation or deactivation of FC-SP policies.

4.8.5. The T11-FC-SP-SA-MIB Module

This MIB module specifies the management information required to manage Security Associations established via FC-SP. All of the tables in this MIB module are INDEX-ed by `t11FcSpSaIfIndex`, with syntax `InterfaceIndexOrZero`, which is either non-zero for a specific interface or zero for all (of the management instance's) interfaces to the particular Fabric.

The MIB module consists of six parts:

- a per-Fabric table, `t11FcSpSaIfTable`, of capabilities, parameters, status information, and counters; the counters include non-transient aggregates of per-SA transient counters;
- three tables, `t11FcSpSaPropTable`, `t11FcSpSaTSelPropTable`, and `t11FcSpSaTransTable`, specifying the proposals for an FC-SP entity acting as an `SA_Initiator` to present to the `SA_Responder` during the negotiation of Security Associations. The same information is also used by an FC-SP entity acting as an `SA_Responder` to decide what to accept during the negotiation of

Security Associations. One of these tables, `t11FcSpSaTransTable`, is used not only for information about security transforms to propose and to accept, but also as agreed upon during the negotiation of Security Associations;

- a table, `t11FcSpSaTSelDrByTable`, of Traffic Selectors having the security action of 'drop' or 'bypass' to be applied either to ingress traffic, which is unprotected by FC-SP, or to all egress traffic;
- four tables, `t11FcSpSaPairTable`, `t11FcSpSaTSelNegInTable`, `t11FcSpSaTSelNegOutTable`, and `t11FcSpSaTSelSpiTable`, containing information about active bidirectional pairs of Security Associations; in particular, `t11FcSpSaPairTable` has one row per active bidirectional SA pair, `t11FcSpSaTSelNegInTable` and `t11FcSpSaTSelNegOutTable` contain information on the Traffic Selectors negotiated on the SAs, and the `t11FcSpSaTSelSpiTable` is an alternate lookup table such that the Traffic Selector(s) in use on a particular Security Association can be quickly determined based on its (ingress) SPI value;
- a table, `t11FcSpSaControlTable`, of control and other information concerning the generation of notifications for events related to FC-SP Security Associations;
- one notification, `t11FcSpSaNotifyAuthFailure`, generated on the occurrence of an Authentication failure for a received FC-2 or CT_IU frame.

4.9. Rate Control for Notifications

All but one of the notifications defined in the five MIB modules in this document are notifications that are generated based on events occurring in the "control plane", e.g., notifications that are generated at the frequency of operator-initiated activities. The one exception is `t11FcSpSaNotifyAuthFailure`, which is generated based on an event occurring in the "data plane", and could (in a worst case scenario) occur for every received ingress frame. Therefore, a method of rate controlling the generation of notifications is needed for `t11FcSpSaNotifyAuthFailure`, but not for any of the other notifications.

For `t11FcSpSaNotifyAuthFailure`, rate control is achieved by specifying that a) after the first occurrence of an Authentication failure on any particular Security Association, the SNMP notifications for second and subsequent failures are suppressed for the duration of a time window and b) that even the notification for the first occurrence is suppressed after it is sent in the same time

window for a configured (in `t11FcSpSaControlMaxNotifs`) number of Security Associations within a Fabric. Note that while these suppressions prevent the network from being flooded with notifications, the Authentication Failures themselves must still be detected and counted.

The length of the time window is given by `t11FcSpSaControlWindow`, a read-write object in the `t11FcSpSaControlTable`. If and when the time since the last generation of the notification is less than the value of `sysUpTime` (e.g., if one or more notifications have occurred since the last re-initialization of the management system), then `t11FcSpSaControlElapsed` and `t11FcSpSaControlSuppressed` contain the elapsed time since the last notification and the number of notifications suppressed in the window after sending the last one, respectively. Otherwise, `t11FcSpSaControlElapsed` contains the value of `sysUpTime` and `t11FcSpSaControlSuppressed` has the value zero.

5. Relationship to Other MIB Modules

The first standardized MIB module for Fibre Channel [RFC2837] was focused on Fibre Channel Switches. It was obsoleted by the more generic Fibre Channel Management MIB [RFC4044], which defines basic information for Fibre Channel Nodes and Switches, including extensions to the standard IF-MIB [RFC2863] for Fibre Channel interfaces. Several other MIB modules have since been defined to extend [RFC4044] for various specific Fibre Channel functionality, (e.g., [RFC4438], [RFC4439], [RFC4625], [RFC4626], [RFC4747], [RFC4936], [RFC4935], and [RFC4983]).

The MIB modules defined in this memo further extend [RFC4044] to cover the operation of Fibre Channel Security Protocols, as specified in [FC-SP].

One part of the FC-SP specification is "FC-SP Zoning", which is an extension/variant of the Fibre Channel Zoning defined in [FC-GS-5]. Management information for the latter is defined in the `T11-FC-ZONE-SERVER-MIB` module [RFC4936]. Consequently, the `T11-FC-SP-ZONING-MIB` module defined in this document defines the extensions to the `T11-FC-ZONE-SERVER-MIB` module that are needed to manage FC-SP Zoning.

The MIB modules in this memo import some common Textual Conventions from `T11-TC-MIB`, defined in [RFC4439], and from `INET-ADDRESS-MIB`, defined in [RFC4001].

If the RADIUS protocol is used for access to an external server, information about RADIUS Servers is likely to be available from the `RADIUS-AUTH-CLIENT-MIB` [RFC4668].

6. MIB Module Definitions

6.1. The T11-FC-SP-TC-MIB Module

T11-FC-SP-TC-MIB DEFINITIONS ::= BEGIN

IMPORTS

```
MODULE-IDENTITY, OBJECT-IDENTITY, mib-2,
Unsigned32          FROM SNMPv2-SMI          -- [RFC2578]
TEXTUAL-CONVENTION FROM SNMPv2-TC;          -- [RFC2579]
```

t11FcTcMIB MODULE-IDENTITY

LAST-UPDATED "200808200000Z"

ORGANIZATION "This MIB module was developed through the coordinated effort of two organizations: T11 began the development and the IETF (in the IMSS Working Group) finished it."

CONTACT-INFO

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DESCRIPTION

"This MIB module defines Textual Conventions for use in the multiple MIB modules, which together define the instrumentation for an implementation of the Fibre Channel Security Protocols (FC-SP) specification.

This MIB module also defines Object Identities (for use as possible values of MIB objects with syntax AutonomousType), including OIDs for the Cryptographic Algorithms defined in FC-SP.

Copyright (C) The IETF Trust (2008). This version of this MIB module is part of RFC 5324; see the RFC itself for full legal notices."

REVISION "200808200000Z"

DESCRIPTION

"Initial version of this MIB module, published as RFC 5324."
::= { mib-2 175 }

```

t11FcSpIdentities OBJECT IDENTIFIER ::= { t11FcTcMIB 1 }
t11FcSpAlgorithms OBJECT IDENTIFIER ::= { t11FcSpIdentities 1 }

--
-- Textual Conventions
--

T11FcSpPolicyHashFormat ::= TEXTUAL-CONVENTION
    STATUS         current
    DESCRIPTION
        "Identifies a cryptographic hash function used to create
        a hash value that summarizes an FC-SP Policy Object.

        Each definition of an object with this TC as its syntax
        must be accompanied by a corresponding definition of an
        object with T11FcSpPolicyHashValue as its syntax, and
        containing the hash value.

        The first two cryptographic hash functions are:

                Hash Type      Hash Tag      Hash Length (Bytes)
                SHA-1          '00000001'h      20
                SHA-256       '00000002'h      32
        "
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 7.1.3.1 and table 106.
        - FIPS PUB 180-2."
    SYNTAX         OCTET STRING (SIZE (4))

T11FcSpPolicyHashValue ::= TEXTUAL-CONVENTION
    STATUS         current
    DESCRIPTION
        "Represents the value of the cryptographic hash function
        of an FC-SP Policy Object.

        Each definition of an object with this TC as its syntax
        must be accompanied by a corresponding definition of an
        object with T11FcSpPolicyHashFormat as its syntax.
        The corresponding object identifies the cryptographic
        hash function used to create the hash value."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 7.1.3.1 and table 106."
    SYNTAX         OCTET STRING (SIZE (0..64))

```

T11FcSpHashCalculationStatus ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"When some kind of 'database' is defined in a set of read-write MIB objects, it is common that multiple changes in the data need to be made at the same time. So, if hash values are maintained for that data, those hash values are only correct if and when they are re-calculated after every change. In such circumstances, the use of an object with this syntax allows the re-calculation of the hash values to be deferred until all changes have been made, and therefore the calculation need only be done once after all changes, rather than repeatedly/after each individual change.

The definition of an object defined using this TC is required to specify which one or more instances of which MIB objects contain the hash values operated upon (or whose status is given) by the value of this TC.

When read, the value of an object with this syntax is either:

correct -- the identified MIB object instance(s)
 contain the correct hash values; or
stale -- the identified MIB object instance(s)
 contain stale (possibly incorrect) values.

Writing a value of 'calculate' is a request to re-calculate and update the values of the corresponding instances of the identified MIB objects. Writing a value of 'correct' or 'stale' to this object is an error (e.g., 'wrongValue')."

SYNTAX INTEGER {
 calculate(1),
 correct(2),
 stale(3)
 }

T11FcSpAuthRejectReasonCode ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A reason code contained in an AUTH_Reject message, or in an SW_RJT (rejecting an AUTH_ILS), or in an LS_RJT (rejecting an AUTH-ELS)."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, Table 17, 48, 52."

SYNTAX INTEGER {

```
        authFailure(1),
        logicalError(2),
        logicalBusy(3),
        authILSNotSupported(4),
        authELSNNotSupported(5),
        notLoggedIn(6)
    }
```

T11FcSpAuthRejReasonCodeExp ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A reason code explanation contained in an AUTH_Reject message, or in an SW_RJT (rejecting an AUTH_ILS), or in an LS_RJT (rejecting an AUTH-ELS)."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, Tables 18, 48, 52."

SYNTAX

```
    INTEGER {
        authMechanismNotUsable(1),
        dhGroupNotUsable(2),
        hashFunctionNotUsable(3),
        authTransactionAlreadyStarted(4),
        authenticationFailed(5),
        incorrectPayload(6),
        incorrectAuthProtocolMessage(7),
        restartAuthProtocol(8),
        authConcatNotSupported(9),
        unsupportedProtocolVersion(10),
        logicalBusy(11),
        authILSNotSupported(12),
        authELSNNotSupported(13),
        notLoggedIn(14)
    }
```

T11FcSpHashFunctions ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A set of zero, one, or more hash functions defined for use in FC-SP."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, Table 14."

SYNTAX

```
    BITS {
        md5(0),
        sha1(1)
    }
```

T11FcSpSignFunctions ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
 "A set of zero, one, or more signature functions defined
 for signing certificates for use with FCAP in FC-SP."
REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, tables 38 & 39."
SYNTAX BITS {
 rsaSha1(0)
}

T11FcSpDhGroups ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
 "A set of zero, one, or more DH Groups defined for use
 in FC-SP."
REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, Table 15."
SYNTAX BITS {
 null(0),
 group1024(1),
 group1280(2),
 group1536(3),
 group2048(4),
 group3072(5),
 group4096(6),
 group6144(7),
 group8192(8)
}

T11FcSpPolicyObjectType ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
 "A value that identifies the type of an FC-SP Policy
 Object."
REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, Table 102."
SYNTAX INTEGER {
 summary(1),
 switchMemberList(2),
 nodeMemberList(3),
 switchConnectivity(4),


```

        ipMgmtList(5),
        attribute(6)
    }

```

T11FcSpPolicyNameType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The format and usage of a companion object having
T11FcSpPolicyName as its syntax.

Six of the values indicate the same format, i.e., they
differ only in semantics. That common format is a Fibre
Channel 'Name_Identifier', i.e., the same syntax as
'FcNameIdOrZero (SIZE(8))'.

These six are three pairs of one restricted and one
unrestricted. Each usage of this syntax must specify
what the meaning of 'restricted' is for that usage and
how the characteristics and behavior of restricted
names differ from unrestricted names.

The six are:

- 'nodeName' - a Node_Name, which is the
Name_Identifier associated
with a Fibre Channel Node.
- 'restrictedNodeName' - a Restricted Node_Name.
- 'portName' - the Name_Identifier associated
with a Fibre Channel Port.
- 'restrictedPortName' - a Restricted Port_Name.
- 'wildcard' - a Wildcard value that is used to
identify 'all others' (typically,
all other members of a Policy
Object, not all other Policy
Objects).
- 'restrictedWildcard' - a Restricted Wildcard value.

Other possible values are:

- 'alphaNumericName' - the value begins with an ASCII
letter (upper or lower case) followed by (0 ... 63)
characters from the set: lower case letters, upper case
letters, digits, and the four symbols: dollar-sign (\$),

dash (-), caret (^), and underscore (_).

'ipv6AddressRange' - two IPv6 addresses in network byte order, the numerically smallest first and the numerically largest second; total length is 32 bytes.

'ipv4AddressRange' - two IPv4 addresses in network byte order, the numerically smallest first and the numerically largest second; total length is 8 bytes."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, Table 103."

SYNTAX INTEGER {
 nodeName(1),
 restrictedNodeName(2),
 portName(3),
 restrictedPortName(4),
 wildcard(5),
 restrictedWildcard(6),
 alphaNumericName(7),
 ipv6AddressRange(8),
 ipv4AddressRange(9)
 }

T11FcSpPolicyName ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A syntax used, when defining Policy Objects, for the name of something.

An object that uses this syntax always identifies a companion object with syntax T11FcSpPolicyNameType such that the companion object specifies the format and usage of the object with this syntax.

When the companion object has the value 'wildcard' or 'restrictedWildcard', the value of the T11FcSpPolicyName object is: '0000000000000000'h."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, Table 103."

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

T11FcSpAlphaNumName ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A syntax used when defining Policy Objects for the name of something, where the name is always in the format specified by:

```
T11FcSpPolicyNameType = 'alphaNumericName'
"
```

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, Table 103."

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

```
T11FcSpAlphaNumNameOrAbsent ::= TEXTUAL-CONVENTION
```

```
STATUS current
```

DESCRIPTION

"An extension of the T11FcSpAlphaNumName TC with one additional possible value: the zero-length string to indicate the absence of a name."

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

```
T11FcSaDirection ::= TEXTUAL-CONVENTION
```

```
STATUS current
```

DESCRIPTION

"The direction of frame transmission on a Security Association. Note that Security Associations are unidirectional, but they always exist as part of an SA pair of the same type in opposite directions."

```
SYNTAX INTEGER { ingress(1), egress(2) }
```

```
T11FcSpiIndex ::= TEXTUAL-CONVENTION
```

```
STATUS current
```

DESCRIPTION

"An SPI (Security Parameter Index) value is carried in the SPI field of a frame protected by the ESP_Header. An SPI is also carried in the SAID field of a Common Transport Information Unit (CT_IU) protected by CT_Authentication. An SPI value identifies the Security Association on which the frame is being transmitted."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 4.7.2 and 4.7.3."

```
SYNTAX Unsigned32 (0..4294967295) -- the default range!!
```

```
T11FcSpPrecedence ::= TEXTUAL-CONVENTION
```

```
DISPLAY-HINT "d"
```

```
STATUS current
```

DESCRIPTION

"The precedence of a Traffic Selector. If a frame matches with two or more Traffic Selectors, then the match that takes precedence is the one with the Traffic Selector having the numerically smallest precedence value. Note that precedence values are not necessarily contiguous."

SYNTAX Unsigned32 (0..4294967295) -- the default range!!

T11FcRoutingControl ::= TEXTUAL-CONVENTION

DISPLAY-HINT "1x"

STATUS current

DESCRIPTION

"A value stored in the R_CTL (Routing Control) 8-bit field of an FC-2 frame containing routing and information bits to categorize the frame function.

For FC-2 frames, an R_CTL value typically distinguishes between control versus data frames and/or solicited versus unsolicited frames, and in combination with the TYPE field (see T11FcSpType), identifies a particular link-layer service/protocol using FC-2.

For CT_Authentication, the information field in the R_CTL field contains '02'h for Request CT_IUs and '03'h for Response CT_IUs.

The comparison of two values having this syntax is done by treating each string as an 8-bit numeric value."

REFERENCE

- "- Fibre Channel - Framing and Signaling-2 (FC-FS-2), ANSI INCITS 424-2007, Project T11/1619-D, February 2007, section 9.3.
- Fibre Channel - Generic Services-5 (FC-GS-5), ANSI INCITS 427-2006, sections 4.5.2.4.2, 4.5.2.4.3 and table 12."

SYNTAX OCTET STRING (SIZE(1))

T11FcSpType ::= TEXTUAL-CONVENTION

DISPLAY-HINT "2x"

STATUS current

DESCRIPTION

"A value, or combination of values, contained in a frame header used in identifying the link layer service/protocol of a frame. The value is always two octets:

- for FC-2 frames, the first octet is zero and the second octet contains the Data structure type (TYPE) value defined by FC-FS-2. The TYPE value is used in combination with T11FcRoutingControl to identify a link

layer service/protocol.

- for Common Transport Information Units (CT_IUs), the first octet contains a GS_Type value and the second octet contains a GS_Subtype value, defined by FC-GS-5.

The comparison of two values having this syntax is done by treating each string as the numeric value obtained by numerically combining the individual octet's value as follows:

$$(256 * \text{1st-octet}) + \text{2nd-octet}$$

"

REFERENCE

- "- Fibre Channel - Framing and Signaling-2 (FC-FS-2), ANSI INCITS 424-2007, Project T11/1619-D, February 2007, section 9.6.
- Fibre Channel - Generic Services-5 (FC-GS-5), ANSI INCITS 427-2006, sections 4.3.2.4 and 4.3.2.5."

SYNTAX OCTET STRING (SIZE(2))

T11FcSpTransforms ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A list of the standardized transforms that are defined by FC-SP for use with ESP_Header, CT_Authentication, and/or IKEv2 Support."

REFERENCE

- "- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, Appendix A.3.1, tables A.23, A.24, A.25, A.26."

SYNTAX BITS {
 encrNull(0),
 encrAesCbc(1),
 encrAesCtr(2),
 encrAesGcm(3),
 encr3Des(4),
 prfHmacMd5(5),
 prfHmacSha1(6),
 prfAesCbc(7),
 authHmacMd5L96(8),
 authHmacSha1L96(9),
 authHmacMd5L128(10),
 authHmacSha1L160(11),
 encrNullAuthAesGmac(12),
 dhGroups1024bit(13),
 dhGroups2048bit(14)
 }

```
T11FcSpSecurityProtocolId ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "A Security Protocol identifier to identify
        the protocol by which traffic is to be protected,
        e.g., ESP_Header or CT_Authentication."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 6.3.2.2 and table 67."
    SYNTAX           INTEGER { espHeader(1), ctAuth(2) }

T11FcSpLifetimeLeft ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "This TC is used for one object of an associated pair
        of objects. The object with this syntax specifies a
        remaining lifetime of something, e.g., of an SA, where
        the lifetime is given in the units specified by the other
        object of the pair which has T11FcSpLifetimeLeftUnits
        as its syntax."
    SYNTAX           Unsigned32

T11FcSpLifetimeLeftUnits ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "An object, defined using T11FcSpLifetimeLeft TC as
        its syntax, is required to be one of an associated
        pair of objects such that the other object of the pair
        is defined with this T11FcSpLifetimeLeftUnits TC as
        its syntax and with its value specifying the
        units of the remaining lifetime given by the
        value of the T11FcSpLifetimeLeft object."
    SYNTAX           INTEGER {
                        seconds(1),          -- seconds
                        kiloBytes(2),        -- 10^3 bytes
                        megaBytes(3),        -- 10^6 bytes
                        gigaBytes(4),        -- 10^9 bytes
                        teraBytes(5),        -- 10^12 bytes
                        petaBytes(6),        -- 10^15 bytes
                        exaBytes(7),         -- 10^18 bytes
                        zettaBytes(8),       -- 10^21 bytes
                        yottaBytes(9),       -- 10^24 bytes
                        }

--
-- Object Identities to identify the Cryptographic Algorithms
-- listed in FC-SP.
```

--

```
t11FcSpEncryptAlgorithms
    OBJECT IDENTIFIER ::= { t11FcSpAlgorithms 1 }

t11FcSpEncrNull OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION     "The ENCR_NULL algorithm."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
           Fibre Channel - Security Protocols (FC-SP),
           February 2007, Table 70."
    ::= { t11FcSpEncryptAlgorithms 1 }

t11FcSpEncrAesCbc OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION     "The ENCR_AES_CBC algorithm."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
           Fibre Channel - Security Protocols (FC-SP),
           February 2007, Table 70."
    ::= { t11FcSpEncryptAlgorithms 2 }

t11FcSpEncrAesCtr OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION     "The ENCR_AES_CTR algorithm."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
           Fibre Channel - Security Protocols (FC-SP),
           February 2007, Table 70."
    ::= { t11FcSpEncryptAlgorithms 3 }

t11FcSpEncrAesGcm OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION     "The ENCR_AES_GCM algorithm."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
           Fibre Channel - Security Protocols (FC-SP),
           February 2007, Table 70."
    ::= { t11FcSpEncryptAlgorithms 4 }

t11FcSpEncr3Des OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION     "The ENCR_3DES algorithm."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
           Fibre Channel - Security Protocols (FC-SP),
           February 2007, Table 70."
```

```
 ::= { t11FcSpEncryptAlgorithms 5 }

t11FcSpAuthAlgorithms
  OBJECT IDENTIFIER ::= { t11FcSpAlgorithms 2 }

t11FcSpAuthNull OBJECT-IDENTITY
  STATUS          current
  DESCRIPTION     "The AUTH_NONE algorithm."
  REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
      Fibre Channel - Security Protocols (FC-SP),
      February 2007, Table 72."
  ::= { t11FcSpAuthAlgorithms 1 }

t11FcSpAuthHmacMd5L96 OBJECT-IDENTITY
  STATUS          current
  DESCRIPTION     "The AUTH_HMAC_MD5_96 algorithm."
  REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
      Fibre Channel - Security Protocols (FC-SP),
      February 2007, Table 72."
  ::= { t11FcSpAuthAlgorithms 2 }

t11FcSpAuthHmacShalL96 OBJECT-IDENTITY
  STATUS          current
  DESCRIPTION     "The AUTH_HMAC_SHA1_96 algorithm."
  REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
      Fibre Channel - Security Protocols (FC-SP),
      February 2007, Table 72."
  ::= { t11FcSpAuthAlgorithms 3 }

t11FcSpAuthHmacMd5L128 OBJECT-IDENTITY
  STATUS          current
  DESCRIPTION     "The AUTH_HMAC_MD5_128 algorithm."
  REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
      Fibre Channel - Security Protocols (FC-SP),
      February 2007, Table 72."
  ::= { t11FcSpAuthAlgorithms 4 }

t11FcSpAuthHmacShalL160 OBJECT-IDENTITY
  STATUS          current
  DESCRIPTION     "The AUTH_HMAC_SHA1_160 algorithm."
  REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
      Fibre Channel - Security Protocols (FC-SP),
      February 2007, Table 72."
```



```

 ::= { t11FcSpAuthAlgorithms 5 }

t11FcSpEncrNullAuthAesGmac OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "The ENCR_NULL_AUTH_AES_GMAC algorithm."
    REFERENCE   "- ANSI INCITS 426-2007, T11/Project 1570-D,
                  Fibre Channel - Security Protocols (FC-SP),
                  February 2007, Table 70."
 ::= { t11FcSpEncryptAlgorithms 6 }

END

```

6.2. The T11-FC-SP-AUTHENTICATION-MIB Module

```

--*****
-- FC-SP Authentication Protocols
--

T11-FC-SP-AUTHENTICATION-MIB  DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, OBJECT-IDENTITY,
    NOTIFICATION-TYPE,
    mib-2, Counter32, Unsigned32
        FROM SNMPv2-SMI -- [RFC2578]
    MODULE-COMPLIANCE, OBJECT-GROUP,
    NOTIFICATION-GROUP
        FROM SNMPv2-CONF -- [RFC2580]
    StorageType, AutonomousType,
    TruthValue, TimeStamp
        FROM SNMPv2-TC -- [RFC2579]
    InterfaceIndex
        FROM IF-MIB -- [RFC2863]
    fcmInstanceIndex,
    FcNameIdOrZero
        FROM FC-MGMT-MIB -- [RFC4044]
    t11FamLocalSwitchWwn
        FROM T11-FC-FABRIC-ADDR-MGR-MIB -- [RFC4439]
    T11FabricIndex
        FROM T11-TC-MIB -- [RFC4439]
    T11FcSpDhGroups,
    T11FcSpHashFunctions,
    T11FcSpSignFunctions,
    T11FcSpLifetimeLeft,
    T11FcSpLifetimeLeftUnits,
    T11FcSpAuthRejectReasonCode,
    T11FcSpAuthRejReasonCodeExp
        FROM T11-FC-SP-TC-MIB;

t11FcSpAuthenticationMIB MODULE-IDENTITY
    LAST-UPDATED "200808200000Z"
    ORGANIZATION "This MIB module was developed through the

```

coordinated effort of two organizations:
T11 began the development and the IETF (in
the IMSS Working Group) finished it."

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DESCRIPTION

"This MIB module specifies the management information
required to manage the Authentication Protocols defined by
Fibre Channel's FC-SP specification.

This MIB module defines three tables:

- t11FcSpAuEntityTable is a table of Fibre Channel
entities that can be authenticated using FC-SP's
Authentication Protocols.
- t11FcSpAuIfStatTable is a table with one row for each
mapping of an Authentication entity onto an interface,
containing statistics information.
- t11FcSpAuRejectTable is a table of volatile information
about FC-SP Authentication Protocol transactions
that were most recently rejected.

Copyright (C) The IETF Trust (2008). This version
of this MIB module is part of RFC 5324; see the RFC
itself for full legal notices."

REVISION "200808200000Z"

DESCRIPTION

"Initial version of this MIB module, published as RFC 5324."
::= { mib-2 176 }

t11FcSpAuMIBNotifications

OBJECT IDENTIFIER ::= { t11FcSpAuthenticationMIB 0 }

t11FcSpAuMIBObjects

OBJECT IDENTIFIER ::= { t11FcSpAuthenticationMIB 1 }

t11FcSpAuMIBConformance

OBJECT IDENTIFIER ::= { t11FcSpAuthenticationMIB 2 }

```
t11FcSpAuMIBIdentities
    OBJECT IDENTIFIER ::= { t11FcSpAuthenticationMIB 3 }

--
-- OIDs defined for use as values of t11FcSpAuServerProtocol
--

t11FcSpAuServerProtocolRadius OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "This OID identifies RADIUS as the protocol used
        to communicate with an External Server as part of
        the process by which identities are verified.
        In this case, information about the RADIUS Servers
        is likely to be provided in radiusAuthServerExtTable
        defined in the RADIUS-AUTH-CLIENT-MIB."
    REFERENCE
        "radiusAuthServerExtTable in 'RADIUS Authentication
        Client MIB', RFC 4668, August 2006."
    ::= { t11FcSpAuMIBIdentities 1 }

t11FcSpAuServerProtocolDiameter OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "This OID identifies Diameter as the protocol used
        to communicate with an External Server as part of
        the process by which identities are verified."
    REFERENCE
        "RFC 3588, September 2003."
    ::= { t11FcSpAuMIBIdentities 2 }

t11FcSpAuServerProtocolTacacs OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "This OID identifies TACACS as the protocol used
        to communicate with an External Server as part of
        the process by which identities are verified."
    REFERENCE
        "RFC 1492, July 1993."
    ::= { t11FcSpAuMIBIdentities 3 }

--
-- Configuration for the Authentication Protocols
--

t11FcSpAuEntityTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF T11FcSpAuEntityEntry
    MAX-ACCESS      not-accessible
```

STATUS current

DESCRIPTION

"A table of Fibre Channel entities that can be authenticated using FC-SP's Authentication Protocols.

The purpose of an FC-SP Authentication Protocol is to verify that a claimed name is associated with the claiming entity. The Authentication Protocols can be used to authenticate Nx_Ports, B_Ports, or Switches."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 3.2.25."

::= { t11FcSpAuMIBObjects 1 }

t11FcSpAuEntityEntry OBJECT-TYPE

SYNTAX T11FcSpAuEntityEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about the configuration and capabilities of an FC-SP entity (which is managed within the Fibre Channel management instance identified by fcmInstanceIndex) on a particular Fabric with respect to FC-SP's Authentication Protocols."

INDEX { fcmInstanceIndex, t11FcSpAuEntityName,
t11FcSpAuFabricIndex }

::= { t11FcSpAuEntityTable 1 }

T11FcSpAuEntityEntry ::= SEQUENCE {

t11FcSpAuEntityName FcNameIdOrZero,

t11FcSpAuFabricIndex T11FabricIndex,

t11FcSpAuServerProtocol Autonomoustype,

-- Config parameters

t11FcSpAuStorageType StorageType,

t11FcSpAuSendRejNotifyEnable TruthValue,

t11FcSpAuRcvRejNotifyEnable TruthValue,

t11FcSpAuDefaultLifetime T11FcSpLifetimeLeft,

t11FcSpAuDefaultLifetimeUnits T11FcSpLifetimeLeftUnits,

t11FcSpAuRejectMaxRows Unsigned32,

-- Capabilities

t11FcSpAuDhChapHashFunctions T11FcSpHashFunctions,

t11FcSpAuDhChapDhGroups T11FcSpDhGroups,

t11FcSpAuFcapHashFunctions T11FcSpHashFunctions,

t11FcSpAuFcapCertsSignFunctions T11FcSpSignFunctions,

t11FcSpAuFcapDhGroups T11FcSpDhGroups,

t11FcSpAuFcpapHashFunctions T11FcSpHashFunctions,

t11FcSpAuFcpapDhGroups T11FcSpDhGroups

```
}
```

```
t11FcSpAuEntityName OBJECT-TYPE
```

```
SYNTAX      FcNameIdOrZero (SIZE (8))
```

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

```
STATUS      current
```

```
DESCRIPTION
```

```
"The name used to identify the FC-SP entity.
```

```
For entities that are Fibre Channel Switches, this value
corresponds to the Switch's value of fcmSwitchWWN. For
entities other than Fibre Channel Switches, this value
corresponds to the value of fcmInstanceWwn for the
corresponding Fibre Channel management instance."
```

```
REFERENCE
```

- "- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.3.3.
- fcmInstanceWwn & fcmSwitchWWN,
'Fibre Channel Management MIB', RFC 4044, May 2005."

```
::= { t11FcSpAuEntityEntry 1 }
```

```
t11FcSpAuFabricIndex OBJECT-TYPE
```

```
SYNTAX      T11FabricIndex
```

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

```
STATUS      current
```

```
DESCRIPTION
```

```
"An index value that uniquely identifies a
particular Fabric to which the entity is attached."
```

```
::= { t11FcSpAuEntityEntry 2 }
```

```
t11FcSpAuServerProtocol OBJECT-TYPE
```

```
SYNTAX      AutonomousType
```

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

```
STATUS      current
```

```
DESCRIPTION
```

```
"The protocol, if any, used by the entity to communicate
with a third party (i.e., an External Server) as part of
the process by which it verifies DH-CHAP responses. For
example, if the entity is using an external RADIUS server
to verify DH-CHAP responses, then this object will have
the value t11FcSpAuServerProtocolRadius.
```

```
The value, zeroDotZero, is used to indicate that no
protocol is being used to communicate with a third
party to verify DH-CHAP responses.
```

```
When no protocol is being used, or if the third party is
```

unreachable via the specified protocol, then locally
configured information (if any) may be used instead."
 ::= { t11FcSpAuEntityEntry 3 }

t11FcSpAuStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object specifies the memory realization of
configuration information related to an FC-SP
Entity on a particular Fabric: specifically, for
MIB objects in the row containing this object.

Even if an instance of this object has the value
'permanent(4)', none of the information in the
corresponding row of this table needs to be writable."

::= { t11FcSpAuEntityEntry 4 }

t11FcSpAuSendRejNotifyEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"An indication of whether or not the entity should issue
t11FcSpAuRejectSentNotify notifications when sending
AUTH_Reject/SW_RJT/LS_RJT to reject an AUTH message.

If the value of the object is 'true', then this type of
notification is generated. If the value is 'false',
this type of notification is not generated."

DEFVAL { false }

::= { t11FcSpAuEntityEntry 5 }

t11FcSpAuRcvRejNotifyEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"An indication of whether or not the entity should issue
t11FcSpAuRejectReceivedNotify notifications on the receipt
of AUTH_Reject/SW_RJT/LS_RJT messages.

If the value of the object is 'true', then this type of
notification is generated. If the value is 'false',
this type of notification is not generated."

DEFVAL { false }

::= { t11FcSpAuEntityEntry 6 }

t11FcSpAuDefaultLifetime OBJECT-TYPE

SYNTAX T11FcSpLifetimeLeft
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"When the value of this object is non-zero, it specifies the default value of a lifetime, specified in units given by the corresponding instance of t11FcSpAuDefaultLifetimeUnits. This default lifetime is to be used for any Security Association that has no explicitly specified value for its lifetime.

An SA's lifetime is either the time interval or the number of passed bytes, after which the SA has to be terminated and (if necessary) replaced with a new SA.

If this object is zero, then there is no default value for lifetime."

DEFVAL { 28800 } -- 8 hours (in units of seconds)
 ::= { t11FcSpAuEntityEntry 7 }

t11FcSpAuDefaultLifetimeUnits OBJECT-TYPE

SYNTAX T11FcSpLifetimeLeftUnits
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"The units in which the value of the corresponding instance of t11FcSpAuDefaultLifetime specifies a default lifetime for a Security Association that has no explicitly-specified value for its lifetime."

DEFVAL { seconds }
 ::= { t11FcSpAuEntityEntry 8 }

t11FcSpAuRejectMaxRows OBJECT-TYPE

SYNTAX Unsigned32 (0..1000)
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"The maximum number of rows in the t11FcSpAuRejectTable for this entity on this Fabric. If and when an AUTH message is rejected, and the t11FcSpAuRejectTable already contains this maximum number of rows for the specific entity and Fabric, the row containing the oldest information is discarded and replaced by a row containing information about the new rejection.

There will be less than this maximum number of rows in the t11FcSpAuRejectTable in exceptional circumstances,

e.g., after an agent restart.

In an implementation that does not support the
t11FcSpAuRejectTable, this object will always be zero."
 ::= { t11FcSpAuEntityEntry 9 }

t11FcSpAuDhChapHashFunctions OBJECT-TYPE
SYNTAX T11FcSpHashFunctions
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The hash functions that the entity supports when using
the DH-CHAP algorithm."
 ::= { t11FcSpAuEntityEntry 10 }

t11FcSpAuDhChapDhGroups OBJECT-TYPE
SYNTAX T11FcSpDhGroups
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The DH Groups that the entity supports when using the
DH-CHAP algorithm in FC-SP."
 ::= { t11FcSpAuEntityEntry 11 }

t11FcSpAuFcapHashFunctions OBJECT-TYPE
SYNTAX T11FcSpHashFunctions
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The hash functions that the entity supports when
specified as Protocol Parameters in the AUTH_Negotiate
message for FCAP in FC-SP."
REFERENCE
"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.5.2.1 and table 28."
 ::= { t11FcSpAuEntityEntry 12 }

t11FcSpAuFcapCertsSignFunctions OBJECT-TYPE
SYNTAX T11FcSpSignFunctions
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The signature functions used within certificates that
the entity supports when using FCAP in FC-SP."
REFERENCE
"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),

February 2007, section 5.5.4.2 and tables 38 & 39."
 ::= { t11FcSpAuEntityEntry 13 }

t11FcSpAuFcapDhGroups OBJECT-TYPE

SYNTAX T11FcSpDhGroups

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The DH Groups that the entity supports when using the
 FCAP algorithm in FC-SP."

::= { t11FcSpAuEntityEntry 14 }

t11FcSpAuFcpapHashFunctions OBJECT-TYPE

SYNTAX T11FcSpHashFunctions

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The hash functions that the entity supports when using
 the FCPAP algorithm in FC-SP."

::= { t11FcSpAuEntityEntry 15 }

t11FcSpAuFcpapDhGroups OBJECT-TYPE

SYNTAX T11FcSpDhGroups

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The DH Groups that the entity supports when using the
 FCPAP algorithm in FC-SP."

::= { t11FcSpAuEntityEntry 16 }

--

-- The Mapping of Authentication Entities onto Interfaces

-- and Statistics

--

t11FcSpAuIfStatTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpAuIfStatEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each FC-SP Authentication entity can operate on one or more
 interfaces, but at most one of them can operate on each
 interface. A row in this table exists for each interface
 to each Fabric on which each Authentication entity operates.

The objects within this table contain statistics information
 related to FC-SP's Authentication Protocols."

::= { t11FcSpAuMIBObjects 2 }

```

t11FcSpAuIfStatEntry OBJECT-TYPE
    SYNTAX          T11FcSpAuIfStatEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "A set of Authentication Protocols statistics for an FC-SP
        Authentication entity (identified by t11FcSpAuEntityName) on
        one of its interfaces to a particular Fabric, which is
        managed within the Fibre Channel management instance
        identified by fcmInstanceIndex."
    INDEX           { fcmInstanceIndex, t11FcSpAuEntityName,
                     t11FcSpAuIfStatInterfaceIndex,
                     t11FcSpAuIfStatFabricIndex }
    ::= { t11FcSpAuIfStatTable 1 }

T11FcSpAuIfStatEntry ::= SEQUENCE {
    t11FcSpAuIfStatInterfaceIndex      InterfaceIndex,
    t11FcSpAuIfStatFabricIndex         T11FabricIndex,
    t11FcSpAuIfStatTimeouts            Counter32,
    t11FcSpAuIfStatInAcceptedMsgs      Counter32,
    t11FcSpAuIfStatInLsSwRejectedMsgs  Counter32,
    t11FcSpAuIfStatInAuthRejectedMsgs  Counter32,
    t11FcSpAuIfStatOutAcceptedMsgs     Counter32,
    t11FcSpAuIfStatOutLsSwRejectedMsgs Counter32,
    t11FcSpAuIfStatOutAuthRejectedMsgs Counter32
}

t11FcSpAuIfStatInterfaceIndex OBJECT-TYPE
    SYNTAX          InterfaceIndex
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The interface on which the FC-SP Authentication entity
        operates and for which the statistics are collected."
    ::= { t11FcSpAuIfStatEntry 1 }

t11FcSpAuIfStatFabricIndex OBJECT-TYPE
    SYNTAX          T11FabricIndex
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "An index value identifying the particular Fabric for
        which the statistics are collected."
    ::= { t11FcSpAuIfStatEntry 2 }

t11FcSpAuIfStatTimeouts OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only

```

STATUS current

DESCRIPTION

"The number of FC-SP Authentication Protocol messages sent by the particular entity on the particular Fabric on the particular interface, for which no response was received within a timeout period.

This counter has no discontinuities other than those that all Counter32's have when sysUpTime=0."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.11."

::= { t11FcSpAuIfStatEntry 3 }

t11FcSpAuIfStatInAcceptedMsgs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of FC-SP Authentication Protocol messages received and accepted by the particular entity on the particular Fabric on the particular interface.

This counter has no discontinuities other than those that all Counter32's have when sysUpTime=0."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.1."

::= { t11FcSpAuIfStatEntry 4 }

t11FcSpAuIfStatInLsSwRejectedMsgs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of FC-SP Authentication Protocol messages received by the particular entity on the particular Fabric on the particular interface, and rejected by a lower-level (SW_RJT or LS_RJT) reject.

This counter has no discontinuities other than those that all Counter32's have when sysUpTime=0."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.1."

```
::= { t11FcSpAuIfStatEntry 5 }
```

t11FcSpAuIfStatInAuthRejectedMsgs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of FC-SP Authentication Protocol messages received by the particular entity on the particular Fabric on the particular interface, and rejected by an AUTH_Reject message.

This counter has no discontinuities other than those that all Counter32's have when sysUpTime=0."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.1."

```
::= { t11FcSpAuIfStatEntry 6 }
```

t11FcSpAuIfStatOutAcceptedMsgs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of FC-SP Authentication Protocol messages sent by the particular entity on the particular Fabric on the particular interface, which were accepted by the neighboring entity, i.e., not rejected by an AUTH_Reject message, nor by a lower-level (SW_RJT or LS_RJT) reject.

This counter has no discontinuities other than those that all Counter32's have when sysUpTime=0."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.1."

```
::= { t11FcSpAuIfStatEntry 7 }
```

t11FcSpAuIfStatOutLsSwRejectedMsgs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of FC-SP Authentication Protocol messages sent by the particular entity on the particular Fabric on the particular interface, which were rejected by a lower-level (SW_RJT or LS_RJT) reject.

This counter has no discontinuities other than those that all Counter32's have when sysUpTime=0."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.1."

::= { t11FcSpAuIfStatEntry 8 }

t11FcSpAuIfStatOutAuthRejectedMsgs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of FC-SP Authentication Protocol messages sent by the particular entity on the particular Fabric on the particular interface, which were rejected by an AUTH_Reject message.

This counter has no discontinuities other than those that all Counter32's have when sysUpTime=0."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.1."

::= { t11FcSpAuIfStatEntry 9 }

--

-- Information about Authentication Protocol Transactions
-- which were recently rejected

--

t11FcSpAuRejectTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpAuRejectEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of volatile information about FC-SP Authentication Protocol transactions that were recently rejected with an AUTH_Reject message, or with an SW_RJT/LS_RJT.

The maximum number of rows in this table for a specific entity on a specific Fabric is given by the value of the corresponding instance of t11FcSpAuRejectMaxRows.

The syntax of t11FcSpAuRejTimestamp is TimeStamp, and thus its value rolls over to zero after approximately 497 days. To avoid any confusion due to such a rollover, rows should be deleted from this table before they are 497 days old.

This table will be empty if no AUTH_Reject messages, nor any SW_RJT/LS_RJT's rejecting an AUTH message, have been sent or received since the last re-initialization of the agent."

```
::= { t11FcSpAuMIBObjects 3 }
```

t11FcSpAuRejectEntry OBJECT-TYPE

SYNTAX T11FcSpAuRejectEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about one AUTH message (either an AUTH_ELS or an AUTH_ILS) that was rejected with an AUTH_Reject, SW_RJT or LS_RJT message, sent/received by the entity identified by values of fcmInstanceIndex and t11FcSpAuEntityName, on an interface to a particular Fabric."

```
INDEX { fcmInstanceIndex, t11FcSpAuEntityName,
        t11FcSpAuRejInterfaceIndex, t11FcSpAuRejFabricIndex,
        t11FcSpAuRejTimestamp }
```

```
::= { t11FcSpAuRejectTable 1 }
```

T11FcSpAuRejectEntry ::= SEQUENCE {

t11FcSpAuRejInterfaceIndex InterfaceIndex,

t11FcSpAuRejFabricIndex T11FabricIndex,

t11FcSpAuRejTimestamp TimeStamp,

t11FcSpAuRejDirection INTEGER,

t11FcSpAuRejType INTEGER,

t11FcSpAuRejAuthMsgString OCTET STRING,

t11FcSpAuRejReasonCode T11FcSpAuthRejectReasonCode,

t11FcSpAuRejReasonCodeExp T11FcSpAuthRejReasonCodeExp

}

t11FcSpAuRejInterfaceIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The interface on which the rejected AUTH message was sent or received."

```
::= { t11FcSpAuRejectEntry 1 }
```

t11FcSpAuRejFabricIndex OBJECT-TYPE

SYNTAX T11FabricIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An index value identifying the particular Fabric on

which the rejected AUTH message was sent or received."
 ::= { t11FcSpAuRejectEntry 2 }

t11FcSpAuRejTimestamp OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The time at which the AUTH message was rejected. If two rows have the same value of this object for the same entity on the same interface and Fabric, the value of this object for the later one is incremented by one."

::= { t11FcSpAuRejectEntry 3 }

t11FcSpAuRejDirection OBJECT-TYPE

SYNTAX INTEGER { sent(1), received(2) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"An indication of whether the rejection was sent or received by the identified entity.

The value 'sent(1)' corresponds to a notification of type t11FcSpAuRejectSentNotify; the value 'received(2)' corresponds to t11FcSpAuRejectReceivedNotify."

::= { t11FcSpAuRejectEntry 4 }

t11FcSpAuRejType OBJECT-TYPE

SYNTAX INTEGER {
 authReject(1),
 swRjt(2),
 lsRjt(3)
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"An indication of whether the rejection was an AUTH_Reject, an SW_RJT or an LS_RJT."

::= { t11FcSpAuRejectEntry 5 }

t11FcSpAuRejAuthMsgString OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(0..255))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The binary content of the AUTH message that was rejected, formatted as an octet string (in network byte order) containing the content of the message.

If the binary content is unavailable, then the length is zero. Otherwise, the first octet of the message identifies the type of message:

'90'h - an AUTH_ELS, see Table 6 in FC-SP,
 '40'h - an AUTH_ILS, see Table 3 in FC-SP, or
 '41'h - an B_AUTH_ILS, see Table 5 in FC-SP.

and the remainder of the message may be truncated."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, Tables 3, 5 and 6."

::= { t11FcSpAuRejectEntry 6 }

t11FcSpAuRejReasonCode OBJECT-TYPE

SYNTAX T11FcSpAuthRejectReasonCode

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The reason code with which this AUTH message was rejected."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, Table 17, 48, 52."

::= { t11FcSpAuRejectEntry 7 }

t11FcSpAuRejReasonCodeExp OBJECT-TYPE

SYNTAX T11FcSpAuthRejReasonCodeExp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The reason code explanation with which this AUTH message was rejected."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, Table 17, 48, 52."

::= { t11FcSpAuRejectEntry 8 }

--

-- Notifications

--

t11FcSpAuRejectSentNotify NOTIFICATION-TYPE

OBJECTS { t11FamLocalSwitchWwn,
 t11FcSpAuRejAuthMsgString,


```

        t11FcSpAuRejType,
        t11FcSpAuRejReasonCode,
        t11FcSpAuRejReasonCodeExp }
STATUS
    current
DESCRIPTION
    "This notification indicates that a Switch (identified
    by the value of t11FamLocalSwitchWwn) has sent a reject
    message of the type indicated by t11FcSpAuRejType in
    response to an AUTH message.

    The content of the rejected AUTH message is given by the
    value of t11FcSpAuRejAuthMsgString. The values of the
    Reason Code and Reason Code Explanation in the
    AUTH_Reject/SW_RJT/LS_RJT are indicated by the values of
    t11FcSpAuRejReasonCode and t11FcSpAuRejReasonCodeExp."
    ::= { t11FcSpAuMIBNotifications 1 }

t11FcSpAuRejectReceivedNotify NOTIFICATION-TYPE
OBJECTS { t11FamLocalSwitchWwn,
          t11FcSpAuRejAuthMsgString,
          t11FcSpAuRejType,
          t11FcSpAuRejReasonCode,
          t11FcSpAuRejReasonCodeExp }
STATUS
    current
DESCRIPTION
    "This notification indicates that a Switch (identified
    by the value of t11FamLocalSwitchWwn) has received a
    reject message of the type indicated by t11FcSpAuRejType
    in response to an AUTH message.

    The content of the rejected AUTH message is given by the
    value of t11FcSpAuRejAuthMsgString. The values of the
    Reason Code and Reason Code Explanation in the
    AUTH_Reject/SW_RJT/LS_RJT are indicated by the values of
    t11FcSpAuRejReasonCode and t11FcSpAuRejReasonCodeExp."
    ::= { t11FcSpAuMIBNotifications 2 }

--
-- Conformance
--

t11FcSpAuMIBCompliances
    OBJECT IDENTIFIER ::= { t11FcSpAuMIBConformance 1 }
t11FcSpAuMIBGroups
    OBJECT IDENTIFIER ::= { t11FcSpAuMIBConformance 2 }

t11FcSpAuMIBCompliance MODULE-COMPLIANCE
STATUS
    current

```

DESCRIPTION

"The compliance statement for entities that implement one or more of the Authentication Protocols defined in FC-SP."

MODULE -- this module

```
MANDATORY-GROUPS { t11FcSpAuGeneralGroup,
                    t11FcSpAuRejectedGroup,
                    t11FcSpAuNotificationGroup }
```

GROUP t11FcSpAuIfStatsGroup

DESCRIPTION

"These counters, of particular FC-SP messages and events, are mandatory only for those systems that count such messages/events."

-- Write access is not required for any objects in this MIB module:

OBJECT t11FcSpAuStorageType

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11FcSpAuSendRejNotifyEnable

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11FcSpAuRcvRejNotifyEnable

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11FcSpAuDefaultLifetime

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11FcSpAuDefaultLifetimeUnits

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT t11FcSpAuRejectMaxRows

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

```
::= { t11FcSpAuMIBCompliances 1 }
```

```
-- Units of Conformance
```

```
t11FcSpAuGeneralGroup OBJECT-GROUP
```

```
OBJECTS { t11FcSpAuServerProtocol,
          t11FcSpAuStorageType,
          t11FcSpAuSendRejNotifyEnable,
          t11FcSpAuRcvRejNotifyEnable,
          t11FcSpAuDefaultLifetime,
          t11FcSpAuDefaultLifetimeUnits,
          t11FcSpAuRejectMaxRows,
          t11FcSpAuDhChapHashFunctions,
          t11FcSpAuDhChapDhGroups,
          t11FcSpAuFcapHashFunctions,
          t11FcSpAuFcapCertsSignFunctions,
          t11FcSpAuFcapDhGroups,
          t11FcSpAuFcpapHashFunctions,
          t11FcSpAuFcpapDhGroups,
          t11FcSpAuIfStatTimeouts }
```

```
STATUS current
```

```
DESCRIPTION
```

"A collection of objects for the capabilities and configuration parameters of FC-SP's Authentication Protocols. The inclusion of t11FcSpAuIfStatTimeouts in this group provides information on mappings of Authentication entities onto interfaces."

```
::= { t11FcSpAuMIBGroups 1 }
```

```
t11FcSpAuIfStatsGroup OBJECT-GROUP
```

```
OBJECTS { t11FcSpAuIfStatInAcceptedMsgs,
          t11FcSpAuIfStatInLsSwRejectedMsgs,
          t11FcSpAuIfStatInAuthRejectedMsgs,
          t11FcSpAuIfStatOutAcceptedMsgs,
          t11FcSpAuIfStatOutLsSwRejectedMsgs,
          t11FcSpAuIfStatOutAuthRejectedMsgs }
```

```
STATUS current
```

```
DESCRIPTION
```

"A collection of objects for monitoring the operations of FC-SP's Authentication Protocols."

```
::= { t11FcSpAuMIBGroups 2 }
```

```
t11FcSpAuRejectedGroup OBJECT-GROUP
```

```
OBJECTS { t11FcSpAuRejDirection,
          t11FcSpAuRejType,
          t11FcSpAuRejAuthMsgString,
          t11FcSpAuRejReasonCode,
          t11FcSpAuRejReasonCodeExp }
```

```

STATUS    current
DESCRIPTION
    "A collection of objects holding information concerning
    FC-SP Authentication Protocol transactions that were
    recently rejected with an AUTH_Reject, with an SW_RJT,
    or with an LS_RJT."
 ::= { t11FcSpAuMIBGroups 3 }

t11FcSpAuNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS { t11FcSpAuRejectSentNotify,
                    t11FcSpAuRejectReceivedNotify }
    STATUS    current
    DESCRIPTION
        "A collection of notifications for use in the management
        of FC-SP's Authentication Protocols."
 ::= { t11FcSpAuMIBGroups 4 }

END

```

6.3. The T11-FC-SP-ZONING-MIB Module

```

--*****
-- FC-SP Zoning
--

T11-FC-SP-ZONING-MIB  DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE,
    NOTIFICATION-TYPE, mib-2,
    Counter32
        FROM SNMPv2-SMI
        -- [RFC2578]
    TruthValue
        FROM SNMPv2-TC
        -- [RFC2579]
    MODULE-COMPLIANCE, OBJECT-GROUP,
    NOTIFICATION-GROUP
        FROM SNMPv2-CONF
        -- [RFC2580]
    ifIndex
        FROM IF-MIB
        -- [RFC2863]
    t11ZsServerEntry,
    t11ZsStatsEntry,
    t11ZsNotifyControlEntry,
    t11ZsFabricIndex
        FROM T11-FC-ZONE-SERVER-MIB
        -- [RFC4936]
    T11FcSpPolicyHashValue,
    T11FcSpPolicyHashFormat,
    T11FcSpHashCalculationStatus
        FROM T11-FC-SP-TC-MIB;

t11FcSpZoningMIB  MODULE-IDENTITY
    LAST-UPDATED   "200808200000Z"

```

ORGANIZATION "This MIB module was developed through the coordinated effort of two organizations: T11 began the development and the IETF (in the IMSS Working Group) finished it."

CONTACT-INFO

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DESCRIPTION

"This MIB module specifies the extensions to the T11-FC-ZONE-SERVER-MIB module that are necessary for the management of Fibre Channel's FC-SP Zoning Servers, as defined in the FC-SP specification.

The persistence of values written to these MIB objects is the same as the persistence of the objects they extend, i.e., it is given by the value of the relevant instance of t11ZsServerDatabaseStorageType (defined in the T11-FC-ZONE-SERVER-MIB module).

Copyright (C) The IETF Trust (2008). This version of this MIB module is part of RFC 5324; see the RFC itself for full legal notices."

REVISION "200808200000Z"

DESCRIPTION

"Initial version of this MIB module, published as RFC 5324."
 ::= { mib-2 177 }

```
t11FcSpZsMIBNotifications OBJECT IDENTIFIER ::= { t11FcSpZoningMIB 0 }
t11FcSpZsMIBObjects       OBJECT IDENTIFIER ::= { t11FcSpZoningMIB 1 }
t11FcSpZsMIBConformance  OBJECT IDENTIFIER ::= { t11FcSpZoningMIB 2 }
t11FcSpZsConfiguration   OBJECT IDENTIFIER ::= { t11FcSpZsMIBObjects 1 }
t11FcSpZsStatistics       OBJECT IDENTIFIER ::= { t11FcSpZsMIBObjects 2 }
```

--

-- Augmenting the table of Zone Servers

--

t11FcSpZsServerTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpZsServerEntry

```

MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "A table which provides FC-SP-specific information about
    the Zone Servers on each Fabric in one or more Switches."
 ::= { t11FcSpZsConfiguration 1 }

```

```

t11FcSpZsServerEntry OBJECT-TYPE
SYNTAX        T11FcSpZsServerEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "Each entry contains information relevant to FC-SP
    for a particular Zone Server for a particular Fabric
    on a particular Switch. The Fabric and Switch are
    identified in the same manner as in t11ZsServerEntry."
AUGMENTS      { t11ZsServerEntry }
 ::= { t11FcSpZsServerTable 1 }

T11FcSpZsServerEntry ::= SEQUENCE {
    t11FcSpZsServerCapabilityObject      BITS,
    t11FcSpZsServerEnabled                TruthValue,
    t11FcSpZoneSetHashStatus              T11FcSpHashCalculationStatus,
    t11FcSpActiveZoneSetHashType          T11FcSpPolicyHashFormat,
    t11FcSpActiveZoneSetHash              T11FcSpPolicyHashValue,
    t11FcSpZoneSetDatabaseHashType        T11FcSpPolicyHashFormat,
    t11FcSpZoneSetDatabaseHash            T11FcSpPolicyHashValue
}

```

```

t11FcSpZsServerCapabilityObject OBJECT-TYPE
SYNTAX        BITS {
                fcSpZoning(0)
            }
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "Capabilities of the Zone Server for the particular Fabric
    on the particular Switch, with respect to FC-SP Zoning:

        fcSpZoning -- set to 1 to indicate the Switch is
                     capable of supporting FC-SP Zoning.

    "
REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
      Fibre Channel - Security Protocols (FC-SP),
      February 2007, Table 184."
 ::= { t11FcSpZsServerEntry 1 }

```

t11FcSpZsServerEnabled OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object indicates whether the Zone Server for the particular Fabric on the particular Switch, is operating in FC-SP Zoning mode."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, Table 185."

::= { t11FcSpZsServerEntry 2 }

t11FcSpZoneSetHashStatus OBJECT-TYPE

SYNTAX T11FcSpHashCalculationStatus

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"When read, the value of this object is either:

correct -- the corresponding instances of both
t11FcSpActiveZoneSetHash and
t11FcSpZoneSetDatabaseHash contain
the correct hash values; or

stale -- the corresponding instances of
t11FcSpActiveZoneSetHash and
t11FcSpZoneSetDatabaseHash contain
stale (possibly incorrect) values;

Writing a value of 'calculate' is a request to re-calculate and update the values of the corresponding instances of both t11FcSpActiveZoneSetHash and t11FcSpZoneSetDatabaseHash. Writing a value of 'correct' or 'stale' to this object is an error (e.g., 'wrongValue').

When the Active Zone Set and/or the Zone Set Database are updated, it is common that multiple changes need to be made at the same time. In such circumstances, the use of this object allows the hash values to be updated only once after all changes, rather than repeatedly/after each individual change.

If and when the corresponding instance of t11ZsServerDatabaseStorageType has the value 'permanent(4)', then if write access is supported to any instance of a read-write object in any row of any table governed by the 'permanent' value of t11ZsServerDatabaseStorageType, then

write access to the corresponding instance of this object must also be supported."

REFERENCE

"t11ZsServerDatabaseStorageType in
'Fibre Channel Zone Server MIB', RFC 4936, August 2007."

DEFVAL { stale }

::= { t11FcSpZsServerEntry 3 }

t11FcSpActiveZoneSetHashType OBJECT-TYPE

SYNTAX T11FcSpPolicyHashFormat

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The format used for the hash value contained in the corresponding instance of t11FcSpActiveZoneSetHash."

::= { t11FcSpZsServerEntry 4 }

t11FcSpActiveZoneSetHash OBJECT-TYPE

SYNTAX T11FcSpPolicyHashValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of the hash for the current Active Zone Set. The format of this value is given by the corresponding instance of t11FcSpActiveZoneSetHashType."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, Table 187."

::= { t11FcSpZsServerEntry 5 }

t11FcSpZoneSetDatabaseHashType OBJECT-TYPE

SYNTAX T11FcSpPolicyHashFormat

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The format used for the hash value contained in the corresponding instance of t11FcSpZoneSetDatabaseHash."

::= { t11FcSpZsServerEntry 6 }

t11FcSpZoneSetDatabaseHash OBJECT-TYPE

SYNTAX T11FcSpPolicyHashValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of the hash for the current Zone Set Database. The format of this value is given by the corresponding instance of t11FcSpZoneSetDatabaseHashType."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, Table 187."

::= { t11FcSpZsServerEntry 7 }

--

-- Additional Statistics for FC-SP Zoning

--

t11FcSpZsStatsTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpZsStatsEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of statistics specific to FC-SP that are
maintained by Zone Servers."

::= { t11FcSpZsStatistics 1 }

t11FcSpZsStatsEntry OBJECT-TYPE

SYNTAX T11FcSpZsStatsEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A set of statistics specific to FC-SP for a particular
Zone Server for a particular Fabric on a particular Switch.
The Fabric and Switch are identified in the same manner as
in t11ZsStatsEntry."

AUGMENTS { t11ZsStatsEntry }

::= { t11FcSpZsStatsTable 1 }

T11FcSpZsStatsEntry ::= SEQUENCE {

t11FcSpZsSPCMITrequestsSent Counter32,

t11FcSpZsSPCMITrequestsAccepted Counter32,

t11FcSpZsSPCMITrequestsRejected Counter32,

t11FcSpZsZcpRequestsSent Counter32,

t11FcSpZsZcpRequestsAccepted Counter32,

t11FcSpZsZcpRequestsRejected Counter32,

t11FcSpZsZirRequestsAccepted Counter32,

t11FcSpZsZirRequestsRejected Counter32

}

t11FcSpZsSPCMITrequestsSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SP Commit Zone Changes (SPCMIT) operation

requests sent by the Zone Server.

This counter has no discontinuities other than those
that all Counter32's have when sysUpTime=0."
 ::= { t11FcSpZsStatsEntry 1 }

t11FcSpZsSPCMITrequestsAccepted OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SP Commit Zone Changes (SPCMIT) operation
requests received and accepted by the Zone Server.

This counter has no discontinuities other than those
that all Counter32's have when sysUpTime=0."
 ::= { t11FcSpZsStatsEntry 2 }

t11FcSpZsSPCMITrequestsRejected OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SP Commit Zone Changes (SPCMIT) operation
requests received but rejected by the Zone Server.

This counter has no discontinuities other than those
that all Counter32's have when sysUpTime=0."
 ::= { t11FcSpZsStatsEntry 3 }

t11FcSpZsZcpRequestsSent OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Zoning Check Protocol (ZCP) requests sent
by the Zone Server.

This counter has no discontinuities other than those
that all Counter32's have when sysUpTime=0."
 ::= { t11FcSpZsStatsEntry 4 }

t11FcSpZsZcpRequestsAccepted OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Zoning Check Protocol (ZCP) requests received

and accepted by the Zone Server.

This counter has no discontinuities other than those
that all Counter32's have when sysUpTime=0."
 ::= { t11FcSpZsStatsEntry 5 }

t11FcSpZsZcpRequestsRejected OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Zoning Check Protocol (ZCP) requests received
but rejected by the Zone Server.

This counter has no discontinuities other than those
that all Counter32's have when sysUpTime=0."
 ::= { t11FcSpZsStatsEntry 6 }

t11FcSpZsZirRequestsAccepted OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Zoning Information Request (ZIR) requests
received and accepted by the Zone Server.

This counter has no discontinuities other than those
that all Counter32's have when sysUpTime=0."
 ::= { t11FcSpZsStatsEntry 7 }

t11FcSpZsZirRequestsRejected OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Zoning Information Request (ZIR) requests
received but rejected by the Zone Server.

This counter has no discontinuities other than those
that all Counter32's have when sysUpTime=0."
 ::= { t11FcSpZsStatsEntry 8 }

--

-- Enable/Disable for Notifications

--

t11FcSpZsNotifyControlTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpZsNotifyControlEntry

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"A table of control information for notifications
 generated due to Zone Server events related to
 FC-SP Zoning."

::= { t11FcSpZsConfiguration 2 }

t11FcSpZsNotifyControlEntry OBJECT-TYPE

SYNTAX T11FcSpZsNotifyControlEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"Each entry is an augmentation of the notification control
 information for a Zone Server for a particular Fabric on a
 particular Switch. The Fabric and Switch are identified in
 the same manner as in t11ZsNotifyControlEntry."

AUGMENTS { t11ZsNotifyControlEntry }
 ::= { t11FcSpZsNotifyControlTable 1 }

T11FcSpZsNotifyControlEntry ::= SEQUENCE {
 t11FcSpZsNotifyJoinSuccessEnable TruthValue,
 t11FcSpZsNotifyJoinFailureEnable TruthValue
 }

t11FcSpZsNotifyJoinSuccessEnable OBJECT-TYPE

SYNTAX TruthValue
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"This object specifies whether
 t11FcSpZsFabricJoinFailureNotify notifications should be
 generated by the Zone Server for this Fabric."

::= { t11FcSpZsNotifyControlEntry 1 }

t11FcSpZsNotifyJoinFailureEnable OBJECT-TYPE

SYNTAX TruthValue
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"This object specifies whether
 t11FcSpZsFabricJoinSuccessNotify notifications should be
 generated by the Zone Server for this Fabric."

::= { t11FcSpZsNotifyControlEntry 2 }

--
 -- Notifications
 --

t11FcSpZsFabricJoinSuccessNotify NOTIFICATION-TYPE

OBJECTS { ifIndex, t11ZsFabricIndex }

STATUS current

DESCRIPTION

"This notification indicates that a Switch that is part of one Fabric (indicated by the value of t11ZsFabricIndex) has successfully joined (on the interface indicated by the value of ifIndex) with a Switch that is part of another Fabric.

If multiple Virtual Fabrics are configured on an interface, and all are successfully joined at the same time, and if the agent so chooses, then it can generate just one notification in which t11ZsFabricIndex has the value 4096."

```
::= { t11FcSpZsMIBNotifications 1 }
```

t11FcSpZsFabricJoinFailureNotify NOTIFICATION-TYPE

OBJECTS { ifIndex, t11ZsFabricIndex }

STATUS current

DESCRIPTION

"This notification indicates that an E_Port on the local Switch has entered the Isolated state because a join between two Fabrics failed. The failure occurred on the local 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 failure to join at the same time, and if the agent so chooses, then it can generate just one notification in which t11ZsFabricIndex has the value 4096."

```
::= { t11FcSpZsMIBNotifications 2 }
```

```
--
```

```
-- Conformance
```

```
--
```

t11FcSpZsMIBCompliances

OBJECT IDENTIFIER ::= { t11FcSpZsMIBConformance 1 }

t11FcSpZsMIBGroups OBJECT IDENTIFIER ::= { t11FcSpZsMIBConformance 2 }

t11FcSpZsMIBCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for entities that implement the extensions specified in FC-SP for Fibre Channel's Zone Server."

```
MODULE -- this module
```

```
MANDATORY-GROUPS { t11FcSpZsObjectsGroup,
                    t11FcSpZsNotificationControlGroup,
                    t11FcSpZsNotificationGroup }
```

```
GROUP          t11FcSpZsStatisticsGroup
```

```
DESCRIPTION
```

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

```
-- Write access is not required for any objects in this MIB module:
```

```
OBJECT          t11FcSpZsServerEnabled
```

```
MIN-ACCESS      read-only
```

```
DESCRIPTION
```

```
"Write access is not required."
```

```
OBJECT          t11FcSpZoneSetHashStatus
```

```
MIN-ACCESS      read-only
```

```
DESCRIPTION
```

```
"Write access is not required."
```

```
OBJECT          t11FcSpZsNotifyJoinSuccessEnable
```

```
MIN-ACCESS      read-only
```

```
DESCRIPTION
```

```
"Write access is not required."
```

```
OBJECT          t11FcSpZsNotifyJoinFailureEnable
```

```
MIN-ACCESS      read-only
```

```
DESCRIPTION
```

```
"Write access is not required."
```

```
::= { t11FcSpZsMIBCompliances 1 }
```

```
-- Units of Conformance
```

```
t11FcSpZsObjectsGroup OBJECT-GROUP
```

```
OBJECTS { t11FcSpZsServerCapabilityObject,
          t11FcSpZsServerEnabled,
          t11FcSpZoneSetHashStatus,
          t11FcSpActiveZoneSetHashType,
          t11FcSpActiveZoneSetHash,
          t11FcSpZoneSetDatabaseHashType,
          t11FcSpZoneSetDatabaseHash
        }
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"A collection of objects for Zone configuration"
```

```

        information of a Zone Server capable of
        operating in FC-SP Zoning mode."
 ::= { t11FcSpZsMIBGroups 1 }

t11FcSpZsNotificationControlGroup OBJECT-GROUP
  OBJECTS { t11FcSpZsNotifyJoinSuccessEnable,
             t11FcSpZsNotifyJoinFailureEnable
           }
  STATUS   current
  DESCRIPTION
    "A collection of notification control objects for
    monitoring Zone Server failures specific to FC-SP."
 ::= { t11FcSpZsMIBGroups 2 }

t11FcSpZsStatisticsGroup OBJECT-GROUP
  OBJECTS { t11FcSpZsSPCMITrequestsSent,
             t11FcSpZsSPCMITrequestsAccepted,
             t11FcSpZsSPCMITrequestsRejected,
             t11FcSpZsZcpRequestsSent,
             t11FcSpZsZcpRequestsAccepted,
             t11FcSpZsZcpRequestsRejected,
             t11FcSpZsZirRequestsAccepted,
             t11FcSpZsZirRequestsRejected
           }
  STATUS   current
  DESCRIPTION
    "A collection of objects for collecting Zone Server
    statistics which are specific to FC-SP."
 ::= { t11FcSpZsMIBGroups 3 }

t11FcSpZsNotificationGroup NOTIFICATION-GROUP
  NOTIFICATIONS { t11FcSpZsFabricJoinSuccessNotify,
                  t11FcSpZsFabricJoinFailureNotify
                }
  STATUS   current
  DESCRIPTION
    "A collection of notification(s) for monitoring
    Zone Server events that are specific to FC-SP."
 ::= { t11FcSpZsMIBGroups 4 }

END

```

6.4. The T11-FC-SP-POLICY-MIB Module

```
--*****
-- FC-SP Policy
--

T11-FC-SP-POLICY-MIB  DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE, mib-2,
    Counter32, Unsigned32
        FROM SNMPv2-SMI                -- [RFC2578]
    RowStatus, StorageType, TimeStamp,
    TruthValue
        FROM SNMPv2-TC                -- [RFC2579]
    MODULE-COMPLIANCE, OBJECT-GROUP,
    NOTIFICATION-GROUP
        FROM SNMPv2-CONF                -- [RFC2580]
    SnmpAdminString
        FROM SNMP-FRAMEWORK-MIB        -- [RFC3411]
    InetAddress, InetPortNumber,
    InetAddressType
        FROM INET-ADDRESS-MIB          -- [RFC4001]
    fcmInstanceIndex,
    FcNameIdOrZero,
    FcDomainIdOrZero
        FROM FC-MGMT-MIB                -- [RFC4044]
    T11NsGs4RejectReasonCode
        FROM T11-FC-NAME-SERVER-MIB    -- [RFC4438]
    T11FabricIndex
        FROM T11-TC-MIB                 -- [RFC4439]
    T11FcSpAlphaNumName,
    T11FcSpAlphaNumNameOrAbsent,
    T11FcSpPolicyName,
    T11FcSpPolicyNameType,
    T11FcSpPolicyObjectType,
    T11FcSpPolicyHashFormat,
    T11FcSpPolicyHashValue,
    T11FcSpHashCalculationStatus
        FROM T11-FC-SP-TC-MIB;

t11FcSpPolicyMIB  MODULE-IDENTITY
    LAST-UPDATED   "200808200000Z"
    ORGANIZATION   "This MIB module was developed through the
                    coordinated effort of two organizations:
                    T11 began the development and the IETF (in
                    the IMSS Working Group) finished it."
    CONTACT-INFO
        "          Claudio DeSanti
                    Cisco Systems, Inc.
                    170 West Tasman Drive
                    San Jose, CA 95134 USA
                    EMail: cds@cisco.com
```


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

DESCRIPTION

"This MIB module specifies the management information required to manage Fabric Policies as defined by Fibre Channel's FC-SP specification.

FC-SP uses the term 'Policy Objects', sometimes abbreviated to just 'Objects', to refer to containers used to hold the data by which Fabric Policies are specified/stored. This obviously has the potential to cause confusion between 'Policy Objects' and 'MIB objects'. The DESCRIPTIONs in this MIB module attempt to avoid such confusion by the use of different adjectives and capitalization, even though such mechanisms are less effective when used in descriptors.

Some types of Policy Objects contain multiple items of information, each of which are held in the same format within the Policy Object. In such cases, FC-SP uses the term 'Entry' to describe each instance of the common format. For example, FC-SP defines an Attribute Policy Object as containing one or more 'Attribute Entries'. Again, this MIB module attempts to avoid confusion by the use of adjectives and capitalization to distinguish an Entry within a Policy Object from an entry within a MIB table.

A Fabric's database of Policy Objects consists of a set of active Objects that are to be enforced by that Fabric, as well as non-active Objects that are not enforced. Operations defined (in FC-SP) for Policy Management are:

- Add/Get/Remove operations on individual non-active Policy Objects,
- Activate/Deactivate operations on a Policy Summary Object, and
- Get operations on the active Policy Summary Object and/or on individual active Policy Objects.

This MIB module has five parts:

- 1) Active Policy Objects - read-only MIB objects representing the set of active Policy Objects for each Fabric,
- 2) Activate/Deactivate Operations

- a read-write MIB object to invoke an Activate operation of the policies specified via a non-active Policy Summary Object, and
- a read-write MIB object to invoke a Deactivate operation.

3) Non-active Policy Objects

- read-create MIB objects to allow the creation of non-active Policy Summary Objects (which reference non-active Policy Objects), and
- read-create MIB objects representing non-active Policy Objects.

4) Statistics

5) Control information and Notifications

Copyright (C) The IETF Trust (2008). This version of this MIB module is part of RFC 5324; see the RFC itself for full legal notices."

REVISION "200808200000Z"

DESCRIPTION

"Initial version of this MIB module, published as RFC 5324."

::= { mib-2 178 }

```
t11FcSpPoMIBNotifications OBJECT IDENTIFIER ::= { t11FcSpPolicyMIB 0 }
t11FcSpPoMIBObjects       OBJECT IDENTIFIER ::= { t11FcSpPolicyMIB 1 }
t11FcSpPoMIBConformance   OBJECT IDENTIFIER ::= { t11FcSpPolicyMIB 2 }
t11FcSpPoActive           OBJECT IDENTIFIER ::= { t11FcSpPoMIBObjects 1 }
t11FcSpPoOperations       OBJECT IDENTIFIER ::= { t11FcSpPoMIBObjects 2 }
t11FcSpPoNonActive        OBJECT IDENTIFIER ::= { t11FcSpPoMIBObjects 3 }
t11FcSpPoStatistics       OBJECT IDENTIFIER ::= { t11FcSpPoMIBObjects 4 }
t11FcSpPoControl          OBJECT IDENTIFIER ::= { t11FcSpPoMIBObjects 5 }
```

--

-- Part 1 - Active Policy Objects

--

t11FcSpPoTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table containing top-level information about active FC-SP policies on various Fabrics."

::= { t11FcSpPoActive 1 }

t11FcSpPoEntry OBJECT-TYPE

```

SYNTAX          T11FcSpPoEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "Each entry contains information about active FC-SP policies
    for a particular Fabric, managed as part of the Fibre
    Channel management instance identified by fcmInstanceIndex."
INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex }
 ::= { t11FcSpPoTable 1 }

```

```

T11FcSpPoEntry ::= SEQUENCE {
    t11FcSpPoFabricIndex          T11FabricIndex,
    t11FcSpPoPolicySummaryObjName T11FcSpAlphaNumName,
    t11FcSpPoAdminFabricName      FcNameIdOrZero,
    t11FcSpPoActivatedTimeStamp   TimeStamp
}

```

```

t11FcSpPoFabricIndex OBJECT-TYPE
    SYNTAX          T11FabricIndex
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "An index value that uniquely identifies a particular
        Fabric."
    ::= { t11FcSpPoEntry 1 }

```

```

t11FcSpPoPolicySummaryObjName OBJECT-TYPE
    SYNTAX          T11FcSpAlphaNumName
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The name of this Fabric's (active) Policy Summary Object."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 7.1.3 and table 104."
    ::= { t11FcSpPoEntry 2 }

```

```

t11FcSpPoAdminFabricName OBJECT-TYPE
    SYNTAX          FcNameIdOrZero (SIZE (8))
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The administratively-specified name for this Fabric, as
        specified in the active Switch Membership List Object.
        This value is meaningful only when Static Domain_IDs are
        in use in a Fabric (see FC-SW-4). Static Domain_IDs are
        administratively enabled by a setting of the Switch Flags

```

in each Switch Entry in the Switch Membership List Object. If Static Domain_IDs are not in use, this value might be '0000000000000000'h.

The t1lFamEnable, t1lFamFabricName, and t1lFamConfigDomainIdType objects defined in the T1l-FC-FABRIC-ADDR-MGR-MIB module are also concerned with the use of an administratively-specified name for a Fabric and Static Domain_IDs. When FC-SP Policy is in use in a Fabric, the values of t1lFamEnable, t1lFamFabricName, and t1lFamConfigDomainIdType must be read-only and reflect the active Policy Objects. For example, the value of t1lFamFabricName must reflect the value of t1lFcSpPoAdminFabricName."

REFERENCE

- "- ANSI INCITS 426-2007, T1l/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.4.1 and table 108.
- Fibre Channel - Switch Fabric-4 (FC-SW-4), ANSI INCITS 418-2006, April 2006, section 7.1.
- Fibre Channel Fabric Address Manager MIB', RFC 4439, March 2006."

```
::= { t1lFcSpPoEntry 3 }
```

t1lFcSpPoActivatedTimeStamp OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at which this Fabric's Policy Summary Object was last activated, or zero if the same Policy Summary Object has been active since the last restart of the management system."

```
::= { t1lFcSpPoEntry 4 }
```

--

-- The table of Policy Summary Objects

--

t1lFcSpPoSummaryTable OBJECT-TYPE

SYNTAX SEQUENCE OF T1lFcSpPoSummaryEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of information about active Policy Objects listed within FC-SP Policy Summary Objects."

```
::= { t1lFcSpPoActive 2 }
```

t11FcSpPoSummaryEntry OBJECT-TYPE

SYNTAX T11FcSpPoSummaryEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"Each entry contains information about one of the active Policy Objects listed within the Policy Summary Object for the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex.

How many Policy Objects of a given type can be active at any one time for a given Fabric depends on the type, as specified in FC-SP. For some types, it is one per Fabric; for other types, more than one can be active per Fabric. In both of these cases, the absence of any entries in this table for a particular type is equivalent to there being one Policy Object of that type that is empty, e.g., a Switch Membership List Object that identifies zero Switches."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 7.1.3 and table 104."

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
 t11FcSpPoSummaryPolicyNameType,
 t11FcSpPoSummaryPolicyName }
 ::= { t11FcSpPoSummaryTable 1 }

T11FcSpPoSummaryEntry ::= SEQUENCE {
 t11FcSpPoSummaryPolicyNameType T11FcSpPolicyNameType,
 t11FcSpPoSummaryPolicyName T11FcSpPolicyName,
 t11FcSpPoSummaryPolicyType T11FcSpPolicyObjectType,
 t11FcSpPoSummaryHashFormat T11FcSpPolicyHashFormat,
 t11FcSpPoSummaryHashValue T11FcSpPolicyHashValue
 }

t11FcSpPoSummaryPolicyNameType OBJECT-TYPE

SYNTAX T11FcSpPolicyNameType {
 nodeName(1),
 alphaNumericName(7)
 }

MAX-ACCESS not-accessible
 STATUS current

DESCRIPTION

"The combination of t11FcSpPoSummaryPolicyNameType and t11FcSpPoSummaryPolicyName specify the name of the Policy Object contained in the Policy Summary Object.

The type of name is 'nodeName' if the value of the corresponding instance of t11FcSpPoSummaryPolicyType is 'switchConnectivity', or 'alphaNumericName' otherwise."
 ::= { t11FcSpPoSummaryEntry 1 }

t11FcSpPoSummaryPolicyName OBJECT-TYPE

SYNTAX T11FcSpPolicyName

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The combination of t11FcSpPoSummaryPolicyNameType and t11FcSpPoSummaryPolicyName specify the name of the Policy Object contained in the Policy Summary Object."

::= { t11FcSpPoSummaryEntry 2 }

t11FcSpPoSummaryPolicyType OBJECT-TYPE

SYNTAX T11FcSpPolicyObjectType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The 'Identifier' that specifies the type of this Policy Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.3.1 and table 104."

::= { t11FcSpPoSummaryEntry 3 }

t11FcSpPoSummaryHashFormat OBJECT-TYPE

SYNTAX T11FcSpPolicyHashFormat

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The format of this Policy Object's hash value as contained in the corresponding instance of the t11FcSpPoSummaryHashValue object."

::= { t11FcSpPoSummaryEntry 4 }

t11FcSpPoSummaryHashValue OBJECT-TYPE

SYNTAX T11FcSpPolicyHashValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The hash value of this Policy Object, in the format identified by the corresponding instance of the t11FcSpPoSummaryHashFormat object."

::= { t11FcSpPoSummaryEntry 5 }

```

--
-- Switch Entries in Active Switch Membership List Objects
--

t11FcSpPoSwMembTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF T11FcSpPoSwMembEntry
    MAX-ACCESS      not-accessible
    STATUS           current
    DESCRIPTION
        "A table of Switch Entries in active Switch Membership List
        Objects.

        One Switch Membership List Object is represented by all
        of the rows of this table that have the same values
        of fcmInstanceIndex and t11FcSpPoFabricIndex."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 7.1.4.1 and table 110."
    ::= { t11FcSpPoActive 3 }

t11FcSpPoSwMembEntry OBJECT-TYPE
    SYNTAX          T11FcSpPoSwMembEntry
    MAX-ACCESS      not-accessible
    STATUS           current
    DESCRIPTION
        "Each entry contains information about one Switch Entry
        within the active Switch Membership List Object for the
        Fabric identified by t11FcSpPoFabricIndex and managed
        within the Fibre Channel management instance identified
        by fcmInstanceIndex."
    INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
            t11FcSpPoSwMembSwitchNameType, t11FcSpPoSwMembSwitchName }
    ::= { t11FcSpPoSwMembTable 1 }

T11FcSpPoSwMembEntry ::= SEQUENCE {
    t11FcSpPoSwMembSwitchNameType T11FcSpPolicyNameType,
    t11FcSpPoSwMembSwitchName     FcNameIdOrZero,
    t11FcSpPoSwMembSwitchFlags    BITS,
    t11FcSpPoSwMembDomainID       FcDomainIdOrZero,
    t11FcSpPoSwMembPolicyDataRole INTEGER,
    t11FcSpPoSwMembAuthBehaviour  BITS,
    t11FcSpPoSwMembAttribute      T11FcSpAlphaNumNameOrAbsent
}

t11FcSpPoSwMembSwitchNameType OBJECT-TYPE
    SYNTAX          T11FcSpPolicyNameType {
                    nodeName(1),

```

```

        restrictedNodeName(2),
        wildcard(5),
        restrictedWildcard(6)
    }
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "If the value of this object is 'nodeName' or
    'restrictedNodeName', then the combination of
    this object and t11FcSpPoSwMembSwitchName specify the
    Switch Name of this Switch Entry.

```

The membership is restricted or unrestricted based on the name type. Restricted membership means that the Switch is not allowed to be part of the Fabric unless allowed by a specific Switch Connectivity Object. Unrestricted membership means that the Switch is allowed to be part of the Fabric unless disallowed by a specific Switch Connectivity Object.

The values of 'wildcard' and 'restrictedWildcard' provide the means to specify whether to allow/deny membership for Switches not explicitly named in the Switch Membership List Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 110."

```
::= { t11FcSpPoSwMembEntry 1 }
```

t11FcSpPoSwMembSwitchName OBJECT-TYPE

```

SYNTAX        FcNameIdOrZero (SIZE (8))
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION

```

"When the value of t11FcSpPoSwMembSwitchNameType is 'wildcard' or 'restrictedWildcard', this object has the value '0000000000000000'h.

Otherwise, the combination of t11FcSpPoSwMembSwitchNameType and this object specify the Switch Name of this Switch Entry."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 110."

```
::= { t11FcSpPoSwMembEntry 2 }
```


t11FcSpPoSwMembSwitchFlags OBJECT-TYPE

```

SYNTAX      BITS {
                staticDomainID(0),
                insistentDomainID(1),
                serialPortsAccess(2),
                physicalPortsAccess(3),
                managerRole(4)
            }
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION

```

"Configurable options in respect to the administration of Policy Objects at this Switch:

'staticDomainID' - if this bit is set, the Switch uses the 'Static Domain_IDs behavior' (as defined in FC-SW-4). This bit needs to have the same setting for all Switches in a Fabric's Switch Membership List Object, or else the Fabric will partition. If this bit is set, the Domain_ID for the Switch is given by the corresponding instance of t11FcSpPoSwMembDomainID.

'insistentDomainID' - if this bit is set, the Switch uses the 'Insistent Domain_ID behavior' (see t11FamConfigDomainId of T11-FC-FABRIC-ADDR-MGR-MIB), the Domain_ID for the Switch is given by the corresponding instance of t11FcSpPoSwMembDomainID.

'serialPortsAccess' - the Switch allows management through serial ports when and only when this bit is set.

'physicalPortsAccess' - the Switch allows management through the physical panel when and only when this bit is set.

'managerRole' - the Switch is allowed to change the Fabric Policy configuration (on receipt of any of the EACA, Enhanced Stage Fabric Configuration (ESFC), Enhanced Update Fabric Configuration (EUFC), ACA, SFC, or UFC SW_ILSs) if and only if this bit is set.

Whenever a Fabric has Active Policy Objects, the value of the t11FamConfigDomainIdType object defined in the T11-FC-FABRIC-ADDR-MGR-MIB module must be read-only and reflect the values of the 'staticDomainID' and 'insistentDomainID' bits of this object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,

- Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 112.
- Fibre Channel - Switch Fabric-4 (FC-SW-4),
ANSI INCITS 418-2006, April 2006, section 7.1.
- t11FamConfigDomainIdType, T11-FC-FABRIC-ADDR-MGR-MIB,
Fibre Channel Fabric Address Manager MIB, RFC 4439."

```
::= { t11FcSpPoSwMembEntry 3 }
```

t11FcSpPoSwMembDomainID OBJECT-TYPE

SYNTAX FcDomainIdOrZero

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The specified Domain_ID value when either of the 'staticDomainID' or 'insistentDomainID' bits are set in the corresponding instance of t11FcSpPoSwMembSwitchFlags.

Whenever a Fabric has Active Policy Objects, the value of the t11FamConfigDomainId object defined in the T11-FC-FABRIC-ADDR-MGR-MIB module must be read-only and reflect the value of this object."

REFERENCE

- "- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and tables 111 and 112.
- t11FamConfigDomainId, T11-FC-FABRIC-ADDR-MGR-MIB,
Fibre Channel Fabric Address Manager MIB, RFC 4439."

```
::= { t11FcSpPoSwMembEntry 4 }
```

t11FcSpPoSwMembPolicyDataRole OBJECT-TYPE

SYNTAX INTEGER {
 client(1),
 autonomous(2),
 server(3)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The role of the Switch in terms of which Policy data it retains/maintains:

'client' - the Switch operates as a Client Switch. A Client Switch maintains its own Switch Connectivity Object and all Fabric-wide List Objects. If FC-SP Zoning is used, a Client Switch maintains only the subset of the Active Zone Set that it requires to enforce the current Fabric Zoning configuration.

'autonomous' - the Switch operates as an Autonomous Switch. An Autonomous Switch maintains its own Switch Connectivity Object and all Fabric-wide List Objects. This is the same as 'client' except that if FC-SP Zoning is used, an Autonomous Switch maintains a complete copy of the Fabric Zoning Database.

'server' - the Switch operates as a Server Switch. A Server Switch maintains all Fabric-wide List Objects and the Switch Connectivity Objects of each Switch in the Fabric. If FC-SP Zoning is used, a Server Switch maintains a complete copy of the Fabric Zoning Database."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 113."

::= { t11FcSpPoSwMembEntry 5 }

t11FcSpPoSwMembAuthBehaviour OBJECT-TYPE

SYNTAX BITS {
mustAuthenticate(0),
rejectIsFailure(1)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The authentication behaviour of the Switch:

'mustAuthenticate' - if this bit is set, all connections between this Switch and neighbor Switches must be authenticated.

'rejectIsFailure' - if this bit is set, the rejection of an AUTH_Negotiate message must be considered as an authentication failure by this Switch."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 114."

::= { t11FcSpPoSwMembEntry 6 }

t11FcSpPoSwMembAttribute OBJECT-TYPE

SYNTAX T11FcSpAlphaNumNameOrAbsent

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The name of an active Attribute Policy Object that is defined for this Switch, or the zero-length string. The

zero-length string indicates that no Attribute Policy Object is defined for this Switch."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 110."

::= { t11FcSpPoSwMembEntry 7 }

--

-- Node Entries in Active Node Membership List Objects

--

t11FcSpPoNoMembTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoNoMembEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of Node Entries in active Node Membership List Objects.

One Node Membership List Object is represented by all of the rows of this table that have the same values of fcmInstanceIndex and t11FcSpPoFabricIndex."

::= { t11FcSpPoActive 4 }

t11FcSpPoNoMembEntry OBJECT-TYPE

SYNTAX T11FcSpPoNoMembEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information about one Node Entry within the active Node Membership List Object for the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex."

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
t11FcSpPoNoMembNodeNameType, t11FcSpPoNoMembNodeName }

::= { t11FcSpPoNoMembTable 1 }

T11FcSpPoNoMembEntry ::= SEQUENCE {

t11FcSpPoNoMembNodeNameType T11FcSpPolicyNameType,

t11FcSpPoNoMembNodeName FcNameIdOrZero,

t11FcSpPoNoMembFlags BITS,

t11FcSpPoNoMembCtAccessIndex Unsigned32,

t11FcSpPoNoMembAttribute T11FcSpAlphaNumNameOrAbsent

}

t11FcSpPoNoMembNodeNameType OBJECT-TYPE

```

SYNTAX      T11FcSpPolicyNameType {
                nodeName(1),
                restrictedNodeName(2),
                portName(3),
                restrictedPortName(4),
                wildcard(5),
                restrictedWildcard(6)
            }
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "If the value of this object is 'wildcard' or
    'restrictedWildcard', this Node Entry applies to Nodes not
    explicitly named in the Node Membership List Object.

    Otherwise, the combination of this object and
    t11FcSpPoNoMembNodeName specify the name of this Node Entry
    in the active Node Membership List Object. A Node is
    identified by its Node Name or by one or more of its Port
    Names.

    Restricted membership means that a Node is not allowed to be
    connected to the Fabric unless allowed by a specific Switch
    Connectivity Object. Unrestricted membership means that a
    Node is allowed to be connected to the Fabric unless
    disallowed by a specific Switch Connectivity Object."
REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
    Fibre Channel - Security Protocols (FC-SP),
    February 2007, section 7.1.4.1 and table 116."
 ::= { t11FcSpPoNoMembEntry 1 }

t11FcSpPoNoMembNodeName OBJECT-TYPE
SYNTAX      FcNameIdOrZero (SIZE (8))
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "If the value of t11FcSpPoNoMembNodeNameType is
    'wildcard' or 'restrictedWildcard', this object has the
    value '0000000000000000'h.

    Otherwise, the combination of t11FcSpPoNoMembNodeNameType
    and this object specify the name of this Node Entry is the
    active Node Membership List Object."
REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
    Fibre Channel - Security Protocols (FC-SP),
    February 2007, section 7.1.4.1 and table 116."

```

```
::= { t11FcSpPoNoMembEntry 2 }
```

t11FcSpPoNoMembFlags OBJECT-TYPE

```
SYNTAX      BITS {
                scsiEnclosureAccess(0),
                authenticationRequired(1)
            }
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Configurable options in respect to the administration of Policy Objects at this Node:

 'scsiEnclosureAccess' - the Node is allowed to control any Switch through SCSI Enclosure Services if this bit is set. If a Switch does not support SCSI Enclosure Services, this bit is ignored.

 'authenticationRequired' - the Node is required to authenticate itself to any Switch to which it is connected if and only if this bit is set."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.4.1 and table 118."

```
::= { t11FcSpPoNoMembEntry 3 }
```

t11FcSpPoNoMembCtAccessIndex OBJECT-TYPE

```
SYNTAX      Unsigned32 (0..4294967295)
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"If the value of this object is zero, then access by this Node to Generic Services is not limited by a Common Transport Access Specifier.

Otherwise, the limits are specified by the set of Common Transport Access Descriptors contained in those rows of the t11FcSpPoCtDescrTable for the same Fabric and for which the value of t11FcSpPoCtDescrSpecifierIndex is the same as the value of this object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.4.1 and tables 118/119/120/121."

```
::= { t11FcSpPoNoMembEntry 4 }
```

t11FcSpPoNoMembAttribute OBJECT-TYPE

```

SYNTAX      T11FcSpAlphaNumNameOrAbsent
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The name of an active Attribute Policy Object that is
    defined for this Node, or the zero-length string. The
    zero-length string indicates that no Attribute Policy
    Object is defined for this Node."
REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
    Fibre Channel - Security Protocols (FC-SP),
    February 2007, section 7.1.4.1 and table 116."
 ::= { t11FcSpPoNoMembEntry 5 }

```

```

--
--
-- Common Transport Access Descriptors
--

```

```

t11FcSpPoCtDescrTable OBJECT-TYPE
SYNTAX      SEQUENCE OF T11FcSpPoCtDescrEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "A table of Common Transport Access Descriptors being used
    within active Policy Objects.

    A Common Transport Access Specifier is a list of Common
    Transport Access Descriptors that specify whether a Node
    is allowed to access a Generic Service or Sub-Server.

    An active Common Transport Access Specifier is represented
    by all rows of this table that have the same values of
    fcmInstanceIndex, t11FcSpPoFabricIndex, and
    t11FcSpPoCtDescrSpecifierIndex."
 ::= { t11FcSpPoActive 5 }

```

```

t11FcSpPoCtDescrEntry OBJECT-TYPE
SYNTAX      T11FcSpPoCtDescrEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "Each entry contains information about one Common
    Transport Access Descriptor of an active Common Transport
    Access Specifier used within the Fabric identified by
    t11FcSpPoFabricIndex and managed within the Fibre Channel
    management instance identified by fcmInstanceIndex."
INDEX      { fcmInstanceIndex, t11FcSpPoFabricIndex,

```

```

        t11FcSpPoCtDescrSpecifierIndex, t11FcSpPoCtDescrIndex }
 ::= { t11FcSpPoCtDescrTable 1 }

T11FcSpPoCtDescrEntry ::= SEQUENCE {
    t11FcSpPoCtDescrSpecifierIndex  Unsigned32,
    t11FcSpPoCtDescrIndex           Unsigned32,
    t11FcSpPoCtDescrFlags           BITS,
    t11FcSpPoCtDescrGsType          OCTET STRING,
    t11FcSpPoCtDescrGsSubType       OCTET STRING
}

t11FcSpPoCtDescrSpecifierIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An index value that uniquely identifies a particular
        Common Transport Access Specifier within a Fabric."
    ::= { t11FcSpPoCtDescrEntry 1 }

t11FcSpPoCtDescrIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An index value that uniquely identifies a particular
        Common Transport Access Descriptor within a Common Transport
        Access Specifier."
    ::= { t11FcSpPoCtDescrEntry 2 }

t11FcSpPoCtDescrFlags OBJECT-TYPE
    SYNTAX      BITS {
        allow(0),
        gsTypeWildcard(1),
        gsSubTypeWildcard(2),
        readOnly(3)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The flag bits that specify how access is to be limited by
        this Common Transport Access Descriptor:

        - allow -- access to the specified Generic Service and
          Server is allowed if this bit is set, and is to be denied
          if this bit is not set.

        - gsTypeWildcard -- if this bit is set, the Generic Service

```


to be allowed/denied is specified by the value of t11FcSpPoCtDescrGsType. If this bit is set, then the gsSubTypeWildcard bit must not be set.

- gsSubTypeWildcard -- if this bit is set, the Generic Service to be allowed/denied is specified by the value of t11FcSpPoCtDescrGsSubType. If this bit is set, then the gsTypeWildcard bit must not be set.

- readOnly -- if this bit is set, then access is to be granted only for reading."

```
::= { t11FcSpPoCtDescrEntry 3 }
```

t11FcSpPoCtDescrGsType OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The GS_Type of the Generic Service (e.g., the FC-GS-5 Management Service) that is subject to access control.

This value is ignored if the gsTypeWildcard bit is not set in the corresponding value of t11FcSpPoCtDescrFlags."

REFERENCE

"- Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2006, section 4.3.2.4."

```
::= { t11FcSpPoCtDescrEntry 4 }
```

t11FcSpPoCtDescrGsSubType OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The GS_Subtype of the Generic Server (e.g., the Fabric Zone Server) that is subject to access control. This value is

ignored if the gsSubTypeWildcard bit is not set in the corresponding value of t11FcSpPoCtDescrFlags."

REFERENCE

"- Fibre Channel - Generic Services-5 (FC-GS-5),
ANSI INCITS 427-2006, section 4.3.2.5."

```
::= { t11FcSpPoCtDescrEntry 5 }
```

--

--

-- Switches/Nodes in Active Switch Connectivity Objects

--

t11FcSpPoSwConnTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoSwConnEntry

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"A table of active Switch Connectivity Objects.

A Switch Connectivity Object defines to which other Switches or Nodes a particular Switch may/may not be connected at the Node level and/or at the Port level."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 7.1.6.1, tables 123/124."

::= { t11FcSpPoActive 6 }

t11FcSpPoSwConnEntry OBJECT-TYPE

SYNTAX T11FcSpPoSwConnEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"Each entry contains the name of either a Switch or a Node with which any port of a particular Switch, or a particular port of that Switch, is allowed or not allowed to be connected.

The particular Switch is on the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex."

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
 t11FcSpPoSwConnSwitchName, t11FcSpPoSwConnAllowedType,
 t11FcSpPoSwConnPortNameOrAll,
 t11FcSpPoSwConnAllowedIndex }

::= { t11FcSpPoSwConnTable 1 }

T11FcSpPoSwConnEntry ::= SEQUENCE {

t11FcSpPoSwConnSwitchName FcNameIdOrZero,
 t11FcSpPoSwConnAllowedType INTEGER,
 t11FcSpPoSwConnPortNameOrAll FcNameIdOrZero,
 t11FcSpPoSwConnAllowedIndex Unsigned32,
 t11FcSpPoSwConnAllowedNameType T11FcSpPolicyNameType,
 t11FcSpPoSwConnAllowedName T11FcSpPolicyName

}

t11FcSpPoSwConnSwitchName OBJECT-TYPE

SYNTAX FcNameIdOrZero (SIZE (8))
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"The name of the particular Switch for which this Switch

Connectivity Object specifies topology restrictions."
 ::= { t11FcSpPoSwConnEntry 1 }

t11FcSpPoSwConnAllowedType OBJECT-TYPE

SYNTAX INTEGER { switch(1), node(2) }

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object specifies whether this row refers to Switch-to-Switch or Switch-to-Node connectivity, i.e., whether the corresponding instance of t11FcSpPoSwConnAllowedName specifies the name of a Switch or the name of a Node."

::= { t11FcSpPoSwConnEntry 2 }

t11FcSpPoSwConnPortNameOrAll OBJECT-TYPE

SYNTAX FcNameIdOrZero (SIZE(0 | 8))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object specifies either the particular port to which this topology restriction applies, or if the value is the zero-length string, that the topology restriction applies to all ports on the particular Switch."

In the FC-SP Policy Database, restrictions for a particular port are formatted within a Port Connectivity Entry of a Switch Connectivity Object, whereas restrictions for all ports on the Switch are specified in the main part of a Switch Connectivity Object, i.e., not in a Port Connectivity Entry."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 7.1.6.1, tables 123/124."

::= { t11FcSpPoSwConnEntry 3 }

t11FcSpPoSwConnAllowedIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"When multiple rows in this table apply to the same port(s) in the same Switch's Switch Connectivity Object, this object provides a unique index value to distinguish between such rows."

::= { t11FcSpPoSwConnEntry 4 }

t11FcSpPoSwConnAllowedNameType OBJECT-TYPE

```
SYNTAX      T11FcSpPolicyNameType {
                nodeName(1),
                restrictedNodeName(2),
                portName(3),
                restrictedPortName(4),
                wildcard(5),
                restrictedWildcard(6)
            }
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"If the value of this object is 'wildcard' or 'restrictedWildcard', this row specifies whether connectivity is allowed/not allowed with entities not explicitly named by other rows.

Otherwise, the combination of t11FcSpPoSwConnAllowedNameType and t11FcSpPoSwConnAllowedName specify the name of:

- a Switch (if t11FcSpPoSwConnAllowedType = 'switch'), or
- a Node (if t11FcSpPoSwConnAllowedType = 'node')

to which connectivity is:

- allowed by 'nodeName' and 'portName',
- not allowed by 'restrictedNodeName' and 'restrictedPortName'."

```
::= { t11FcSpPoSwConnEntry 5 }
```

t11FcSpPoSwConnAllowedName OBJECT-TYPE

```
SYNTAX      T11FcSpPolicyName (SIZE (8))
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"If the value of t11FcSpPoSwConnAllowedNameType is 'wildcard' or 'restrictedWildcard', this object has the value '0000000000000000'h.

Otherwise, the combination of t11FcSpPoSwConnAllowedNameType and t11FcSpPoSwConnAllowedName specify the name of:

- a Switch (if t11FcSpPoSwConnAllowedType = 'switch'), or
- a Node (if t11FcSpPoSwConnAllowedType = 'node')

to which connectivity is allowed/restricted."

```
::= { t11FcSpPoSwConnEntry 6 }
```

--
--
--

IP Management Entries in Active IP Management List Objects

t11FcSpPoIpMgmtTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoIpMgmtEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of IP Management Entries in active IP Management List Objects. An IP Management List Object is a Fabric-wide Policy Object that describes which IP hosts are allowed to manage a Fabric.

One IP Management List Object is represented by all of the rows of this table that have the same values of fcmInstanceIndex and t11FcSpPoFabricIndex."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.7"

::= { t11FcSpPoActive 7 }

t11FcSpPoIpMgmtEntry OBJECT-TYPE

SYNTAX T11FcSpPoIpMgmtEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information about one IP Management Entry within the active IP Management List Object for the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex.

The Policy Object Name of an IP Management Entry Policy Object is either an IPv6 Address Range or an IPv4 Address Range, where in each case, the range is specified as two addresses: the low and high ends of the range. In particular, since the Policy Object Name in this situation can only be an IPv6 Address Range or an IPv4 Address Range, it is represented here by three MIB objects defined as a (InetAddressType, InetAddress, InetAddress) tuple, in which the first address is the low end of the range, the second address is the high end of the range, and both addresses are of the type designated by InetAddressType.

In theory, the use of t11FcSpPoIpMgmtEntryNameLow and t11FcSpPoIpMgmtEntryNameHigh (which both have the syntax

of InetAddress) in the INDEX could cause the need for excessively long OIDs. In practice, this can't happen because FC-SP doesn't allow these objects to be specified as DNS names."

```
INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
        t11FcSpPoIpMgmtEntryNameType,
        t11FcSpPoIpMgmtEntryNameLow,
        t11FcSpPoIpMgmtEntryNameHigh }
 ::= { t11FcSpPoIpMgmtTable 1 }
```

```
T11FcSpPoIpMgmtEntry ::= SEQUENCE {
    t11FcSpPoIpMgmtEntryNameType    InetAddressType,
    t11FcSpPoIpMgmtEntryNameLow     InetAddress,
    t11FcSpPoIpMgmtEntryNameHigh    InetAddress,
    t11FcSpPoIpMgmtWkpIndex         Unsigned32,
    t11FcSpPoIpMgmtAttribute        T11FcSpAlphaNumNameOrAbsent
}
```

t11FcSpPoIpMgmtEntryNameType OBJECT-TYPE

```
SYNTAX      InetAddressType
            -- INTEGER { ipv4(1), ipv6(2) }
```

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The combination of t11FcSpPoIpMgmtNameType, t11FcSpPoIpMgmtNameLow, and t11FcSpPoIpMgmtNameHigh specify the Internet address range of this IP Management Entry in the IP Management List Object.

The FC-SP specification does not allow the use of a DNS domain name to specify the address at the lower end or at the higher end of the Internet address range, nor does it allow the specification of a zone index. Therefore, the type of address must be one of: 'ipv4', or 'ipv6'."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, sections 7.1.7.1 & 7.1.2, tables 103/126."

```
::= { t11FcSpPoIpMgmtEntry 1 }
```

t11FcSpPoIpMgmtEntryNameLow OBJECT-TYPE

```
SYNTAX      InetAddress (SIZE(4 | 16))
```

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The lower end of an Internet address range. The type of this address is given by the corresponding instance of t11FcSpPoIpMgmtEntryNameType.

The combination of `t11FcSpPoIpMgmtNameType`, `t11FcSpPoIpMgmtNameLow`, and `t11FcSpPoIpMgmtNameHigh` specify the Internet address range of this IP Management Entry in the IP Management List Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, sections 7.1.7.1 & 7.1.2, tables 103/126."

```
::= { t11FcSpPoIpMgmtEntry 2 }
```

`t11FcSpPoIpMgmtEntryNameHigh` OBJECT-TYPE

SYNTAX InetAddress (SIZE(4 | 16))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The higher end of an Internet address range. The type of this address is given by the corresponding instance of `t11FcSpPoIpMgmtEntryNameType`.

The combination of `t11FcSpPoIpMgmtNameType`, `t11FcSpPoIpMgmtNameLow`, and `t11FcSpPoIpMgmtNameHigh` specify the Internet address range of this IP Management Entry in the IP Management List Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, sections 7.1.7.1 & 7.1.2, tables 103/126."

```
::= { t11FcSpPoIpMgmtEntry 3 }
```

`t11FcSpPoIpMgmtWkpIndex` OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object identifies the restrictions for IP management access by IP hosts in this range of IP addresses, specified as the set of Well-Known Protocols Access Descriptors contained in those rows of the `t11FcSpPoWkpDescrTable` for which the value of `t11FcSpPoWkpDescrSpecifierIndex` is the same as the value of this object. A value of zero indicates that this IP Management Entry does not identify a Well-Known Protocols Access Specifier."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.7.1 and tables 127/129."

```
::= { t11FcSpPoIpMgmtEntry 4 }
```

t11FcSpPoIpMgmtAttribute OBJECT-TYPE

SYNTAX T11FcSpAlphaNumNameOrAbsent

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The name of an active Attribute Policy Object that is defined for this IP Management entry or the zero-length string. The zero-length string indicates that no Attribute Policy Object is defined for this IP Management entry."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.7.1 and table 128."

::= { t11FcSpPoIpMgmtEntry 5 }

--

-- Well-Known Protocol Access Descriptors

--

t11FcSpPoWkpDescrTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoWkpDescrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of the Well-Known Protocol Access Descriptors being used within active Policy Objects.

A Well-Known Protocol Access Specifier is a list of Well-Known Protocol Access Descriptors each of which specifies a protocol number, a port number, and/or various flags specifying how IP management access is restricted.

A Well-Known Protocol Transport Access Specifier is represented by all rows of this table that have the same values of fcmInstanceIndex, t11FcSpPoFabricIndex, and t11FcSpPoWkpDescrSpecifierIndex."

::= { t11FcSpPoActive 8 }

t11FcSpPoWkpDescrEntry OBJECT-TYPE

SYNTAX T11FcSpPoWkpDescrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information about one Well-Known Protocol Access Descriptor of a Well-Known Protocol Access Specifier used within the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex."


```

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
        t11FcSpPoWkpDescrSpecifierIndex, t11FcSpPoWkpDescrIndex }
 ::= { t11FcSpPoWkpDescrTable 1 }

```

```

T11FcSpPoWkpDescrEntry ::= SEQUENCE {
    t11FcSpPoWkpDescrSpecifierIndex Unsigned32,
    t11FcSpPoWkpDescrIndex          Unsigned32,
    t11FcSpPoWkpDescrFlags          BITS,
    t11FcSpPoWkpDescrWkpNumber      Unsigned32,
    t11FcSpPoWkpDescrDestPort       InetPortNumber
}

```

```

t11FcSpPoWkpDescrSpecifierIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "An index value that uniquely identifies a particular
        Well-Known Protocol Access Specifier within a Fabric."
    ::= { t11FcSpPoWkpDescrEntry 1 }

```

```

t11FcSpPoWkpDescrIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "An index value that uniquely identifies a particular
        Well-Known Protocol Access Descriptor within a Well-Known
        Protocol Access Specifier."
    ::= { t11FcSpPoWkpDescrEntry 2 }

```

```

t11FcSpPoWkpDescrFlags OBJECT-TYPE
    SYNTAX      BITS {
        allow(0),
        wkpWildcard(1),
        destPortWildcard(2),
        readOnly(3)
    }
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The flag bits that specify how access is to be limited by
        this Well-Known Protocol Access Descriptor:

        - allow -- IP management access using this protocol/port
          is allowed if this bit is set, and to be denied if this
          bit is not set."

```

- wkpWildcard -- if this bit is set, the IP Protocol number of the Well-Known Protocol to be allowed/denied is specified by the value of t11FcSpPoWkpDescrWkpNumber.
- destPortWildcard -- if this bit is set, the Destination (TCP/UDP) Port number of the Well-Known Protocol to be allowed/denied is specified by the value of t11FcSpPoWkpDescrDestPort.
- readOnly -- if this bit is set, then access is to be granted only for reading."

REFERENCE

- "- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.7.1 and table 131."

```
::= { t11FcSpPoWkpDescrEntry 3 }
```

t11FcSpPoWkpDescrWkpNumber OBJECT-TYPE

```
SYNTAX      Unsigned32 (0..255)
```

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

```
STATUS      current
```

DESCRIPTION

"When the 'wkpWildcard' bit is set in the corresponding instance of t11FcSpPoWkpDescrFlags, this object specifies the IP protocol number of the Well-Known Protocol."

REFERENCE

- "- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.7.1 and table 131.
- <http://www.iana.org/assignments/protocol-numbers>."

```
::= { t11FcSpPoWkpDescrEntry 4 }
```

t11FcSpPoWkpDescrDestPort OBJECT-TYPE

```
SYNTAX      InetPortNumber
```

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

```
STATUS      current
```

DESCRIPTION

"When the 'destPortWildcard' bit is set in the corresponding instance of t11FcSpPoWkpDescrFlags, this object specifies the Destination (TCP/UDP) Port number of the Well-Known Protocol. When the 'destPortWildcard' bit is reset, this object is ignored (and can have the value zero)."

REFERENCE

- "- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.7.1 and table 131.
- <http://www.iana.org/assignments/port-numbers>."

```
::= { t11FcSpPoWkpDescrEntry 5 }
```

--
-- Attribute Entries in Active Attribute Policy Objects
--

t11FcSpPoAttribTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoAttribEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of the Attribute Policy Objects being used within active Policy Objects. In the FC-SP Policy Database, each Attribute Policy Object consists of an Attribute Object Name and a set of Attribute Entries.

An active Attribute Policy Object is represented by all the Attribute Entries in this table that have the same value of t11FcSpPoAttribName."

::= { t11FcSpPoActive 9 }

t11FcSpPoAttribEntry OBJECT-TYPE

SYNTAX T11FcSpPoAttribEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each row contains information specific to an Attribute Entry contained within an Attribute Policy Object that is active within the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex.

For some types of Attribute Policy Objects, it is valuable to break out some semantically significant parts of the Policy Object's value into their own individual MIB objects; for example, to extract the one or more individual Authentication Protocol Identifiers and associated Authentication Protocol Parameters out of an Attribute Object containing a 'AUTH_Negotiate Message Payload'. For such types, another MIB table is defined to hold the extracted values in MIB objects specific to the Attribute Policy Object's type. In such cases, the t11FcSpPoAttribExtension object in this table points to the other MIB table.

If the value of one Attribute Entry is too large (more than 256 bytes) to be contained within the value of one instance of t11FcSpPoAttribValue, then one row in this table contains the first 256 bytes, and one (or more) other row(s) in this table contain the rest of the value."

```

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
        t11FcSpPoAttribName, t11FcSpPoAttribEntryIndex,
        t11FcSpPoAttribPartIndex }
 ::= { t11FcSpPoAttribTable 1 }

T11FcSpPoAttribEntry ::= SEQUENCE {
    t11FcSpPoAttribName      T11FcSpAlphaNumName,
    t11FcSpPoAttribEntryIndex Unsigned32,
    t11FcSpPoAttribPartIndex Unsigned32,
    t11FcSpPoAttribType      Unsigned32,
    t11FcSpPoAttribValue     OCTET STRING,
    t11FcSpPoAttribExtension OBJECT IDENTIFIER
}

t11FcSpPoAttribName OBJECT-TYPE
    SYNTAX      T11FcSpAlphaNumName
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The name of the Attribute Policy Object containing one
        or more Attribute Entries."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 7.1.8.1 and table 133."
    ::= { t11FcSpPoAttribEntry 1 }

t11FcSpPoAttribEntryIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A unique value to distinguish this Attribute Entry
        from other Attribute Entries contained in the same
        Attribute Policy Object."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 7.1.8.1, tables 133/134."
    ::= { t11FcSpPoAttribEntry 2 }

t11FcSpPoAttribPartIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "When the value of an Attribute Entry is shorter than 257
        bytes, the whole value is contained in one instance of

```

t11FcSpPoAttribValue, and the value of this object is 1.

If the value of an Attribute Entry is longer than 256 bytes, then that value is divided up on 256-byte boundaries such that all parts are 256 bytes long except the last part, which is shorter if necessary, with each such part contained in a separate row of this table, and the value of this object is set to the part number. That is, this object has the value of 1 for bytes 0-255, the value of 2 for bytes 256-511, etc."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.8.1, tables 134/135."

::= { t11FcSpPoAttribEntry 3 }

t11FcSpPoAttribType OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The type of attribute. The first type to be defined is:

t11FcSpPoAttribType	t11FcSpPoAttribValue
=====	=====
'00000001'h	The AUTH_Negotiate Message Payload
"	

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP), February 2007,
section 7.1.8.1, tables 134/135 and table 10."

::= { t11FcSpPoAttribEntry 4 }

t11FcSpPoAttribValue OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0..256))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of an Attribute Entry is divided up on 256-byte boundaries such that all parts are 256 bytes long except the last part, which is shorter if necessary, and each such part is contained in a separate instance of this object.

The value of this object is independent of whether some parts of its value are broken out into separate MIB objects pointed to by the corresponding instance of t11FcSpPoAttribExtension."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP), February 2007,
 section 7.1.8.1, tables 134/135 and table 10."
 ::= { t11FcSpPoAttribEntry 5 }

t11FcSpPoAttribExtension OBJECT-TYPE

SYNTAX OBJECT IDENTIFIER
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"For some types of Attribute Policy Object, the value of this MIB object points to type-specific MIB objects that contain individual/broken-out parts of the Attribute Policy Object's value. If this object doesn't point to such type-specific MIB objects, then it contains the value: zeroDotZero.

In particular, when the value of t11FcSpPoAttribType indicates 'AUTH_Negotiate Message Payload', one or more Authentication Protocol Identifiers and their associated Authentication Protocol Parameters are embedded within the value of the corresponding instance of t11FcSpPoAttribValue; MIB objects to contain these individual values are defined in the t11FcSpPoAuthProtTable. Thus, for an 'AUTH_Negotiate Message Payload' Attribute, the value of this object contains an OID within the t11FcSpPoAuthProtTable, e.g., of the whole table, of an individual row, or of an individual instance within the table."

::= { t11FcSpPoAttribEntry 6 }

--

-- Auth. Protocol Parameters in Active Attribute Policy Objects

--

t11FcSpPoAuthProtTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoAuthProtEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"A table of Authentication Protocol Identifier and Authentication Protocol Parameters that are embedded in Attribute Policy Objects being used within active Policy Objects.

This table is used for Attribute Entries of Attribute Policy Objects for which the value of t11FcSpPoAttribType indicates 'AUTH_Negotiate Message Payload' and the value of t11FcSpPoAttribExtension contains the OID of this table."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP), February 2007,
sections 5.3.2 & 7.1.8.1, tables 134/135 and tables
10/11."

::= { t11FcSpPoActive 10 }

t11FcSpPoAuthProtEntry OBJECT-TYPE

SYNTAX T11FcSpPoAuthProtEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information about an Authentication Protocol that is extracted out of the Attribute Entry (identified by t11FcSpPoAttribEntryIndex) of the Policy Attribute Object (identified by t11FcSpPoAttribName), which is active within the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex.

If the value of one Attribute Protocol Parameters string is too large (more than 256 bytes) to be contained within the value of one instance of t11FcSpPoAuthProtParams, then one row in this table contains the first 256 bytes, and one (or more) other row(s) in this table contain the rest of the value."

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
t11FcSpPoAttribName, t11FcSpPoAttribEntryIndex,
t11FcSpPoAuthProtIdentifier,
t11FcSpPoAuthProtPartIndex }

::= { t11FcSpPoAuthProtTable 1 }

T11FcSpPoAuthProtEntry ::= SEQUENCE {

t11FcSpPoAuthProtIdentifier Unsigned32,
t11FcSpPoAuthProtPartIndex Unsigned32,
t11FcSpPoAuthProtParams OCTET STRING

}

t11FcSpPoAuthProtIdentifier OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The Authentication Protocol Identifier:

1	= DH-CHAP
2	= FCAP
3	= FCPAP

4 = IKEv2
 5 = IKEv2-AUTH
 240 thru 255 = Vendor Specific Protocols

all other values are 'Reserved' (by T11)."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 5.3.2, table 11."

::= { t11FcSpPoAuthProtEntry 1 }

t11FcSpPoAuthProtPartIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"When the value of an Attribute Protocol Parameters string is shorter than 257 bytes, the whole value is contained in one instance of t11FcSpPoAuthProtParams, and the value of this object is 1. (This includes the case when the Attribute Protocol Parameters string is zero bytes in length.)

If the value of an Authentication Protocol Parameters string is longer than 256 bytes, then that value is divided up on 256-byte boundaries such that all parts are 256 bytes long except the last part, which is shorter if necessary, with each such part contained in a separate row of this table, and the value of this object is set to the part number. That is, this object has the value of 1 for bytes 0-255, the value of 2 for bytes 256-511, etc."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 5.3.2, table 10."

::= { t11FcSpPoAuthProtEntry 2 }

t11FcSpPoAuthProtParams OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0..256))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of an Authentication Protocol Parameters string is divided up on 256-byte boundaries such that all parts are 256 bytes long except the last part, which is shorter if necessary, and each such part is contained in a separate instance of this object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,

Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.3.2, table 10."

```
::= { t11FcSpPoAuthProtEntry 3 }
```

```
--
```

```
-- Part 2 - Activate/De-Activate Operations
```

```
--
```

```
--
```

```
-- Objects to Invoke Activate/De-Activate Operations
```

```
--
```

```
t11FcSpPoOperTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF T11FcSpPoOperEntry
```

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

```
STATUS          current
```

```
DESCRIPTION
```

"A table that allows Activate and Deactivate operations to be invoked for FC-SP Policies on various Fabrics.

Activating a new policy configuration is a two-step process:

- 1) create a single Policy Summary Object as a set of rows in the t11FcSpPoNaSummaryTable specifying a set of Policy Objects that describe the new configuration; and
- 2) activate that Policy Summary Object using the t11FcSpPoOperActivate object defined in this table.

Deactivating the current policy configuration is a one-step process: the current Policy Summary Object is deactivated using the t11FcSpPoOperDeActivate object."

```
::= { t11FcSpPoOperations 1 }
```

```
t11FcSpPoOperEntry OBJECT-TYPE
```

```
SYNTAX          T11FcSpPoOperEntry
```

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

```
STATUS          current
```

```
DESCRIPTION
```

"Each entry allows an Activate and/or Deactivate operation to be invoked on a particular Fabric, which is managed as part of the Fibre Channel management instance identified by fcmInstanceIndex."

```
INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex }
```

```
::= { t11FcSpPoOperTable 1 }
```

```
T11FcSpPoOperEntry ::= SEQUENCE {
```

```
    t11FcSpPoOperActivate      T11FcSpAlphaNumName,
```

```

t11FcSpPoOperDeActivate    T11FcSpAlphaNumName,
t11FcSpPoOperResult        INTEGER,
t11FcSpPoOperFailCause     SnmpAdminString
}

```

t11FcSpPoOperActivate OBJECT-TYPE

```

SYNTAX          T11FcSpAlphaNumName
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION

```

"Writing the name of a Policy Summary Object into this object is a request to activate the policy configuration described by the combination of all rows in t11FcSpPoNaSummaryTable that have that name as their value of t11FcSpPoNaSummaryName and are for the same Fabric.

Before issuing such a request, the relevant rows in the t11FcSpPoNaSummaryTable must exist and represent a complete and consistent Policy Summary Object. If they do not, the request will fail, with t11FcSpPoOperResult having the 'badSummaryObject' value.

When read, the value of this object is always the zero-length string.

Writing to this object does not delete (or in any way affect) any rows in the MIB tables for non-active Policy Objects."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.3.6.2"

```
::= { t11FcSpPoOperEntry 1 }
```

t11FcSpPoOperDeActivate OBJECT-TYPE

```

SYNTAX          T11FcSpAlphaNumName
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION

```

"Writing the current value of t11FcSpPoPolicySummaryObjName into this object (for a particular Fabric) is a request to deactivate that Fabric's current policy configuration. Writing any other value into this object is an error (e.g., 'wrongValue')."

When read, the value of this object is always the zero-length string."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.3.6.3"

::= { t11FcSpPoOperEntry 2 }

t11FcSpPoOperResult OBJECT-TYPE

SYNTAX INTEGER {
activateSuccess(1),
badSummaryObject(2),
activateFailure(3),
deactivateSuccess(4),
deactivateFailure(5),
inProgress(6),
none(7)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object indicates the status/result of the last activation/deactivation that was invoked via the corresponding instance of t11FcSpPoOperActivate or t11FcSpPoOperDeActivate.

When the value of this object is 'inProgress', the values of the corresponding instances of t11FcSpPoOperActivate and t11FcSpPoOperDeActivate cannot be modified.

The value 'badSummaryObject' indicates an activation request that did not name a complete and consistent Policy Summary Object.

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

::= { t11FcSpPoOperEntry 3 }

t11FcSpPoOperFailCause OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE (0..64))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A textual message indicating the reason for the most recent activation/deactivation failure, or the zero-length string if no information is available (e.g., because the corresponding instance of t11FcSpPoOperResult has the value 'none')."

When the corresponding instance of
 t11FcSpPoOperResult is either 'activateFailure'
 or 'deactivateFailure', the value of this object
 indicates the reason for that failure."
 ::= { t11FcSpPoOperEntry 4 }

--

-- Part 3 - Non-Active Policy Objects

--

--

-- Non-Active Policy Summary Objects Available for Activation

--

t11FcSpPoNaSummaryTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoNaSummaryEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of non-active Policy Summary Objects available
 to be activated.

The functionality of this table deviates slightly from FC-SP
 in that FC-SP specifies that the only Policy Summary Object
 is the Active one, i.e., FC-SP does not store non-active
 Policy Summary Objects in the Policy Database. Instead,
 FC-SP requires a new Policy Summary Object to be created
 for, and embedded within, every Activate (APS) request.
 Thus, the newly created Policy Summary Object outlasts the
 APS request only as the new active Policy Summary Object and
 only if the APS succeeds. In contrast, the Activate
 operation provided by this MIB module consists of two steps:

- 1) create a non-active Policy Summary Object as a set of
 entries in this table describing a new configuration;
- 2) activate a Policy Summary Object (stored as a set of
 entries in this table) using t11FcSpPoOperActivate.

These two steps are only loosely connected, i.e., the result
 of the first operation is a non-active Policy Summary Object
 that is retained (in this table) even if it isn't
 immediately activated. Even after an attempt to activate
 it succeeds or fails, a non-active Policy Summary Object
 is not deleted, but is retained and still available for
 subsequent modification/re-use."

::= { t11FcSpPoNonActive 1 }

t11FcSpPoNaSummaryEntry OBJECT-TYPE

SYNTAX T11FcSpPoNaSummaryEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"Each entry contains information about one non-active Policy Object within a non-active Policy Summary Object defined for potential use on the Fabric identified by t11FcSpPoFabricIndex, and managed within the Fibre Channel management instance identified by fcmInstanceIndex.

A non-active Policy Summary Object is described by a set of entries in this table that have the same value of t11FcSpPoNaSummaryName.

As and when a Policy Summary Object is activated using the t11FcSpPoOperActivate object, if the activation is successful, existing rows (if any) in MIB tables for active Policy Objects are deleted and replaced by the appropriate new set of rows. Existing rows in this table and/or in other tables for non-active Policy Objects are not affected by the activate operation.

The StorageType of a row in this table is specified by the instance of t11FcSpPoStorageType that is INDEX-ed by the same values of fcmInstanceIndex and t11FcSpPoFabricIndex."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 7.1.3 and table 104."

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
 t11FcSpPoNaSummaryName, t11FcSpPoNaSummaryPolicyType,
 t11FcSpPoNaSummaryPolicyIndex }
 ::= { t11FcSpPoNaSummaryTable 1 }

```
T11FcSpPoNaSummaryEntry ::= SEQUENCE {
    t11FcSpPoNaSummaryName          T11FcSpAlphaNumName,
    t11FcSpPoNaSummaryPolicyType    T11FcSpPolicyObjectType,
    t11FcSpPoNaSummaryPolicyIndex   Unsigned32,
    t11FcSpPoNaSummaryPolicyNameType T11FcSpPolicyNameType,
    t11FcSpPoNaSummaryPolicyName    T11FcSpPolicyName,
    t11FcSpPoNaSummaryHashStatus    T11FcSpHashCalculationStatus,
    t11FcSpPoNaSummaryHashFormat    T11FcSpPolicyHashFormat,
    t11FcSpPoNaSummaryHashValue     T11FcSpPolicyHashValue,
    t11FcSpPoNaSummaryRowStatus     RowStatus
}
```

t11FcSpPoNaSummaryName OBJECT-TYPE
 SYNTAX T11FcSpAlphaNumName

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"The name of the non-active Policy Summary Object that contains this Policy Object."

::= { t11FcSpPoNaSummaryEntry 1 }

t11FcSpPoNaSummaryPolicyType OBJECT-TYPE

SYNTAX T11FcSpPolicyObjectType
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"The 'Identifier' (i.e., the type) of this Policy Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 7.1.3.1 and table 104."

::= { t11FcSpPoNaSummaryEntry 2 }

t11FcSpPoNaSummaryPolicyIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"A unique integer value to distinguish this Policy Object from any others that have the same type and that are contained in the same Policy Summary Object."

::= { t11FcSpPoNaSummaryEntry 3 }

t11FcSpPoNaSummaryPolicyNameType OBJECT-TYPE

SYNTAX T11FcSpPolicyNameType {
 nodeName(1),
 alphaNumericName(7)
 }

MAX-ACCESS read-create
 STATUS current
 DESCRIPTION

"The combination of t11FcSpPoNaSummaryPolicyNameType and t11FcSpPoNaSummaryPolicyName specify the name of the non-active Policy Object identified by this row.

The type of name must be 'nodeName' if the value of the corresponding instance of t11FcSpPoNaSummaryPolicyType is 'switchConnectivity', or 'alphaNumericName' otherwise."

::= { t11FcSpPoNaSummaryEntry 4 }

t11FcSpPoNaSummaryPolicyName OBJECT-TYPE

SYNTAX T11FcSpPolicyName

MAX-ACCESS read-create
 STATUS current
 DESCRIPTION

"The combination of t11FcSpPoNaSummaryPolicyNameType and
 t11FcSpPoNaSummaryPolicyName specify the name of the
 non-active Policy Object identified by this row."

::= { t11FcSpPoNaSummaryEntry 5 }

t11FcSpPoNaSummaryHashStatus OBJECT-TYPE

SYNTAX T11FcSpHashCalculationStatus
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION

"When read, the value of this object is either:

correct -- the corresponding instance of
 t11FcSpPoNaSummaryHashValue contains
 the correct value; or

stale -- the corresponding instance of
 t11FcSpPoNaSummaryHashValue contains
 a stale (possibly incorrect) value;

Writing a value of 'calculate' is a request to re-calculate
 and update the value of the corresponding instance of
 t11FcSpPoNaSummaryHashValue. Writing a value of 'correct'
 or 'stale' to this object is an error (e.g., 'wrongValue')."

DEFVAL { stale }

::= { t11FcSpPoNaSummaryEntry 6 }

t11FcSpPoNaSummaryHashFormat OBJECT-TYPE

SYNTAX T11FcSpPolicyHashFormat
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"The format of this Policy Object's hash value as
 contained in the corresponding instance of the
 t11FcSpPoNaSummaryHashValue object."

DEFVAL { '00000001'h }

::= { t11FcSpPoNaSummaryEntry 7 }

t11FcSpPoNaSummaryHashValue OBJECT-TYPE

SYNTAX T11FcSpPolicyHashValue
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"The hash value of this Policy Object, in the format
 identified by the corresponding instance of the
 t11FcSpPoNaSummaryHashFormat object."

```

DEFVAL      { "" }
 ::= { t11FcSpPoNaSummaryEntry 8 }

```

t11FcSpPoNaSummaryRowStatus OBJECT-TYPE

```

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

```

Before a row in this table can have 'active' status, a non-Active Policy Object must already be represented in the table corresponding to the value of t11FcSpPoNaSummaryPolicyType with the name given by the combination of t11FcSpPoNaSummaryPolicyNameType and t11FcSpPoNaSummaryPolicyName. If such a Policy Object gets deleted from the relevant table, the row in this table must also get deleted.

When a row has 'active' status, the only write-able MIB objects in this table are t11FcSpPoNaSummaryHashStatus and t11FcSpPoNaSummaryRowStatus."

```

 ::= { t11FcSpPoNaSummaryEntry 9 }

```

```

--
-- Non-Active Switch Membership List Objects
--

```

t11FcSpPoNaSwListTable OBJECT-TYPE

```

SYNTAX      SEQUENCE OF T11FcSpPoNaSwListEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "A table of non-active Switch Membership List Objects."
REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
      Fibre Channel - Security Protocols (FC-SP),
      February 2007, section 7.1.4.1 and table 108."
 ::= { t11FcSpPoNonActive 2 }

```

t11FcSpPoNaSwListEntry OBJECT-TYPE

```

SYNTAX      T11FcSpPoNaSwListEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "Each entry contains information about one non-active
      Switch Membership List Object for the Fabric identified
      by t11FcSpPoFabricIndex and managed within the Fibre

```


Channel management instance identified by
fcmInstanceIndex.

The StorageType of a row in this table is specified by the
instance of t11FcSpPoStorageType that is INDEX-ed by the
same values of fcmInstanceIndex and t11FcSpPoFabricIndex."

```
INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
        t11FcSpPoNaSwListName }
 ::= { t11FcSpPoNaSwListTable 1 }
```

```
T11FcSpPoNaSwListEntry ::= SEQUENCE {
    t11FcSpPoNaSwListName      T11FcSpAlphaNumName,
    t11FcSpPoNaSwListFabricName FcNameIdOrZero,
    t11FcSpPoNaSwListRowStatus RowStatus
}
```

```
t11FcSpPoNaSwListName OBJECT-TYPE
    SYNTAX      T11FcSpAlphaNumName
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The name of the Switch Membership List Object."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
          Fibre Channel - Security Protocols (FC-SP),
          February 2007, section 7.1.4.1 and table 108."
    ::= { t11FcSpPoNaSwListEntry 1 }
```

```
t11FcSpPoNaSwListFabricName OBJECT-TYPE
    SYNTAX      FcNameIdOrZero
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The administratively specified Fabric_Name. This value
         is meaningful only when static Domain_IDs are used in a
         Fabric. If Static Domain_IDs are not used, the Fabric_Name
         is dynamically determined, in which case the value of this
         object can be '0000000000000000'h or the zero-length
         string."
    REFERENCE
        "- t11FamConfigDomainId, T11-FC-FABRIC-ADDR-MGR-MIB,
          Fibre Channel Fabric Address Manager MIB, RFC 4439;
        - ANSI INCITS 426-2007, T11/Project 1570-D,
          Fibre Channel - Security Protocols (FC-SP),
          February 2007, table 108."
    ::= { t11FcSpPoNaSwListEntry 2 }
```

```
t11FcSpPoNaSwListRowStatus OBJECT-TYPE
```

```

SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The status of this row.  Values of object instances
    within the row can be modified at any time.

    If a row in this table is deleted, any row in the
    t11FcSpPoNaSwMembTable for the same Switch Membership
    List Object will also get deleted."
 ::= { t11FcSpPoNaSwListEntry 3 }

```

```

--
-- Switch Entries in Non-Active Switch Membership List Objects
--

```

```

t11FcSpPoNaSwMembTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11FcSpPoNaSwMembEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table of Switch Entries in non-active Switch Membership
        List Objects."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 7.1.4.1 and table 110."
    ::= { t11FcSpPoNonActive 3 }

```

```

t11FcSpPoNaSwMembEntry OBJECT-TYPE
    SYNTAX      T11FcSpPoNaSwMembEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Each entry contains information about one Switch that
        is listed in a Switch Entry of a non-active Switch Membership
        List Object for the Fabric identified by t11FcSpPoFabricIndex
        and managed within the Fibre Channel management instance
        identified by fcmInstanceIndex.

        A row cannot exist unless there is a row in
        t11FcSpPoNaSwListTable for the given Switch Membership List
        Object, i.e., the row in t11FcSpPoNaSwListTable for a
        Switch Membership List Object must be created before (or
        simultaneously with) a row in this table for a Switch
        Entry in that Switch Membership List Object, and when a
        row in t11FcSpPoNaSwListTable is deleted, all rows in this
        table for Switch Entries in that Switch Membership List

```

Object also get deleted.

The StorageType of a row in this table is specified by the instance of t11FcSpPoStorageType that is INDEX-ed by the same values of fcmInstanceIndex and t11FcSpPoFabricIndex."

```
INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
        t11FcSpPoNaSwListName,
        t11FcSpPoNaSwMembSwitchNameType,
        t11FcSpPoNaSwMembSwitchName }
 ::= { t11FcSpPoNaSwMembTable 1 }
```

```
T11FcSpPoNaSwMembEntry ::= SEQUENCE {
    t11FcSpPoNaSwMembSwitchNameType T11FcSpPolicyNameType,
    t11FcSpPoNaSwMembSwitchName      FcNameIdOrZero,
    t11FcSpPoNaSwMembFlags            BITS,
    t11FcSpPoNaSwMembDomainID         FcDomainIdOrZero,
    t11FcSpPoNaSwMembPolicyDataRole  INTEGER,
    t11FcSpPoNaSwMembAuthBehaviour    BITS,
    t11FcSpPoNaSwMembAttribute        T11FcSpAlphaNumNameOrAbsent,
    t11FcSpPoNaSwMembRowStatus        RowStatus
}
```

t11FcSpPoNaSwMembSwitchNameType OBJECT-TYPE

```
SYNTAX      T11FcSpPolicyNameType {
                nodeName(1),
                restrictedNodeName(2),
                wildcard(5),
                restrictedWildcard(6)
            }
```

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"If the value of this object is 'nodeName' or 'restrictedNodeName', then the combination of this object and t11FcSpPoNaSwMembSwitchName specify the Switch Name of this Switch Entry.

The membership is restricted or unrestricted based on the name type. Restricted membership means that the Switch is not allowed to be part of the Fabric unless allowed by a specific Switch Connectivity Object. Unrestricted membership means that the Switch is allowed to be part of the Fabric unless disallowed by a specific Switch Connectivity Object.

The values of 'wildcard' and 'restrictedWildcard' provide the means to specify whether to allow/deny membership for Switches not explicitly named in the Switch Membership

List Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 110."

::= { t11FcSpPoNaSwMembEntry 1 }

t11FcSpPoNaSwMembSwitchName OBJECT-TYPE

SYNTAX FcNameIdOrZero (SIZE (8))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"If the value of t11FcSpPoSwMembSwitchNameType is
'wildcard' or 'restrictedWildcard', this object has the
value '0000000000000000'h.

Otherwise, the combination of
t11FcSpPoNaSwMembSwitchNameType and this object specify the
Switch Name of this Switch Entry."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 110."

::= { t11FcSpPoNaSwMembEntry 2 }

t11FcSpPoNaSwMembFlags OBJECT-TYPE

SYNTAX BITS {
staticDomainID(0),
insistentDomainID(1),
serialPortsAccess(2),
physicalPortsAccess(3),
managerRole(4)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Configurable options in respect to the administration
of Policy Objects at this Switch:

'staticDomainID' - the Switch uses the 'Static
Domain_IDs behavior' (as defined in FC-SW-4) when this bit
is set. This bit should have the same setting for all
Switches in a Fabric's Switch Membership List Object, or
else the Fabric will partition. If this bit is set,
the 'insistentDomainID' bit must not be set.

'insistentDomainID' - if this bit is set, the Switch
uses the 'Insistent Domain_IDs behavior' (as defined in

FC-SW-4), and the 'staticDomainID' bit must not be set.

'serialPortsAccess' - the Switch allows management through serial ports when and only when this bit is set.

'physicalPortsAccess' - the Switch allows management through the physical panel when and only when this bit is set.

'managerRole' - the Switch is allowed to change the Fabric Policy configuration (on receipt of any of the EACA, ESFC, EUFC, ACA, SFC, or UFC SW_ILSs) if this bit is set."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 112."

::= { t11FcSpPoNaSwMembEntry 3 }

t11FcSpPoNaSwMembDomainID OBJECT-TYPE

SYNTAX FcDomainIdOrZero

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Domain_ID to be used when either the 'staticDomainID' bit or the 'insistentDomainID' bit is set in the corresponding value of t11FcSpPoNaSwMembFlags."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and tables 111 and 112."

::= { t11FcSpPoNaSwMembEntry 4 }

t11FcSpPoNaSwMembPolicyDataRole OBJECT-TYPE

SYNTAX INTEGER {
 client(1),
 autonomous(2),
 server(3)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The role of the Switch in terms of which Policy data it retains/maintains:

'client' - the Switch operates as a Client Switch. A Client Switch maintains its own Switch Connectivity Object and all Fabric-wide List Objects. If FC-SP

Zoning is used, a Client Switch maintains only the subset of the Active Zone Set that it requires to enforce the current Fabric Zoning configuration.

'autonomous' - the Switch operates as an Autonomous Switch. An Autonomous Switch maintains its own Switch Connectivity Object and all Fabric-wide List Objects. This is the same as 'client' except that if FC-SP Zoning is used, an Autonomous Switch maintains a complete copy of the Fabric Zoning Database.

'server' - the Switch operates as a Server Switch. A Server Switch maintains all Fabric-wide List Objects and the Switch Connectivity Objects of each Switch in the Fabric. If FC-SP Zoning is used, a Server Switch maintains a complete copy of the Fabric Zoning Database."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 113."

::= { t11FcSpPoNaSwMembEntry 5 }

t11FcSpPoNaSwMembAuthBehaviour OBJECT-TYPE

SYNTAX BITS {
mustAuthenticate(0),
rejectIsFailure(1)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The authentication behaviour of the Switch:

'mustAuthenticate' - if this bit is set, all connections between this Switch and neighbor Switches must be authenticated.

'rejectIsFailure' - if this bit is set, the rejection of an AUTH_Negotiate message must be considered as an authentication failure by this Switch."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 114."

::= { t11FcSpPoNaSwMembEntry 6 }

t11FcSpPoNaSwMembAttribute OBJECT-TYPE

SYNTAX T11FcSpAlphaNumNameOrAbsent

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The name of a non-active Attribute Policy Object that is defined for this Switch. The zero-length string indicates that no non-active Attribute Policy Object is defined for this Switch.

The effect of having no rows in the t11FcSpPoNaAttribTable for which the value of t11FcSpPoNaAttribName is the same as the value of this object, is the same as this object's value being the zero-length string."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 110."

::= { t11FcSpPoNaSwMembEntry 7 }

t11FcSpPoNaSwMembRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this row. Values of object instances within the row can be modified at any time.

A row cannot exist unless there is a row in the t11FcSpPoNaSwListTable for the Switch Membership List Object containing the Switch Entry for this Switch, i.e., the row in t11FcSpPoNaSwListTable for a Switch Membership List Object must be created before (or simultaneously) with a row in this table for a Switch Entry in that Switch Membership List Object; and when a row in t11FcSpPoNaSwListTable is deleted, any row in this table for a Switch Entry in that Switch Membership List Object also gets deleted."

::= { t11FcSpPoNaSwMembEntry 8 }

--

-- Node Entries in Non-Active Node Membership List Objects

--

t11FcSpPoNaNoMembTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoNaNoMembEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of Node Entries in non-active Node Membership List Objects.

One Node Membership List Object is represented by all the rows in this table that have the same value of t11FcSpPoNaNoMembListName."

::= { t11FcSpPoNonActive 4 }

t11FcSpPoNaNoMembEntry OBJECT-TYPE

SYNTAX T11FcSpPoNaNoMembEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information about one Node Entry of a non-active Node Membership List Object for the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIdIndex."

The StorageType of a row in this table is specified by the instance of t11FcSpPoStorageType that is INDEX-ed by the same values of fcmInstanceIdIndex and t11FcSpPoFabricIndex."

INDEX { fcmInstanceIdIndex, t11FcSpPoFabricIndex,
t11FcSpPoNaNoMembListName,
t11FcSpPoNaNoMembNodeNameType,
t11FcSpPoNaNoMembNodeName }

::= { t11FcSpPoNaNoMembTable 1 }

T11FcSpPoNaNoMembEntry ::= SEQUENCE {

t11FcSpPoNaNoMembListName T11FcSpAlphaNumName,

t11FcSpPoNaNoMembNodeNameType T11FcSpPolicyNameType,

t11FcSpPoNaNoMembNodeName FcNameIdOrZero,

t11FcSpPoNaNoMembFlags BITS,

t11FcSpPoNaNoMembCtAccessIndex Unsigned32,

t11FcSpPoNaNoMembAttribute T11FcSpAlphaNumNameOrAbsent,

t11FcSpPoNaNoMembRowStatus RowStatus

}

t11FcSpPoNaNoMembListName OBJECT-TYPE

SYNTAX T11FcSpAlphaNumName

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The name of the non-active Node Membership List Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.4.1 and table 116."

::= { t11FcSpPoNaNoMembEntry 1 }

t11FcSpPoNaNoMembNodeNameType OBJECT-TYPE


```

SYNTAX      T11FcSpPolicyNameType {
                nodeName(1),
                restrictedNodeName(2),
                portName(3),
                restrictedPortName(4),
                wildcard(5),
                restrictedWildcard(6)
            }
MAX-ACCESS   not-accessible
STATUS       current
DESCRIPTION   "If the value of this object is 'wildcard' or
                'restrictedWildcard', this Node Entry applies to Nodes not
                explicitly named in the Node Membership List Object.

                Otherwise, the combination of this object and
                t11FcSpPoNaNoMembNodeName specify the name of this Node Entry
                in the active Node Membership List Object. A Node is
                identified by its Node Name or by one or more of its Port
                Names.

                Restricted membership means that a Node is not allowed to be
                connected to the Fabric unless allowed by a specific Switch
                Connectivity Object. Unrestricted membership means that a
                Node is allowed to be connected to the Fabric unless
                disallowed by a specific Switch Connectivity Object."

REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
       Fibre Channel - Security Protocols (FC-SP),
       February 2007, section 7.1.4.1 and table 116."
 ::= { t11FcSpPoNaNoMembEntry 2 }

t11FcSpPoNaNoMembNodeName OBJECT-TYPE
SYNTAX       FcNameIdOrZero (SIZE (8))
MAX-ACCESS   not-accessible
STATUS       current
DESCRIPTION   "If the value of t11FcSpPoNaNoMembNodeNameType is
                'wildcard' or 'restrictedWildcard', this object has the
                value '0000000000000000'h.

                Otherwise, the combination of t11FcSpPoNaNoMembNodeNameType
                and this object specify the name of this Node Entry is the
                active Node Membership List Object."

REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
       Fibre Channel - Security Protocols (FC-SP),
       February 2007, section 7.1.4.1 and table 116."

```

```
::= { t11FcSpPoNaNoMembEntry 3 }
```

t11FcSpPoNaNoMembFlags OBJECT-TYPE

```
SYNTAX      BITS {
                scsiEnclosureAccess(0),
                authenticationRequired(1)
            }
```

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Configurable options in respect to the administration of Policy Objects at this Node:

 'scsiEnclosureAccess' - the Node is allowed to control any Switch through SCSI Enclosure Services if this bit is set. If a Switch does not support SCSI Enclosure Services, this bit is ignored.

 'authenticationRequired' - the Node is required to authenticate itself to any Switch to which it is connected if and only if this bit is set."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.4.1 and table 118."

```
::= { t11FcSpPoNaNoMembEntry 4 }
```

t11FcSpPoNaNoMembCtAccessIndex OBJECT-TYPE

```
SYNTAX      Unsigned32 (0..4294967295)
```

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If the value of this object is zero, then access by this Node to Generic Services is not limited by a Common Transport Access Specifier.

Otherwise, the limits are specified by the set of Common Transport Access Descriptors contained in those rows of the t11FcSpPoNaCtDescrTable for which the value of t11FcSpPoNaCtDescrSpecifierIndex is the same as the value of this object. No such rows in t11FcSpPoNaCtDescrTable have the same effect as this object's value being zero."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.4.1 and tables 118/119/120/121."

```
::= { t11FcSpPoNaNoMembEntry 5 }
```

```

t11FcSpPoNaNoMembAttribute OBJECT-TYPE
    SYNTAX      T11FcSpAlphaNumNameOrAbsent
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The name of a non-active Attribute Policy Object that
         is defined for this Node.  The zero-length string indicates
         that no non-active Attribute Policy Object is defined for
         this Node.

         The effect of having no rows in the t11FcSpPoNaAttribTable
         for which the value of t11FcSpPoNaAttribName is the
         same as the value of this object, is the same as
         this object's value being the zero-length string."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
         Fibre Channel - Security Protocols (FC-SP),
         February 2007, section 7.1.4.1 and table 116."
    ::= { t11FcSpPoNaNoMembEntry 6 }

```

```

t11FcSpPoNaNoMembRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this row.  Values of object instances
         within the row can be modified at any time."
    ::= { t11FcSpPoNaNoMembEntry 7 }

```

```

--
--
-- Non-Active Common Transport Access Descriptors
--

```

```

t11FcSpPoNaCtDescrTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11FcSpPoNaCtDescrEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A table of Common Transport Access Descriptors referenced
         by non-active Policy Objects.

         A Common Transport Access Specifier is a list of Common
         Transport Access Descriptors that specify whether a Node
         is allowed to access a Generic Service or Sub-Server.

         A non-active Common Transport Access Specifier is
         represented by all rows of this table that have the same

```

values of fcmInstanceIndex, t11FcSpPoFabricIndex, and
t11FcSpPoNaCtDescrSpecifierIndex."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.5"

::= { t11FcSpPoNonActive 5 }

t11FcSpPoNaCtDescrEntry OBJECT-TYPE

SYNTAX T11FcSpPoNaCtDescrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information about one Common Transport
Access Descriptor of an non-active Common Transport Access
Specifier used within the Fabric identified by
t11FcSpPoFabricIndex and managed within the Fibre Channel
management instance identified by fcmInstanceIndex.

The StorageType of a row in this table is specified by the
instance of t11FcSpPoStorageType that is INDEX-ed by the
same values of fcmInstanceIndex and t11FcSpPoFabricIndex."

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
t11FcSpPoNaCtDescrSpecifierIndex, t11FcSpPoNaCtDescrIndex }
::= { t11FcSpPoNaCtDescrTable 1 }

T11FcSpPoNaCtDescrEntry ::= SEQUENCE {
t11FcSpPoNaCtDescrSpecifierIndex Unsigned32,
t11FcSpPoNaCtDescrIndex Unsigned32,
t11FcSpPoNaCtDescrFlags BITS,
t11FcSpPoNaCtDescrGsType OCTET STRING,
t11FcSpPoNaCtDescrGsSubType OCTET STRING,
t11FcSpPoNaCtDescrRowStatus RowStatus
}

t11FcSpPoNaCtDescrSpecifierIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An index value that uniquely identifies a particular
Common Transport Access Specifier within a Fabric."

::= { t11FcSpPoNaCtDescrEntry 1 }

t11FcSpPoNaCtDescrIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An index value that uniquely identifies a particular Common Transport Access Descriptor within a Common Transport Access Specifier."

::= { t11FcSpPoNaCtDescrEntry 2 }

t11FcSpPoNaCtDescrFlags OBJECT-TYPE

SYNTAX BITS {
 allow(0),
 gsTypeWildcard(1),
 gsSubTypeWildcard(2),
 readOnly(3)
 }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The flag bits that specify how access is to be limited by this Common Transport Access Descriptor:

- allow -- access to the specified Generic Service and Server is allowed if this bit is set, and is to be denied if this bit is not set.
- gsTypeWildcard -- if this bit is set, the Generic Service to be allowed/denied is specified by the value of t11FcSpPoNaCtDescrGsType, and the gsSubTypeWildcard bit must not also be set.
- gsSubTypeWildcard -- if this bit is set, the Generic Service to be allowed/denied is specified by the value of t11FcSpPoNaCtDescrGsSubType, and the gsTypeWildcard bit must not also be set.
- readOnly -- if this bit is set, then access is to be granted only for reading."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.5.1, and tables 117, 118, and 120."

::= { t11FcSpPoNaCtDescrEntry 3 }

t11FcSpPoNaCtDescrGsType OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The GS_Type of the Generic Service (e.g., the FC-GS-5 Management Service) that is subject to access control.

This value is ignored if the gsTypeWildcard bit is not set in the corresponding value of t11FcSpPoNaCtDescrFlags."

REFERENCE

- "- ANSI INCITS 427-2006,
Fibre Channel - Generic Services-5 (FC-GS-5),
section 4.3.2.4.
- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.5.1 and table 120."

::= { t11FcSpPoNaCtDescrEntry 4 }

t11FcSpPoNaCtDescrGsSubType OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The GS_Subtype of the Generic Server (e.g., the Fabric Zone Server) that is subject to access control. This value is ignored if the gsSubTypeWildcard bit is not set in the corresponding value of t11FcSpPoNaCtDescrFlags."

REFERENCE

- "- ANSI INCITS 427-2006,
Fibre Channel - Generic Services-5 (FC-GS-5),
section 4.3.2.5.
- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.5.1 and table 120."

::= { t11FcSpPoNaCtDescrEntry 5 }

t11FcSpPoNaCtDescrRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this row. Values of object instances within the row can be modified at any time."

::= { t11FcSpPoNaCtDescrEntry 6 }

--

-- Switches/Nodes in Non-Active Switch Connectivity Objects

--

t11FcSpPoNaSwConnTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoNaSwConnEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of non-active Switch Connectivity Objects.

A Switch Connectivity Object defines to which other Switches or Nodes a particular Switch may/may not be connected at the Node level and/or at the Port level."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.6."

::= { t11FcSpPoNonActive 6 }

t11FcSpPoNaSwConnEntry OBJECT-TYPE

SYNTAX T11FcSpPoNaSwConnEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains the name of a Switch/Node with which any port of a particular Switch on a particular Fabric, or a particular port on that Switch, is allowed or not allowed to be connected.

The particular Fabric is identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex.

The StorageType of a row in this table is specified by the instance of t11FcSpPoStorageType that is INDEX-ed by the same values of fcmInstanceIndex and t11FcSpPoFabricIndex."

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
t11FcSpPoNaSwConnSwitchName,
t11FcSpPoNaSwConnAllowedType,
t11FcSpPoNaSwConnPortNameOrAll,
t11FcSpPoNaSwConnAllowedIndex }

::= { t11FcSpPoNaSwConnTable 1 }

T11FcSpPoNaSwConnEntry ::= SEQUENCE {

t11FcSpPoNaSwConnSwitchName	FcNameIdOrZero,
t11FcSpPoNaSwConnAllowedType	INTEGER,
t11FcSpPoNaSwConnPortNameOrAll	FcNameIdOrZero,
t11FcSpPoNaSwConnAllowedIndex	Unsigned32,
t11FcSpPoNaSwConnAllowedNameType	T11FcSpPolicyNameType,
t11FcSpPoNaSwConnAllowedName	FcNameIdOrZero,
t11FcSpPoNaSwConnRowStatus	RowStatus

}

t11FcSpPoNaSwConnSwitchName OBJECT-TYPE

SYNTAX FcNameIdOrZero (SIZE (8))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The name of the Switch for which this Switch Connectivity Object specifies topology restrictions."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.6.1 and table 123."

::= { t11FcSpPoNaSwConnEntry 1 }

t11FcSpPoNaSwConnAllowedType OBJECT-TYPE

SYNTAX INTEGER { switch(1), node(2) }

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object specifies whether this row refers to an 'Allowed Switch' that concerns Switch-to-Switch connectivity or an 'Allowed Node' that concerns Switch-to-Node connectivity. Consequently, this object's value indicates whether the corresponding instance of t11FcSpPoNaSwConnAllowedName specifies the name of a Switch or the name of a Node."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.6.1 and table 123."

::= { t11FcSpPoNaSwConnEntry 2 }

t11FcSpPoNaSwConnPortNameOrAll OBJECT-TYPE

SYNTAX FcNameIdOrZero (SIZE(0 | 8))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object specifies either the particular port on which this topology restriction applies, or if the value is the zero-length string, that the topology restriction applies to all ports of the Switch.

In other words, if this object's value contains the name of a port, then this row represents a 'Port Connectivity Entry' (as described in FC-SP) within a Switch Connectivity Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.6.1 and tables 123/124."

::= { t11FcSpPoNaSwConnEntry 3 }

t11FcSpPoNaSwConnAllowedIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"When multiple rows in this table refer to different 'Allowed Switches' or to different 'Allowed Nodes' for the same port(s) in the same Switch Connectivity Object, this object provides a unique index value to distinguish between such rows."

::= { t11FcSpPoNaSwConnEntry 4 }

t11FcSpPoNaSwConnAllowedNameType OBJECT-TYPE

SYNTAX T11FcSpPolicyNameType {
 nodeName(1),
 restrictedNodeName(2),
 portName(3),
 restrictedPortName(4),
 wildcard(5),
 restrictedWildcard(6)
 }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If the value of this object is 'wildcard' or 'restrictedWildcard', this row specifies whether connectivity is allowed/not allowed with entities not explicitly named by other rows.

Otherwise, the combination of
 t11FcSpPoNaSwConnAllowedNameType and
 t11FcSpPoNaSwConnAllowedName specify the name of:

- a Switch (if t11FcSpPoNaSwConnAllowedType = 'switch'), or
- a Node (if t11FcSpPoNaSwConnAllowedType = 'node')

to which connectivity is allowed/not allowed."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 7.1.6.1 and tables 123/124."

::= { t11FcSpPoNaSwConnEntry 5 }

t11FcSpPoNaSwConnAllowedName OBJECT-TYPE

SYNTAX FcNameIdOrZero (SIZE (8))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If t11FcSpPoNaSwConnAllowedNameType has the value 'wildcard' or 'restrictedWildcard', this object has the value '0000000000000000'h.

Otherwise, the combination of
 t11FcSpPoNaSwConnAllowedNameType and
 t11FcSpPoNaSwConnAllowedName specify the name of:

- a Switch (if t11FcSpPoNaSwConnAllowedType = 'switch'), or
- a Node (if t11FcSpPoNaSwConnAllowedType = 'node')

to which connectivity is allowed/not allowed."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 7.1.6.1 and tables 123/124."

::= { t11FcSpPoNaSwConnEntry 6 }

t11FcSpPoNaSwConnRowStatus OBJECT-TYPE

SYNTAX RowStatus
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"The status of this row. Values of object instances
 within the row can be modified at any time."

::= { t11FcSpPoNaSwConnEntry 7 }

--

-- IP Management Entries in Non-Active IP Management List Objects

--

t11FcSpPoNaIpMgmtTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoNaIpMgmtEntry
 MAX-ACCESS not-accessible
 STATUS current

DESCRIPTION

"A table of IP Management Entries in non-active IP
 Management List Objects. The IP Management List Object is a
 Fabric-wide Policy Object that describes which IP hosts are
 allowed to manage a Fabric.

One non-active IP Management List Object is represented by
 all rows of this table that have the same values of
 fcmInstanceIndex and t11FcSpPoFabricIndex."

::= { t11FcSpPoNonActive 7 }

t11FcSpPoNaIpMgmtEntry OBJECT-TYPE

SYNTAX T11FcSpPoNaIpMgmtEntry
 MAX-ACCESS not-accessible
 STATUS current

DESCRIPTION

"Each entry contains information about one IP Management

entry within a non-active IP Management List Object for the Fabric identified by `t11FcSpPoFabricIndex` and managed within the Fibre Channel management instance identified by `fcmInstanceIndex`.

The Policy Object Name of an IP Management Entry Policy Object is either an IPv6 Address Range or an IPv4 Address Range. In a Fabric's database of Policy Objects, every Policy Object Name, including these Internet address ranges, is represented as a (`T11FcSpPolicyNameType`, `T11FcSpPolicyName`) tuple. In contrast, this MIB module uses the conventional MIB syntax for IP addresses, and therefore represents the Policy Object Name of an IP Management Entry Policy Object as a (`InetAddressType`, `InetAddress`, `InetAddress`) tuple.

In theory, the use of `t11FcSpPoNaIpMgmtEntryNameLow` and `t11FcSpPoNaIpMgmtEntryNameHigh`, which have the syntax of `InetAddress`, in the INDEX could cause the need for excessively long OIDs. In practice, this can't happen because FC-SP doesn't allow these objects to be specified as DNS names.

The `StorageType` of a row in this table is specified by the instance of `t11FcSpPoStorageType` that is INDEX-ed by the same values of `fcmInstanceIndex` and `t11FcSpPoFabricIndex`."

```
INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
        t11FcSpPoNaIpMgmtListName,
        t11FcSpPoNaIpMgmtEntryNameType,
        t11FcSpPoNaIpMgmtEntryNameLow,
        t11FcSpPoNaIpMgmtEntryNameHigh }
 ::= { t11FcSpPoNaIpMgmtTable 1 }
```

```
T11FcSpPoNaIpMgmtEntry ::= SEQUENCE {
    t11FcSpPoNaIpMgmtListName      T11FcSpAlphaNumName,
    t11FcSpPoNaIpMgmtEntryNameType  InetAddressType,
    t11FcSpPoNaIpMgmtEntryNameLow   InetAddress,
    t11FcSpPoNaIpMgmtEntryNameHigh  InetAddress,
    t11FcSpPoNaIpMgmtWkpIndex       Unsigned32,
    t11FcSpPoNaIpMgmtAttribute      T11FcSpAlphaNumNameOrAbsent,
    t11FcSpPoNaIpMgmtRowStatus      RowStatus
}
```

```
t11FcSpPoNaIpMgmtListName OBJECT-TYPE
    SYNTAX      T11FcSpAlphaNumName
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
```

"The name of a non-active Node Membership List Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.7.1 and table 125."

::= { t11FcSpPoNaIpMgmtEntry 1 }

t11FcSpPoNaIpMgmtEntryNameType OBJECT-TYPE

SYNTAX InetAddressType { ipv4(1), ipv6(2) }

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The combination of t11FcSpPoNaIpMgmtEntryNameType,
t11FcSpPoNaIpMgmtNameLow, and t11FcSpPoNaIpMgmtNameHigh
specify the Internet address range of this IP Management
Entry in the IP Management List Object."

The FC-SP specification does not allow this address to
be specified using a DNS domain name, nor does it allow
the specification of zone indexes. Therefore, the
type of address must be one of: 'ipv4' or 'ipv6'."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, sections 7.1.7.1 and table 126."

::= { t11FcSpPoNaIpMgmtEntry 2 }

t11FcSpPoNaIpMgmtEntryNameLow OBJECT-TYPE

SYNTAX InetAddress (SIZE(4 | 16))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The lower end of an Internet address range. The type
of this address is given by the corresponding instance
of t11FcSpPoNaIpMgmtEntryNameType."

The combination of t11FcSpPoNaIpMgmtEntryNameType,
t11FcSpPoNaIpMgmtNameLow, and t11FcSpPoNaIpMgmtNameHigh
specify the Internet address range of this IP Management
Entry in the IP Management List Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, sections 7.1.7.1 and table 126."

::= { t11FcSpPoNaIpMgmtEntry 3 }

t11FcSpPoNaIpMgmtEntryNameHigh OBJECT-TYPE

SYNTAX InetAddress (SIZE(4 | 16))

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"The higher end of an Internet address range. The type of this address is given by the corresponding instance of t11FcSpPoNaIpMgmtEntryNameType.

The combination of t11FcSpPoNaIpMgmtEntryNameType, t11FcSpPoNaIpMgmtNameLow, and t11FcSpPoNaIpMgmtNameHigh specify the Internet address range of this IP Management Entry in the IP Management List Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, sections 7.1.7.1 and table 126."

::= { t11FcSpPoNaIpMgmtEntry 4 }

t11FcSpPoNaIpMgmtWkpIndex OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object identifies the restrictions for IP management access by IP hosts in this range of IP addresses.

The restrictions are specified as the set of Well-Known Protocols Access Descriptors contained in those rows of the t11FcSpPoNaWkpDescrTable for which the value of t11FcSpPoNaWkpDescrSpecifierIndx is the same as the value of this object. If there are no such rows or if the value of this object is zero, then this IP Management Entry does not identify any Well-Known Protocols Access restrictions."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 7.1.7.1 and tables 127/129."

::= { t11FcSpPoNaIpMgmtEntry 5 }

t11FcSpPoNaIpMgmtAttribute OBJECT-TYPE

SYNTAX T11FcSpAlphaNumNameOrAbsent

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The name of a non-active Attribute Policy Object that is defined for this IP Management entry. The zero-length string indicates that no non-active Attribute Policy Object is defined for it.

The effect of having no rows in the t11FcSpPoNaAttribTable for which the value of t11FcSpPoNaAttribName is the same as the value of this object, is the same as this object's value being the zero-length string."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.7.1 and table 128."

::= { t11FcSpPoNaIpMgmtEntry 6 }

t11FcSpPoNaIpMgmtRowStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"The status of this row. Values of object instances within the row can be modified at any time."

::= { t11FcSpPoNaIpMgmtEntry 7 }

--

-- Non-Active Well-Known Protocol Access Descriptors

--

t11FcSpPoNaWkpDescrTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoNaWkpDescrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"A table of the Well-Known Protocol Access Descriptors referenced from non-active Policy Objects.

A Well-Known Protocol Access Specifier is a list of Well-Known Protocol Access Descriptors each of which specifies a protocol number, a port number, and/or various flags specifying how IP management access is restricted.

A non-active Well-Known Protocol Transport Access Specifier is represented by all rows of this table that have the same values of fcmInstanceIndex, t11FcSpPoFabricIndex, and t11FcSpPoNaWkpDescrSpecifierIndx."

::= { t11FcSpPoNonActive 8 }

t11FcSpPoNaWkpDescrEntry OBJECT-TYPE

SYNTAX T11FcSpPoNaWkpDescrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"Each entry contains information about one Well-Known

Protocol Access Descriptor of a non-active Well-Known Protocol Access Specifier used within the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex.

The StorageType of a row in this table is specified by the instance of t11FcSpPoStorageType that is INDEX-ed by the same values of fcmInstanceIndex and t11FcSpPoFabricIndex."

```
INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
        t11FcSpPoNaWkpDescrSpecifierIndx,
        t11FcSpPoNaWkpDescrIndex }
 ::= { t11FcSpPoNaWkpDescrTable 1 }
```

```
T11FcSpPoNaWkpDescrEntry ::= SEQUENCE {
    t11FcSpPoNaWkpDescrSpecifierIndx    Unsigned32,
    t11FcSpPoNaWkpDescrIndex            Unsigned32,
    t11FcSpPoNaWkpDescrFlags            BITS,
    t11FcSpPoNaWkpDescrWkpNumber        Unsigned32,
    t11FcSpPoNaWkpDescrDestPort         InetPortNumber,
    t11FcSpPoNaWkpDescrRowStatus        RowStatus
}
```

t11FcSpPoNaWkpDescrSpecifierIndx OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An index value that uniquely identifies a particular non-active Well-Known Protocol Access Specifier within a Fabric."

```
::= { t11FcSpPoNaWkpDescrEntry 1 }
```

t11FcSpPoNaWkpDescrIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An index value that uniquely identifies a particular Well-Known Protocol Access Descriptor within a non-active Well-Known Protocol Access Specifier."

```
::= { t11FcSpPoNaWkpDescrEntry 2 }
```

t11FcSpPoNaWkpDescrFlags OBJECT-TYPE

```
SYNTAX BITS {
    allow(0),
    wkpWildcard(1),
    destPortWildcard(2),
    readOnly(3)
}
```

```

    }
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION

```

"The flag bits that specify how access is to be limited by this Well-Known Protocol Access Descriptor:

- allow -- IP management access using this protocol/port is allowed if this bit is set, and to be denied if this bit is not set.
- wkpWildcard -- if this bit is set, the IP Protocol number of the Well-Known Protocol to be allowed/denied is specified by the value of t11FcSpPoNaWkpDescrWkpNumber.
- destPortWildcard -- if this bit is set, the Destination (TCP/UDP) Port number of the Well-Known Protocol to be allowed/denied is specified by the value of t11FcSpPoNaWkpDescrDestPort.
- readOnly -- if this bit is set, then access is to be granted only for reading."

REFERENCE

- "- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.7.1 and table 131."

```
::= { t11FcSpPoNaWkpDescrEntry 3 }
```

t11FcSpPoNaWkpDescrWkpNumber OBJECT-TYPE

```

SYNTAX          Unsigned32 (0..255)
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION

```

"When the 'wkpWildcard' bit is set in the corresponding instance of t11FcSpPoNaWkpDescrFlags, this object specifies the IP protocol number of the Well-Known Protocol."

REFERENCE

- "- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.7.1 and table 131.
- <http://www.iana.org/assignments/protocol-numbers>."

```
::= { t11FcSpPoNaWkpDescrEntry 4 }
```

t11FcSpPoNaWkpDescrDestPort OBJECT-TYPE

```

SYNTAX          InetPortNumber
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION

```


"When the 'destPortWildcard' bit is set in the corresponding instance of t11FcSpPoNaWkpDescrFlags, this object specifies the Destination (TCP/UDP) Port number of the Well-Known Protocol. When the 'destPortWildcard' bit is reset, this object is ignored (and can have the value zero)."

REFERENCE

- "- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.1.7.1 and table 131.
- <http://www.iana.org/assignments/port-numbers>."

```
::= { t11FcSpPoNaWkpDescrEntry 5 }
```

t11FcSpPoNaWkpDescrRowStatus OBJECT-TYPE

```
SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      current
```

DESCRIPTION

"The status of this row. Values of object instances within the row can be modified at any time."

```
::= { t11FcSpPoNaWkpDescrEntry 6 }
```

```
--
```

```
-- Attribute Entries in Non-Active Attribute Policy Objects
```

```
--
```

t11FcSpPoNaAttribTable OBJECT-TYPE

```
SYNTAX      SEQUENCE OF T11FcSpPoNaAttribEntry
MAX-ACCESS  not-accessible
STATUS      current
```

DESCRIPTION

"A table of the Attribute Policy Objects being used within non-active Policy Objects.

A non-active Attribute Policy Object is represented by all the Attribute Entries in this table that have the same value of t11FcSpPoNaAttribName."

```
::= { t11FcSpPoNonActive 9 }
```

t11FcSpPoNaAttribEntry OBJECT-TYPE

```
SYNTAX      T11FcSpPoNaAttribEntry
MAX-ACCESS  not-accessible
STATUS      current
```

DESCRIPTION

"Each entry contains information about one Attribute Entry contained within an Attribute Policy Object that is non-active within the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex.

For some types of Attribute Policy Objects, it is valuable to break out some semantically significant parts of the Policy Object's value into their own individual MIB objects; for example, to extract the one or more individual Authentication Protocol Identifiers and associated

Authentication Protocol Parameters out of an Attribute containing a 'AUTH_Negotiate Message Payload'. For such types, another MIB table is defined to hold the extracted values in MIB objects specific to the Attribute Policy Object's type. In such cases, the t11FcSpPoNaAttribExtension object in this table points to the other MIB table.

If the value of one Attribute Entry is too large (more than 256 bytes) to be contained within the value of one instance of t11FcSpPoNaAttribValue, then one row in this table contains the first 256 bytes, and one (or more) other row(s) in this table contain the rest of the value.

The StorageType of a row in this table is specified by the instance of t11FcSpPoStorageType that is INDEX-ed by the same values of fcmInstanceIndex and t11FcSpPoFabricIndex."

```
INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
        t11FcSpPoNaAttribName, t11FcSpPoNaAttribEntryIndex,
        t11FcSpPoNaAttribPartIndex }
 ::= { t11FcSpPoNaAttribTable 1 }
```

```
T11FcSpPoNaAttribEntry ::= SEQUENCE {
    t11FcSpPoNaAttribName      T11FcSpAlphaNumName,
    t11FcSpPoNaAttribEntryIndex Unsigned32,
    t11FcSpPoNaAttribPartIndex Unsigned32,
    t11FcSpPoNaAttribType      Unsigned32,
    t11FcSpPoNaAttribValue      OCTET STRING,
    t11FcSpPoNaAttribExtension  OBJECT IDENTIFIER,
    t11FcSpPoNaAttribRowStatus  RowStatus
}
```

t11FcSpPoNaAttribName OBJECT-TYPE

SYNTAX T11FcSpAlphaNumName

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The name of the Attribute Policy Object containing one or more Attribute Entries."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),

February 2007, section 7.1.8.1 and table 133."
 ::= { t11FcSpPoNaAttribEntry 1 }

t11FcSpPoNaAttribEntryIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A unique value to distinguish this Attribute Entry from other Attribute Entries contained in the same Attribute Policy Object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.8.1, tables 133/134."

::= { t11FcSpPoNaAttribEntry 2 }

t11FcSpPoNaAttribPartIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"When the value of an Attribute Entry is shorter than 257 bytes, the whole value is contained in one instance of t11FcSpPoNaAttribValue, and the value of this object is 1.

If the value of an Attribute Entry is longer than 256 bytes, then that value is divided up on 256-byte boundaries such that all parts are 256 bytes long except the last part which is shorter if necessary, with each such part contained in a separate row of this table, and the value of this object is set to the part number. That is, this object has the value of 1 for bytes 0-255, the value of 2 for bytes 256-511, etc."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.1.8.1, tables 134/135."

::= { t11FcSpPoNaAttribEntry 3 }

t11FcSpPoNaAttribType OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The type of attribute. The first type to be defined is:

t11FcSpPoNaAttribType t11FcSpPoNaAttribValue

```

=====
'00000001'h          The AUTH_Negotiate Message Payload
"

```

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP), February 2007,
section 7.1.8.1, tables 134/135 and table 10."

```
 ::= { t11FcSpPoNaAttribEntry 4 }
```

t11FcSpPoNaAttribValue OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0..256))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The value of an Attribute Entry is divided up on 256-byte boundaries such that all parts are 256 bytes long except the last part, which is shorter if necessary, and each such part is contained in a separate instance of this object.

When the value of the corresponding instance of t11FcSpPoNaAttribExtension is not zeroDotZero, then the same underlying management data has its value contained both in this object and in the individual/broken-out parts pointed to by t11FcSpPoNaAttribExtension. Thus, after any modification of the underlying management data, e.g., after a Set operation to the value of either MIB representation, then that modification is reflected in the values of both MIB representations."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP), February 2007,
section 7.1.8.1, tables 134/135 and table 10."

```
 ::= { t11FcSpPoNaAttribEntry 5 }
```

t11FcSpPoNaAttribExtension OBJECT-TYPE

SYNTAX OBJECT IDENTIFIER

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"For some types of Attribute Policy Object, the value of this MIB object points to type-specific MIB objects that contain individual/broken-out parts of the Attribute Policy Object's value. If this object doesn't point to such type-specific MIB objects, then it contains the value: zeroDotZero.

In particular, when the value of t11FcSpPoNaAttribType indicates 'AUTH_Negotiate Message Payload', one or more

Authentication Protocol Identifiers and their associated Authentication Protocol Parameters are embedded within the value of the corresponding instance of t11FcSpPoNaAttribValue; MIB objects to contain these individual values are defined in the t11FcSpPoAuthProtTable. Thus, for an 'AUTH_Negotiate Message Payload' Attribute, the value of this object would contain the OID of t11FcSpPoNaAuthProtTable.

When the value of this object is not zeroDotZero, then the same underlying management data has its value contained in both the individual/broken-out parts pointed to by this object and in the corresponding instance of t11FcSpPoNaAttribValue. Thus, after any modification of the underlying management data, e.g., after a Set operation to the value of either MIB representation, then that modification is reflected in the values of both MIB representations."

```
::= { t11FcSpPoNaAttribEntry 6 }
```

```
t11FcSpPoNaAttribRowStatus OBJECT-TYPE
```

```
SYNTAX          RowStatus
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
```

"The status of this row. Values of object instances within the row can be modified at any time."

```
::= { t11FcSpPoNaAttribEntry 7 }
```

```
--
```

```
-- Auth. Protocol Parameters in Non-Active Attribute Policy Objects
```

```
--
```

```
t11FcSpPoNaAuthProtTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF T11FcSpPoNaAuthProtEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
```

"A table of Authentication Protocol Identifier and Authentication Protocol Parameters that are embedded in Attribute Policy Objects being used within non-active Policy Objects.

This table is used for Attribute Entries of Attribute Policy Objects for which the value of t11FcSpPoNaAttribType indicates 'AUTH_Negotiate Message Payload' and the value of t11FcSpPoNaAttribExtension contains the OID of this table."

```
REFERENCE
```

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, sections 5.3.2 & 7.1.8.1,
tables 134/135 and tables 10/11."

::= { t11FcSpPoNonActive 10 }

t11FcSpPoNaAuthProtEntry OBJECT-TYPE

SYNTAX T11FcSpPoNaAuthProtEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each row contains information about an Authentication Protocol that is extracted out of the Attribute Entry (identified by t11FcSpPoNaAttribEntryIndex) of the non-active Policy Attribute Object (identified by t11FcSpPoNaAttribName) for the Fabric identified by t11FcSpPoFabricIndex and managed within the Fibre Channel management instance identified by fcmInstanceIndex.

If the value of one Attribute Protocol Parameters string is too large (more than 256 bytes) to be contained within the value of one instance of t11FcSpPoNaAuthProtParams, then one row in this table contains the first 256 bytes, and one (or more) other row(s) in this table contain the rest of the value.

The same underlying management data that is represented in rows of this table is also represented by the corresponding instances of t11FcSpPoNaAttribValue. Thus, after any modification of the underlying management data, e.g., after a Set operation to the value of either MIB representation, then that modification is reflected in the values of both MIB representations."

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex,
t11FcSpPoNaAttribName, t11FcSpPoNaAttribEntryIndex,
t11FcSpPoNaAuthProtIdentifier,
t11FcSpPoNaAuthProtPartIndex }

::= { t11FcSpPoNaAuthProtTable 1 }

T11FcSpPoNaAuthProtEntry ::= SEQUENCE {

t11FcSpPoNaAuthProtIdentifier Unsigned32,
t11FcSpPoNaAuthProtPartIndex Unsigned32,
t11FcSpPoNaAuthProtParams OCTET STRING,
t11FcSpPoNaAuthProtRowStatus RowStatus

}

t11FcSpPoNaAuthProtIdentifier OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"The Authentication Protocol Identifier:

1 = DH-CHAP
 3 = FCPAP
 4 = IKEv2
 5 = IKEv2-AUTH
 240 thru 255 = Vendor Specific Protocols

all other values are 'Reserved' (by T11)."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 5.3.2, table 11."

::= { t11FcSpPoNaAuthProtEntry 1 }

t11FcSpPoNaAuthProtPartIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"When the value of an Attribute Protocol Parameters string is shorter than 257 bytes, the whole value is contained in one instance of t11FcSpPoNaAuthProtParams, and the value of this object is 1. (This includes the case when the Attribute Protocol Parameters string is zero bytes in length.)

If the value of an Authentication Protocol Parameters string is longer than 256 bytes, then that value is divided up on 256-byte boundaries such that all parts are 256 bytes long except the last part, which is shorter if necessary, with each such part contained in a separate row of this table, and the value of this object is set to the part number. That is, this object has the value of 1 for bytes 0-255, the value of 2 for bytes 256-511, etc."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 5.3.2, table 10."

::= { t11FcSpPoNaAuthProtEntry 2 }

t11FcSpPoNaAuthProtParams OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0..256))
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION

"The value of an Authentication Protocol Parameters string is divided up on 256-byte boundaries such that all parts are 256 bytes long except the last part, which is shorter if necessary, and each such part is contained in a separate instance of this object."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 5.3.2, table 10."

::= { t11FcSpPoNaAuthProtEntry 3 }

t11FcSpPoNaAuthProtRowStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The status of this row. Values of object instances within the row can be modified at any time."

::= { t11FcSpPoNaAuthProtEntry 4 }

--

-- Part 4 - Statistics

--

t11FcSpPoStatsTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoStatsEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"A table of statistics maintained by FC-SP Security Policy Servers."

::= { t11FcSpPoStatistics 1 }

t11FcSpPoStatsEntry OBJECT-TYPE

SYNTAX T11FcSpPoStatsEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"A set of statistics for the FC-SP Security Policy Server on the Fabric identified by the value of t11FcSpPoFabricIndex, and managed within the Fibre Channel management instance identified by fcmInstanceIndex."

INDEX { fcmInstanceIndex, t11FcSpPoFabricIndex }

::= { t11FcSpPoStatsTable 1 }

T11FcSpPoStatsEntry ::= SEQUENCE {

t11FcSpPoInRequests Counter32,
t11FcSpPoInAccepts Counter32,


```

    t11FcSpPoInRejects      Counter32
}

t11FcSpPoInRequests OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The number of FC-SP Policy Management Requests
        (e.g., GPS, APS, etc.) received by this FC-SP
        Security Policy Server on this Fabric.

        This counter has no discontinuities other than those
        that all Counter32's have when sysUpTime=0."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 7.3."
    ::= { t11FcSpPoStatsEntry 1 }

t11FcSpPoInAccepts OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The number of times that this FC-SP Security Policy Server
        sent an Accept CT_IU on this Fabric in response to a
        received FC-SP Policy Management Request (e.g., GPS, APS,
        etc.).

        This counter has no discontinuities other than those
        that all Counter32's have when sysUpTime=0."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, section 7.3."
    ::= { t11FcSpPoStatsEntry 2 }

t11FcSpPoInRejects OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The number of times that this FC-SP Security Policy Server
        sent a Reject CT_IU on this Fabric in response to a
        received FC-SP Policy Management Request (e.g., GPS, APS,
        etc.).

```

This counter has no discontinuities other than those that all Counter32's have when sysUpTime=0."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.3."

::= { t11FcSpPoStatsEntry 3 }

--

-- Part 5 - Control Information & Notifications

--

--

-- Control Information

--

t11FcSpPoServerAddress OBJECT-TYPE

SYNTAX FcNameIdOrZero

MAX-ACCESS accessible-for-notify

STATUS current

DESCRIPTION

"The WWN of the FC-SP Security Policy Server that received a request that is referenced in a notification."

::= { t11FcSpPoControl 1 }

t11FcSpPoControlTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpPoControlEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of control information, including the memory realization of FC-SP Policy Databases, and concerning the generation of notifications due to FC-SP Policy-related events."

::= { t11FcSpPoControl 2 }

t11FcSpPoControlEntry OBJECT-TYPE

SYNTAX T11FcSpPoControlEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains control information specific to FC-SP Policy and Policy-related events for the Fabric identified by the value of t11FcSpPoFabricIndex, and managed within the Fibre Channel management instance identified by fcmInstanceIndex."

```

INDEX    { fcmInstanceIndex, t11FcSpPoFabricIndex }
 ::= { t11FcSpPoControlTable 1 }

```

```

T11FcSpPoControlEntry ::= SEQUENCE {
    t11FcSpPoStorageType      StorageType,
    t11FcSpPoNotificationEnable TruthValue,
    t11FcSpPoLastNotifyType   INTEGER,
    t11FcSpPoRequestSource     FcNameIdOrZero,
    t11FcSpPoReasonCode        T11NsGs4RejectReasonCode,
    t11FcSpPoCtCommandString   OCTET STRING,
    t11FcSpPoReasonCodeExp     Unsigned32,
    t11FcSpPoReasonVendorCode   OCTET STRING
}

```

```

t11FcSpPoStorageType OBJECT-TYPE

```

```

    SYNTAX      StorageType

```

```

    MAX-ACCESS  read-write

```

```

    STATUS      current

```

```

    DESCRIPTION

```

"This object specifies the memory realization of FC-SP Policy Objects and related information for a particular Fabric; specifically, for:

- rows created and/or modified for the particular Fabric in these tables:

```

    t11FcSpPoNaSummaryTable
    t11FcSpPoNaSwListTable
    t11FcSpPoNaSwMembTable
    t11FcSpPoNaNoMembTable
    t11FcSpPoNaCtDescrTable
    t11FcSpPoNaSwConnTable
    t11FcSpPoNaIpMgmtTable
    t11FcSpPoNaWkpDescrTable
    t11FcSpPoNaAttribTable

```

- the activate and deactivate actions invoked through the t11FcSpPoOperActivate and t11FcSpPoOperDeActivate objects for the particular Fabric; and
- modified information contained in the same row as an instance of this object.

Even if an instance of this object has the value 'permanent(4)', none of the information defined in this MIB module for the given Fabric needs to be writable."

```

 ::= { t11FcSpPoControlEntry 1 }

```

t11FcSpPoNotificationEnable OBJECT-TYPE

SYNTAX TruthValue
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"This object specifies whether the following types of notifications:

t11FcSpPoNotifyActivation,
 t11FcSpPoNotifyActivateFail,
 t11FcSpPoNotifyDeactivation and
 t11FcSpPoNotifyDeactivateFail

should be generated for this Fabric."

::= { t11FcSpPoControlEntry 2 }

t11FcSpPoLastNotifyType OBJECT-TYPE

SYNTAX INTEGER {
 none(1),
 activation(2),
 activateFail(3),
 deactivation(4),
 deactivateFail(5)
 }
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"An indication of which of the following types of notification is currently being/was most recently generated for the Fabric:

'activation' -- t11FcSpPoNotifyActivation
 'activateFail' -- t11FcSpPoNotifyActivateFail
 'deactivation' -- t11FcSpPoNotifyDeactivation
 'deactivateFail' -- t11FcSpPoNotifyDeactivateFail

The value 'none' indicates that none of these types of notifications have been generated since the last restart of the network management system, and therefore that the corresponding instances of: t11FcSpPoRequestSource, t11FcSpPoReasonCode, t11FcSpPoCtCommandString, t11FcSpPoReasonCodeExp, and t11FcSpPoReasonVendorCode are irrelevant."

::= { t11FcSpPoControlEntry 3 }

t11FcSpPoRequestSource OBJECT-TYPE

SYNTAX FcNameIdOrZero
 MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The WWN of the source of the (Activate Policy Summary or Deactivate Policy Summary) request for which the current/most recent notification of the type indicated by the corresponding instance of t11FcSpPoLastNotifyType is being/was generated.

If no source is available, the value of this object is the zero-length string."

DEFVAL { "" }

::= { t11FcSpPoControlEntry 4 }

t11FcSpPoReasonCode OBJECT-TYPE

SYNTAX T11NsGs4RejectReasonCode

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The reason code associated with the failure that is indicated when the value of the corresponding instance of t11FcSpPoLastNotifyType is 'activateFail' or 'deactivateFail'.

For other values of t11FcSpPoLastNotifyType, the value of this object is 'none(1)'."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 7.3.6.2 & 7.3.6.3"

::= { t11FcSpPoControlEntry 5 }

t11FcSpPoCtCommandString OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0..255))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The binary content of the failed request that is indicated when the value of the corresponding instance of t11FcSpPoLastNotifyType is 'activateFail' or 'deactivateFail'. The content of the request is 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).

For other values of t11FcSpPoLastNotifyType, or if the CT_IU's content is unavailable, the value of this object is the zero-length string.

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

```
::= { t11FcSpPoControlEntry 6 }
```

t11FcSpPoReasonCodeExp OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The reason code explanation associated with the failure that is indicated when the value of the corresponding instance of t11FcSpPoLastNotifyType is 'activateFail' or 'deactivateFail'.

For other values of t11FcSpPoLastNotifyType, the value of this object is zero."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.3.6.2 & 7.3.6.3"

```
::= { t11FcSpPoControlEntry 7 }
```

t11FcSpPoReasonVendorCode OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0 | 1))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The vendor-specific reason code associated with the failure that is indicated when the value of the corresponding instance of t11FcSpPoLastNotifyType is 'activateFail' or 'deactivateFail'.

For other values of t11FcSpPoLastNotifyType, or if no vendor-specific reason code is available, the value of this object is the zero-length string."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.3.6.2 & 7.3.6.3"

```
::= { t11FcSpPoControlEntry 8 }
```

--

-- Notification definitions

--

t11FcSpPoNotifyActivation NOTIFICATION-TYPE

OBJECTS { t11FcSpPoServerAddress,

```

        t11FcSpPoPolicySummaryObjName,
        t11FcSpPoRequestSource }
STATUS          current
DESCRIPTION
    "This notification is generated whenever a Security
    Policy Server (indicated by the value of
    t11FcSpPoServerAddress) successfully completes the
    execution of an Activate Policy Summary request.
    The value of t11FcSpPoRequestSource indicates
    the source of the APS request. The value of
    t11FcSpPoPolicySummaryObjName indicates the name of
    the activated Policy Summary Object."
 ::= { t11FcSpPoMIBNotifications 1 }

```

```

t11FcSpPoNotifyActivateFail NOTIFICATION-TYPE
OBJECTS          { t11FcSpPoServerAddress,
                   t11FcSpPoRequestSource,
                   t11FcSpPoCtCommandString,
                   t11FcSpPoReasonCode,
                   t11FcSpPoReasonCodeExp,
                   t11FcSpPoReasonVendorCode }
STATUS          current
DESCRIPTION
    "This notification is generated whenever a Security Policy
    Server (indicated by the value of t11FcSpPoServerAddress)
    fails to complete the execution of an Activate Policy
    Summary request.

    The value of t11FcSpPoCtCommandString indicates the
    rejected request, and the values of t11FcSpPoReasonCode,
    t11FcSpPoReasonCodeExp, and t11FcSpPoReasonVendorCode
    indicate the reason for the rejection. The value of
    t11FcSpPoRequestSource indicates the source of the
    request."
REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
    Fibre Channel - Security Protocols (FC-SP),
    February 2007, section 7.3.6.2."
 ::= { t11FcSpPoMIBNotifications 2 }

```

```

t11FcSpPoNotifyDeactivation NOTIFICATION-TYPE
OBJECTS          { t11FcSpPoServerAddress,
                   t11FcSpPoRequestSource }
STATUS          current
DESCRIPTION
    "This notification is generated whenever a Security
    Policy Server (indicated by the value of
    t11FcSpPoServerAddress) successfully completes the

```

execution of a Deactivate Policy Summary request.
The value of t11FcSpPoRequestSource indicates
the source of the DPS request."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 7.3.6.3."

::= { t11FcSpPoMIBNotifications 3 }

t11FcSpPoNotifyDeactivateFail NOTIFICATION-TYPE

OBJECTS { t11FcSpPoServerAddress,
t11FcSpPoRequestSource,
t11FcSpPoCtCommandString,
t11FcSpPoReasonCode,
t11FcSpPoReasonCodeExp,
t11FcSpPoReasonVendorCode }

STATUS current

DESCRIPTION

"This notification is generated whenever a Security Policy
Server (indicated by the value of t11FcSpPoServerAddress)
fails to complete the execution of a Deactivate Policy
Summary request.

The value of t11FcSpPoCtCommandString indicates the
rejected request, and the values of t11FcSpPoReasonCode,
t11FcSpPoReasonCodeExp, and t11FcSpPoReasonVendorCode
indicate the reason for the rejection. The value of
t11FcSpPoRequestSource indicates the source of the
request."

::= { t11FcSpPoMIBNotifications 4 }

--

-- Conformance

--

t11FcSpPoMIBCompliances

OBJECT IDENTIFIER ::= { t11FcSpPoMIBConformance 1 }
t11FcSpPoMIBGroups OBJECT IDENTIFIER ::= { t11FcSpPoMIBConformance 2 }

t11FcSpPoMIBCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for entities that
support the Fabric Policies defined in FC-SP,"

MODULE -- this module

MANDATORY-GROUPS { t11FcSpPoActiveObjectsGroup }


```
GROUP          t11FcSpPoNonActiveObjectsGroup
DESCRIPTION
    "These objects are mandatory for FC-SP Security Policy
    Servers."

GROUP          t11FcSpPoNotifyObjectsGroup
DESCRIPTION
    "These objects are mandatory for FC-SP Security Policy
    Servers."

GROUP          t11FcSpPoNotificationGroup
DESCRIPTION
    "These notifications are mandatory for FC-SP Security
    Policy Servers."

GROUP          t11FcSpPoOperationsObjectsGroup
DESCRIPTION
    "These objects are mandatory only for FC-SP Security
    Policy Servers that support the activation/deactivation
    of policies via SNMP."

GROUP          t11FcSpPoStatsObjectsGroup
DESCRIPTION
    "These objects are optional."
```

-- Write access is not required for any objects in this MIB module:

```
OBJECT          t11FcSpPoOperActivate
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."

OBJECT          t11FcSpPoOperDeActivate
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."

OBJECT          t11FcSpPoStorageType
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."

OBJECT          t11FcSpPoNotificationEnable
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."

OBJECT          t11FcSpPoNaSummaryPolicyNameType
```

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

OBJECT t11FcSpPoNaSummaryPolicyName
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11FcSpPoNaSummaryHashStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11FcSpPoNaSummaryRowStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11FcSpPoNaSwListFabricName
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11FcSpPoNaSwListRowStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11FcSpPoNaSwMembFlags
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11FcSpPoNaSwMembDomainID
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11FcSpPoNaSwMembPolicyDataRole
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11FcSpPoNaSwMembAuthBehaviour
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT t11FcSpPoNaSwMembAttribute
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT t11FcSpPoNaSwMembRowStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT t11FcSpPoNaNoMembFlags
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT t11FcSpPoNaNoMembCtAccessIndex
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT t11FcSpPoNaNoMembAttribute
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT t11FcSpPoNaNoMembRowStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT t11FcSpPoNaCtDescrFlags
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT t11FcSpPoNaCtDescrGsType
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT t11FcSpPoNaCtDescrGsSubType
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT t11FcSpPoNaCtDescrRowStatus
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaSwConnAllowedNameType
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaSwConnAllowedName
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaSwConnRowStatus
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaIpMgmtWkpIndex
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaIpMgmtAttribute
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaIpMgmtRowStatus
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaWkpDescrFlags
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaWkpDescrWkpNumber
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaWkpDescrDestPort
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT t11FcSpPoNaWkpDescrRowStatus

```

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

OBJECT        t11FcSpPoNaAttribType
MIN-ACCESS    read-only
DESCRIPTION
    "Write access is not required."

OBJECT        t11FcSpPoNaAttribValue
MIN-ACCESS    read-only
DESCRIPTION
    "Write access is not required."

OBJECT        t11FcSpPoNaAttribRowStatus
MIN-ACCESS    read-only
DESCRIPTION
    "Write access is not required."

OBJECT        t11FcSpPoNaAuthProtParams
MIN-ACCESS    read-only
DESCRIPTION
    "Write access is not required."

OBJECT        t11FcSpPoNaAuthProtRowStatus
MIN-ACCESS    read-only
DESCRIPTION
    "Write access is not required."

```

```
 ::= { t11FcSpPoMIBCompliances 1 }
```

```
-- Units of Conformance
```

```

t11FcSpPoActiveObjectsGroup OBJECT-GROUP
    OBJECTS {
        t11FcSpPoPolicySummaryObjName,
        t11FcSpPoAdminFabricName,
        t11FcSpPoActivatedTimeStamp,
        t11FcSpPoSummaryPolicyType,
        t11FcSpPoSummaryHashFormat,
        t11FcSpPoSummaryHashValue,
        t11FcSpPoSwMembSwitchFlags,
        t11FcSpPoSwMembDomainID,
        t11FcSpPoSwMembPolicyDataRole,
        t11FcSpPoSwMembAuthBehaviour,
        t11FcSpPoSwMembAttribute,
        t11FcSpPoNoMembFlags,
        t11FcSpPoNoMembCtAccessIndex,
        t11FcSpPoNoMembAttribute,
    }

```

```

        t11FcSpPoCtDescrFlags,
        t11FcSpPoCtDescrGsType,
        t11FcSpPoCtDescrGsSubType,
        t11FcSpPoSwConnAllowedNameType,
        t11FcSpPoSwConnAllowedName,
        t11FcSpPoIpMgmtWkpIndex,
        t11FcSpPoIpMgmtAttribute,
        t11FcSpPoWkpDescrFlags,
        t11FcSpPoWkpDescrWkpNumber,
        t11FcSpPoWkpDescrDestPort,
        t11FcSpPoAttribType,
        t11FcSpPoAttribValue,
        t11FcSpPoAttribExtension,
        t11FcSpPoAuthProtParams
    }
STATUS      current
DESCRIPTION
    "A collection of MIB objects that contain information
    about active Policy Objects that express Fibre Channel
    Security (FC-SP) policy."
 ::= { t11FcSpPoMIBGroups 1 }

t11FcSpPoOperationsObjectsGroup OBJECT-GROUP
OBJECTS {
    t11FcSpPoOperActivate,
    t11FcSpPoOperDeActivate,
    t11FcSpPoOperResult,
    t11FcSpPoOperFailCause
}
STATUS      current
DESCRIPTION
    "A collection of MIB objects that allow a new set of
    Fibre Channel Security (FC-SP) policies to be activated
    or an existing set to be deactivated."
 ::= { t11FcSpPoMIBGroups 2 }

t11FcSpPoNonActiveObjectsGroup OBJECT-GROUP
OBJECTS {
    t11FcSpPoStorageType,
    t11FcSpPoNaSummaryPolicyNameType,
    t11FcSpPoNaSummaryPolicyName,
    t11FcSpPoNaSummaryHashStatus,
    t11FcSpPoNaSummaryHashFormat,
    t11FcSpPoNaSummaryHashValue,
    t11FcSpPoNaSummaryRowStatus,
    t11FcSpPoNaSwListFabricName,
    t11FcSpPoNaSwListRowStatus,
    t11FcSpPoNaSwMembFlags,
    t11FcSpPoNaSwMembDomainID,
    t11FcSpPoNaSwMembPolicyDataRole,

```

```

        t11FcSpPoNaSwMembAuthBehaviour,
        t11FcSpPoNaSwMembAttribute,
        t11FcSpPoNaSwMembRowStatus,
        t11FcSpPoNaNoMembFlags,
        t11FcSpPoNaNoMembCtAccessIndex,
        t11FcSpPoNaNoMembAttribute,
        t11FcSpPoNaNoMembRowStatus,
        t11FcSpPoNaCtDescrFlags,
        t11FcSpPoNaCtDescrGsType,
        t11FcSpPoNaCtDescrGsSubType,
        t11FcSpPoNaCtDescrRowStatus,
        t11FcSpPoNaSwConnAllowedNameType,
        t11FcSpPoNaSwConnAllowedName,
        t11FcSpPoNaSwConnRowStatus,
        t11FcSpPoNaIpMgmtWkpIndex,
        t11FcSpPoNaIpMgmtAttribute,
        t11FcSpPoNaIpMgmtRowStatus,
        t11FcSpPoNaWkpDescrFlags,
        t11FcSpPoNaWkpDescrWkpNumber,
        t11FcSpPoNaWkpDescrDestPort,
        t11FcSpPoNaWkpDescrRowStatus,
        t11FcSpPoNaAttribType,
        t11FcSpPoNaAttribValue,
        t11FcSpPoNaAttribExtension,
        t11FcSpPoNaAttribRowStatus,
        t11FcSpPoNaAuthProtParams,
        t11FcSpPoNaAuthProtRowStatus
    }
STATUS      current
DESCRIPTION
    "A collection of MIB objects that contain information
    about non-active Policy Objects available for activation
    in order to change Fibre Channel Security (FC-SP) policy."
 ::= { t11FcSpPoMIBGroups 3 }

t11FcSpPoStatsObjectsGroup OBJECT-GROUP
OBJECTS {
    t11FcSpPoInRequests,
    t11FcSpPoInAccepts,
    t11FcSpPoInRejects
}
STATUS      current
DESCRIPTION
    "A collection of MIB objects that contain statistics
    that can be maintained by FC-SP Security Policy Servers."
 ::= { t11FcSpPoMIBGroups 4 }

t11FcSpPoNotifyObjectsGroup OBJECT-GROUP
OBJECTS {
    t11FcSpPoNotificationEnable,

```

```

        t11FcSpPoServerAddress,
        t11FcSpPoLastNotifyType,
        t11FcSpPoRequestSource,
        t11FcSpPoReasonCode,
        t11FcSpPoCtCommandString,
        t11FcSpPoReasonCodeExp,
        t11FcSpPoReasonVendorCode
    }
    STATUS      current
    DESCRIPTION
        "A collection of MIB objects to control the generation of
        notifications concerning Fibre Channel Security (FC-SP)
        policy, and to hold information contained in such
        notifications."
    ::= { t11FcSpPoMIBGroups 5 }

t11FcSpPoNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
        t11FcSpPoNotifyActivation,
        t11FcSpPoNotifyActivateFail,
        t11FcSpPoNotifyDeactivation,
        t11FcSpPoNotifyDeactivateFail
    }
    STATUS      current
    DESCRIPTION
        "A collection of notifications of events concerning
        Fibre Channel Security (FC-SP) policy."
    ::= { t11FcSpPoMIBGroups 6 }

END

```

6.5. The T11-FC-SP-SA-MIB Module

```

--*****
-- FC-SP Security Associations
--

T11-FC-SP-SA-MIB  DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
    Unsigned32, Counter32, Counter64, TimeTicks, Gauge32,
    mib-2
        FROM SNMPv2-SMI
        -- [RFC2578]
    RowStatus, StorageType, AutonomousType, TimeStamp,
    TruthValue
        FROM SNMPv2-TC
        -- [RFC2579]
    MODULE-COMPLIANCE, OBJECT-GROUP,
    NOTIFICATION-GROUP
        FROM SNMPv2-CONF
        -- [RFC2580]
    InterfaceIndex,

```



```

InterfaceIndexOrZero  FROM IF-MIB                -- [RFC2863]
fcmInstanceIndex,
FcAddressIdOrZero      FROM FC-MGMT-MIB           -- [RFC4044]
T11FabricIndex         FROM T11-TC-MIB           -- [RFC4439]
T11FcSpType,
T11FcSpiIndex,
T11FcSpLifetimeLeft,
T11FcSpLifetimeLeftUnits,
T11FcSpSecurityProtocolId,
T11FcRoutingControl,
T11FcSaDirection,
T11FcSpPrecedence,
T11FcSpTransforms      FROM T11-FC-SP-TC-MIB;

```

t11FcSpSaMIB MODULE-IDENTITY

LAST-UPDATED "200808200000Z"

ORGANIZATION "This MIB module was developed through the coordinated effort of two organizations: T11 began the development and the IETF (in the IMSS Working Group) finished it."

CONTACT-INFO

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DESCRIPTION

"This MIB module specifies the management information required to manage Security Associations established via Fibre Channel's FC-SP specification.

The MIB module consists of six parts:

- a per-Fabric table, t11FcSpSaIfTable, of capabilities, parameters, status information, and counters; the counters include non-transient aggregates of per-SA transient counters;
- three tables, t11FcSpSaPropTable, t11FcSpSaTSelPropTable, and t11FcSpSaTransTable, specifying the proposals for an FC-SP entity acting as an SA_Initiator to present to the SA_Responder during the negotiation of Security

Associations. The same information is also used by an FC-SP entity acting as an SA_Responder to decide what to accept during the negotiation of Security Associations. One of these tables, `t11FcSpSaTransTable`, is used not only for information about security transforms to propose and to accept, but also as agreed upon during the negotiation of Security Associations;

- a table, `t11FcSpSaTSelDrByTable`, of Traffic Selectors having the security action of 'drop' or 'bypass' to be applied either to ingress traffic that is unprotected by FC-SP, or to all egress traffic;
- four tables, `t11FcSpSaPairTable`, `t11FcSpSaTSelNegInTable`, `t11FcSpSaTSelNegOutTable`, and `t11FcSpSaTSelSpiTable`, containing information about active bidirectional pairs of Security Associations; in particular, `t11FcSpSaPairTable` has one row per active bidirectional SA pair, `t11FcSpSaTSelNegInTable` and `t11FcSpSaTSelNegOutTable` contain information on the Traffic Selectors negotiated on the SAs, and the `t11FcSpSaTSelSpiTable` is an alternate lookup table such that the Traffic Selector(s) in use on a particular Security Association can be quickly determined based on the (ingress) SPI value;
- a table, `t11FcSpSaControlTable`, of control and other information concerning the generation of notifications for events related to FC-SP Security Associations;
- one notification, `t11FcSpSaNotifyAuthFailure`, generated on the occurrence of an Authentication failure for a received FC-2 or CT_IU frame.

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REVISION "200808200000Z"

DESCRIPTION

"Initial version of this MIB module, published as RFC 5324."

::= { mib-2 179 }

```
t11FcSpSaMIBNotifications OBJECT IDENTIFIER ::= { t11FcSpSaMIB 0 }
t11FcSpSaMIBObjects       OBJECT IDENTIFIER ::= { t11FcSpSaMIB 1 }
t11FcSpSaMIBConformance OBJECT IDENTIFIER ::= { t11FcSpSaMIB 2 }
t11FcSpSaBase             OBJECT IDENTIFIER ::= { t11FcSpSaMIBObjects 1 }
t11FcSpSaConfig           OBJECT IDENTIFIER ::= { t11FcSpSaMIBObjects 2 }
t11FcSpSaActive           OBJECT IDENTIFIER ::= { t11FcSpSaMIBObjects 3 }
t11FcSpSaControl          OBJECT IDENTIFIER ::= { t11FcSpSaMIBObjects 4 }
```

```

--
-- Base-level Per-Fabric Information
--

t11FcSpSaIfTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11FcSpSaIfEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A table containing per-Fabric information related to
        FC-SP Security Associations."
    ::= { t11FcSpSaBase 1 }

t11FcSpSaIfEntry OBJECT-TYPE
    SYNTAX      T11FcSpSaIfEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Each entry contains information related to Security
        Associations on a particular Fabric, and managed as part
        of the Fibre Channel management instance identified by
        fcmInstanceIndex."
    INDEX       { fcmInstanceIndex, t11FcSpSaIfIndex,
                  t11FcSpSaIfFabricIndex }
    ::= { t11FcSpSaIfTable 1 }

T11FcSpSaIfEntry ::= SEQUENCE {
    t11FcSpSaIfIndex          InterfaceIndexOrZero,
    t11FcSpSaIfFabricIndex    T11FabricIndex,
    -- capabilities
    t11FcSpSaIfEspHeaderCapab T11FcSpTransforms,
    t11FcSpSaIfCTAuthCapab    T11FcSpTransforms,
    t11FcSpSaIfIKEv2Capab     T11FcSpTransforms,
    t11FcSpSaIfIkev2AuthCapab TruthValue,
    -- parameters and status
    t11FcSpSaIfStorageType     StorageType,
    t11FcSpSaIfReplayPrevention TruthValue,
    t11FcSpSaIfReplayWindowSize Unsigned32,
    t11FcSpSaIfDeadPeerDetections Counter32,
    t11FcSpSaIfTerminateAllSas INTEGER,
    -- summary frame counters
    t11FcSpSaIfOutDrops         Counter64,
    t11FcSpSaIfOutBypasses     Counter64,
    t11FcSpSaIfOutProcesses    Counter64,
    t11FcSpSaIfOutUnMatcheds    Counter64,
    t11FcSpSaIfInUnprotUnmtchDrops Counter64,
    -- aggregates of per-SA transient counters
    t11FcSpSaIfInDetReplays     Counter64,

```

```

t11FcSpSaIfInUnprotMtchDrops    Counter64,
t11FcSpSaIfInBadXforms          Counter64,
t11FcSpSaIfInGoodXforms         Counter64,
t11FcSpSaIfInProtUnmtchs        Counter64
}

t11FcSpSaIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndexOrZero
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This object has a non-zero value to identify a particular
        interface, or the value zero to indicate that the
        information in this row applies to all (of the management
        instance's) interfaces to the particular Fabric.

        If any row has a non-zero value of t11FcSpSaIfIndex, then
        all rows for the same Fibre Channel management instance must
        also have a non-zero value of t11FcSpSaIfIndex and thereby
        be specific to a particular interface.

        As and when zero values of t11FcSpSaIfIndex are used in
        this table, then they must also be used in each other
        table that has t11FcSpSaIfIndex in its INDEX clause."
    ::= { t11FcSpSaIfEntry 1 }

t11FcSpSaIfFabricIndex OBJECT-TYPE
    SYNTAX      T11FabricIndex
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "An index value that uniquely identifies a particular
        Fabric."
    ::= { t11FcSpSaIfEntry 2 }

t11FcSpSaIfEspHeaderCapab OBJECT-TYPE
    SYNTAX      T11FcSpTransforms
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "A list of the standardized transforms supported by this
        entity on this interface for ESP_Header protection."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
        Fibre Channel - Security Protocols (FC-SP),
        February 2007, Appendix A.3.1, tables A.23, A.25."
    ::= { t11FcSpSaIfEntry 3 }

```

t11FcSpSaIfCTAuthCapab OBJECT-TYPE

SYNTAX T11FcSpTransforms

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A list of the standardized transforms supported by this entity on this interface for CT_Authentication protection."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, Appendix A.3.1, tables A.23, A.25."

::= { t11FcSpSaIfEntry 4 }

t11FcSpSaIfIKEv2Capab OBJECT-TYPE

SYNTAX T11FcSpTransforms

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A list of the standardized transforms supported by this entity on this interface with IKEv2 protection."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, Appendix A.3.1, tables A.23, A.24,
A.25, A.26."

::= { t11FcSpSaIfEntry 5 }

t11FcSpSaIfIkev2AuthCapab OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"An indication of whether the entity is capable of supporting the IKEv2-AUTH protocol on this interface, i.e., concatenation of Authentication and SA Management Transactions, such that an SA Management Transaction is used to perform both the authentication function and SA management."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 6.7.2, and table A.27."

::= { t11FcSpSaIfEntry 6 }

t11FcSpSaIfStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object specifies the memory realization of information related to FC-SP Security Associations for interface(s) to a particular Fabric; specifically, for rows created and/or modified in these tables:

t11FcSpSaPropTable
 t11FcSpSaTSelDrByTable
 t11FcSpSaControlTable

and, for modified information contained in the same row as an instance of this object.

Even if an instance of this object has the value 'permanent(4)', none of the information defined in this MIB module for interface(s) to the given Fabric need to be writable."

::= { t11FcSpSaIfEntry 7 }

t11FcSpSaIfReplayPrevention OBJECT-TYPE

SYNTAX TruthValue
 MAX-ACCESS read-write
 STATUS current

DESCRIPTION

"This object indicates whether anti-replay protection is enabled for frame reception on this interface.

Note that the replay-protection mechanism in FC-SP is conceptually similar to the corresponding mechanism in IPsec ESP."

REFERENCE

"- IP Encapsulating Security Payload (ESP),
 RFC 4303, December 2005, section 3.3.3."

::= { t11FcSpSaIfEntry 8 }

t11FcSpSaIfReplayWindowSize OBJECT-TYPE

SYNTAX Unsigned32
 MAX-ACCESS read-write
 STATUS current

DESCRIPTION

"The size of the replay window to be used when anti-replay protection is enabled for frame reception on this interface.

Note that the replay-protection mechanism in FC-SP is conceptually similar to the corresponding mechanism in IPsec ESP."

REFERENCE

"- IP Encapsulating Security Payload (ESP),
RFC 4303, December 2005, section 3.4.3."
 ::= { t11FcSpSaIfEntry 9 }

t11FcSpSaIfDeadPeerDetections OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times that a dead peer condition has been detected on this interface.

This counter has no discontinuities other than those that all Counter32's have when sysUpTime=0."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 8.5.3.3."

::= { t11FcSpSaIfEntry 10 }

t11FcSpSaIfTerminateAllSas OBJECT-TYPE

SYNTAX INTEGER { noop(1), terminate(2) }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Setting this object to 'terminate' is a request to terminate all outstanding Security Associations on this interface.

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

::= { t11FcSpSaIfEntry 11 }

t11FcSpSaIfOutDrops OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of output frames that were dropped, instead of being transmitted on this interface, because they matched an active (at that time) Traffic Selector with an action of 'Drop'.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."

::= { t11FcSpSaIfEntry 12 }

t11FcSpSaIfOutBypasses OBJECT-TYPE

SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of output frames that were transmitted unchanged by FC-SP on this interface because they matched an active (at that time) Traffic Selector with an action of 'Bypass'.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaIfEntry 13 }

t11FcSpSaIfOutProcesses OBJECT-TYPE

SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of output frames that were protected by FC-SP before being transmitted on this interface because they matched an active (at that time) Traffic Selector with an action of 'Process'.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaIfEntry 14 }

t11FcSpSaIfOutUnMatcheds OBJECT-TYPE

SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of frames that were transmitted unchanged by FC-SP on this interface because they did not match any Traffic Selector active at that time.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaIfEntry 15 }

t11FcSpSaIfInUnprotUnmtchDrops OBJECT-TYPE

SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of frames received on this interface that were dropped because they were unprotected and did not match any Traffic Selector active at that time.

This counter has no discontinuities other than those
that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaIfEntry 16 }

t11FcSpSaIfInDetReplays OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times that a replay has been detected on
a Security Association that is currently active or was
previously active on this interface. Note that a frame
that is discarded because it is 'behind' the window,
i.e., too old, is counted as a replay.

This counter has no discontinuities other than those
that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaIfEntry 17 }

t11FcSpSaIfInUnprotMtchDrops OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times that a frame received on this
interface was dropped because it matched with a Traffic
Selector for a Security Association that was active at
the time of receipt but the frame was not protected as
negotiated for that Security Association.

This counter has no discontinuities other than those
that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaIfEntry 18 }

t11FcSpSaIfInBadXforms OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times that a frame received on this
interface was dropped because of a failure of one of the
transforms negotiated for the Security Association on
which it was received.

This counter has no discontinuities other than those
that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaIfEntry 19 }

t11FcSpSaIfInGoodXforms OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of frames received on this interface on a Security Association for which the transforms negotiated for that Security Association were successfully applied, and that matched a Traffic Selector for that Security Association.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."

::= { t11FcSpSaIfEntry 20 }

t11FcSpSaIfInProtUnmtchs OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of frames received on this interface that were dropped because they did not match any of the Traffic Selectors negotiated for the Security Association on which they were received, even though the Security Association's transforms were successfully applied.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."

::= { t11FcSpSaIfEntry 21 }

--

-- Proposals to present in Security Association negotiation

--

t11FcSpSaPropTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpSaPropEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of proposals for an FC-SP entity acting as an SA_Initiator to present to the SA_Responder during the negotiation of Security Associations. This information is also used by an FC-SP entity acting as an SA_Responder to decide what to accept during the negotiation of Security Associations."

::= { t11FcSpSaConfig 1 }

t11FcSpSaPropEntry OBJECT-TYPE

SYNTAX T11FcSpSaPropEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"Each entry contains information about one proposal for the FC-SP entity to present, or what to accept, during the negotiation of Security Associations on one or more interfaces (identified by t11FcSpSaIfIndex) to a particular Fabric (identified by t11FcSpSaIfFabricIndex), and managed as part of the Fibre Channel management instance identified by fcmInstanceIndex.

The StorageType of a row in this table is specified by the instance of t11FcSpSaIfStorageType that is INDEX-ed by the same values of fcmInstanceIndex, t11FcSpSaIfIndex and t11FcSpSaIfFabricIndex."

INDEX { fcmInstanceIndex, t11FcSpSaIfIndex,
 t11FcSpSaIfFabricIndex,
 t11FcSpSaPropIndex }
 ::= { t11FcSpSaPropTable 1 }

T11FcSpSaPropEntry ::= SEQUENCE {
 t11FcSpSaPropIndex Unsigned32,
 t11FcSpSaPropSecurityProt T11FcSpSecurityProtocolId,
 t11FcSpSaPropTSelListIndex Unsigned32,
 t11FcSpSaPropTransListIndex Unsigned32,
 t11FcSpSaPropAcceptAlgorithm INTEGER,
 t11FcSpSaPropOutMatchSucceeds Counter64,
 t11FcSpSaPropRowStatus RowStatus
 }

t11FcSpSaPropIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"An index value that uniquely identifies a particular proposal for use on one or more interfaces to a Fabric."

::= { t11FcSpSaPropEntry 1 }

t11FcSpSaPropSecurityProt OBJECT-TYPE

SYNTAX T11FcSpSecurityProtocolId
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION

"The Security Protocol identifier for this proposal, i.e., whether the proposal is for traffic to be protected using ESP_Header or CT_Authentication."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, section 6.3.2.2 and table 67."

::= { t11FcSpSaPropEntry 2 }

t11FcSpSaPropTSelListIndex OBJECT-TYPE

SYNTAX Unsigned32
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"When the value of this object is non-zero, it points to the proposal's list of Traffic Selectors. The value must be non-zero in an active row of this table.

The identified list is represented by all rows in the t11FcSpSaTSelPropTable for which t11FcSpSaTSelPropListIndex has the same value as this object (and with corresponding values of t11FcSpSaIfIndex and fcmInstanceIndex)."

::= { t11FcSpSaPropEntry 3 }

t11FcSpSaPropTransListIndex OBJECT-TYPE

SYNTAX Unsigned32
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"When the value of this object is non-zero, it points to the proposal's list of Transforms. The value must be non-zero in an active row of this table.

The identified list is represented by all rows in the t11FcSpSaTransTable for which t11FcSpSaTransListIndex has the same value as this object (and with corresponding values of t11FcSpSaIfIndex and fcmInstanceIndex)."

::= { t11FcSpSaPropEntry 4 }

t11FcSpSaPropAcceptAlgorithm OBJECT-TYPE

SYNTAX INTEGER {
 intersection(1),
 union(2),
 other(3)
 }

MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The algorithm by which an SA_Responder in an SA negotiation decides on which Traffic Selectors to specify in a response to an IKE_Create_Child_SA request. This algorithm is used

when the Traffic Selectors specified by an SA_Initiator in an IKE_Create_Child_SA request overlap with this proposal's list of Traffic Selectors:

intersection(1) - the SA_Responder specifies the largest subset of what the SA_Initiator proposed, which is also a subset of this proposal's Traffic Selectors.

union(2) - the SA_Responder specifies the smallest superset of what the SA_Initiator proposed, which is also a superset of this proposal's Traffic Selectors.

other(3) - the SA_Responder uses some other algorithm.

"

::= { t11FcSpSaPropEntry 5 }

t11FcSpSaPropOutMatchSucceeds OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of egress frames that have matched a Traffic Selector that was negotiated to select traffic for an SA based on this proposal being accepted.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."

::= { t11FcSpSaPropEntry 6 }

t11FcSpSaPropRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of a row. Values of object instances within an active row can be modified at any time.

The status cannot be set to 'active' unless and until the instances of t11FcSpSaPropTSelListIndex and t11FcSpSaPropTransListIndex in the row have been set to point to active rows in the t11FcSpSaTSelPropTable and t11FcSpSaTransTable tables, respectively. A row in this table is deleted if the active rows it points to are deleted."

::= { t11FcSpSaPropEntry 7 }

```
--
-- Traffic Selector Proposals
--

t11FcSpSaTSelPropTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11FcSpSaTSelPropEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A table containing information about Traffic Selectors
        to propose and/or to accept during the negotiation of
        Security Associations."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
          Fibre Channel - Security Protocols (FC-SP),
          February 2007, section 6.4.5.
          - Use of IKEv2 in FC-SP, RFC 4595,
            July 2006, section 4.4."
    ::= { t11FcSpSaConfig 2 }

t11FcSpSaTSelPropEntry OBJECT-TYPE
    SYNTAX      T11FcSpSaTSelPropEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Each entry contains information about one Traffic
        Selector within a list of Traffic Selectors to propose,
        or for use in determining what to accept during Security
        Association negotiation.

        One such list is configured for use on a Fabric by
        configuring the list's value of t11FcSpSaTSelPropListIndex
        as the value of an instance of t11FcSpSaPropTSelListIndex,
        for corresponding values of t11FcSpSaIfIndex and
        fcmInstanceIndex. Further, the proposing and accepting
        of Traffic Selectors is only done as a part of a proposal
        specified by a row of the t11FcSpSaPropTable, i.e.,
        in combination with the proposing and accepting of security
        transforms as specified by the combination of
        t11FcSpSaPropTSelListIndex and t11FcSpSaPropTransListIndex
        in one row of the t11FcSpSaPropTable.

        The StorageType of a row in this table is specified by
        the instance of t11FcSpSaTSelPropStorageType in that row."
    INDEX { fcmInstanceIndex, t11FcSpSaIfIndex,
            t11FcSpSaTSelPropListIndex, t11FcSpSaTSelPropPrecedence }
    ::= { t11FcSpSaTSelPropTable 1 }
```

```

T11FcSpSaTSelPropEntry ::= SEQUENCE {
    t11FcSpSaTSelPropListIndex      Unsigned32,
    t11FcSpSaTSelPropPrecedence     T11FcSpPrecedence,
    t11FcSpSaTSelPropDirection      T11FcSaDirection,
    t11FcSpSaTSelPropStartSrcAddr    FcAddressIdOrZero,
    t11FcSpSaTSelPropEndSrcAddr      FcAddressIdOrZero,
    t11FcSpSaTSelPropStartDstAddr    FcAddressIdOrZero,
    t11FcSpSaTSelPropEndDstAddr      FcAddressIdOrZero,
    t11FcSpSaTSelPropStartRctl       T11FcRoutingControl,
    t11FcSpSaTSelPropEndRctl        T11FcRoutingControl,
    t11FcSpSaTSelPropStartType       T11FcSpType,
    t11FcSpSaTSelPropEndType        T11FcSpType,
    t11FcSpSaTSelPropStorageType     StorageType,
    t11FcSpSaTSelPropRowStatus       RowStatus
}

t11FcSpSaTSelPropListIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "An index value that identifies a particular list of
        Traffic Selectors."
    ::= { t11FcSpSaTSelPropEntry 1 }

t11FcSpSaTSelPropPrecedence OBJECT-TYPE
    SYNTAX      T11FcSpPrecedence
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The precedence of this Traffic Selector.  Each
        Traffic Selector within a particular list of
        Traffic Selectors must have a different precedence.

        If an egress frame matches multiple Traffic Selectors,
        it should be transmitted on the SA associated with the
        Traffic Selector having the numerically smallest
        precedence value."
    ::= { t11FcSpSaTSelPropEntry 2 }

t11FcSpSaTSelPropDirection OBJECT-TYPE
    SYNTAX      T11FcSaDirection
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "An indication of whether this Traffic Selector is
        to be proposed for ingress or egress traffic."
    DEFVAL      { egress }

```

```
::= { t11FcSpSaTSelPropEntry 3 }
```

```
t11FcSpSaTSelPropStartSrcAddr OBJECT-TYPE
```

```
SYNTAX      FcAddressIdOrZero (SIZE (3))
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"The numerically smallest 24-bit value of a source address
(S_ID) of a frame that will match with this Traffic
Selector."
```

```
REFERENCE
```

```
"- ANSI INCITS 426-2007, T11/Project 1570-D,
   Fibre Channel - Security Protocols (FC-SP),
   February 2007, section 6.4.5."
```

```
DEFVAL      { '000000'h }
```

```
::= { t11FcSpSaTSelPropEntry 4 }
```

```
t11FcSpSaTSelPropEndSrcAddr OBJECT-TYPE
```

```
SYNTAX      FcAddressIdOrZero (SIZE (3))
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"The numerically largest 24-bit value of a source address
(S_ID) of a frame that will match with this Traffic
Selector."
```

```
REFERENCE
```

```
"- ANSI INCITS 426-2007, T11/Project 1570-D,
   Fibre Channel - Security Protocols (FC-SP),
   February 2007, section 6.4.5."
```

```
DEFVAL      { 'FFFFFF'h }
```

```
::= { t11FcSpSaTSelPropEntry 5 }
```

```
t11FcSpSaTSelPropStartDstAddr OBJECT-TYPE
```

```
SYNTAX      FcAddressIdOrZero (SIZE (3))
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"The numerically smallest 24-bit value of a destination
address (D_ID) of a frame that will match with this
Traffic Selector."
```

```
REFERENCE
```

```
"- ANSI INCITS 426-2007, T11/Project 1570-D,
   Fibre Channel - Security Protocols (FC-SP),
   February 2007, section 6.4.5."
```

```
DEFVAL      { '000000'h }
```

```
::= { t11FcSpSaTSelPropEntry 6 }
```

```
t11FcSpSaTSelPropEndDstAddr OBJECT-TYPE
```


SYNTAX FcAddressIdOrZero (SIZE (3))
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "The numerically largest 24-bit value of a destination
 address (D_ID) of a frame that will match with this
 Traffic Selector."

REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 6.4.5."

DEFVAL { 'FFFFFF'h }
 ::= { t11FcSpSaTSelPropEntry 7 }

t11FcSpSaTSelPropStartRctl OBJECT-TYPE

SYNTAX T11FcRoutingControl
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "The numerically smallest 8-bit value contained within a
 Routing Control (R_CTL) field of a frame that will match
 with this Traffic Selector."

REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 6.4.5."

DEFVAL { '00'h }
 ::= { t11FcSpSaTSelPropEntry 8 }

t11FcSpSaTSelPropEndRctl OBJECT-TYPE

SYNTAX T11FcRoutingControl
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "The numerically largest 8-bit value contained within a
 Routing Control (R_CTL) field of a frame that will match
 with this Traffic Selector."

REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 6.4.5."

DEFVAL { 'FF'h }
 ::= { t11FcSpSaTSelPropEntry 9 }

t11FcSpSaTSelPropStartType OBJECT-TYPE

SYNTAX T11FcSpType
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"The numerically smallest of a range of possible 'type' values of frames that will match with this Traffic Selector."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 6.4.5."

DEFVAL { '0000'h }

::= { t11FcSpSaTSelPropEntry 10 }

t11FcSpSaTSelPropEndType OBJECT-TYPE

SYNTAX T11FcSpType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The numerically largest of a range of possible 'type' values of frames that will match with this Traffic Selector."

REFERENCE

"- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, section 6.4.5."

DEFVAL { 'FFFF'h }

::= { t11FcSpSaTSelPropEntry 11 }

t11FcSpSaTSelPropStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the memory realization of the information in this row.

Even if an instance of this object has the value 'permanent(4)', none of the information in its row needs to be writable."

::= { t11FcSpSaTSelPropEntry 12 }

t11FcSpSaTSelPropRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this row. Values of object instances within the row can be modified at any time."

::= { t11FcSpSaTSelPropEntry 13 }

--

-- Transform Proposals

--

t11FcSpSaTransTable OBJECT-TYPE

SYNTAX SEQUENCE OF T11FcSpSaTransEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table containing information about security transforms to propose, to accept and/or agreed upon during the negotiation of Security Associations."

::= { t11FcSpSaConfig 3 }

t11FcSpSaTransEntry OBJECT-TYPE

SYNTAX T11FcSpSaTransEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information about one proposal within a list of security transforms to be proposed, to be accepted, or already agreed upon, for use on a pair of Security Associations on one or more interfaces (identified by t11FcSpSaIfIndex), managed as part of the Fibre Channel management instance identified by fcmInstanceIndex.

One such list is configured to be proposed or accepted for use on a Fabric, by having the list's value of t11FcSpSaTransListIndex be the value of an instance of t11FcSpSaPropTransListIndex for that Fabric. Further, the proposing and accepting of security transforms is only done as a part of a proposal specified by a row of the t11FcSpSaPropTable, i.e., in combination with the proposing and accepting of Traffic Selectors as specified by the combination of t11FcSpSaPropTSelListIndex and t11FcSpSaPropTransListIndex in one row of the t11FcSpSaPropTable.

The security (encryption and integrity) transform in use on an SA pair is indicated by having the pair's values of t11FcSpSaPairTransListIndex and t11FcSpSaPairTransIndex contain the values of t11FcSpSaTransListIndex and t11FcSpSaTransIndex for the transform's row in this table.

The StorageType of a row in this table is specified by the instance of t11FcSpSaTransStorageType in that row."

INDEX { fcmInstanceIndex, t11FcSpSaIfIndex,
t11FcSpSaTransListIndex, t11FcSpSaTransIndex }

```

 ::= { t11FcSpSaTransTable 1 }

T11FcSpSaTransEntry ::= SEQUENCE {
    t11FcSpSaTransListIndex      Unsigned32,
    t11FcSpSaTransIndex          Unsigned32,
    t11FcSpSaTransSecurityProt    T11FcSpSecurityProtocolId,
    t11FcSpSaTransEncryptAlg      AutonomousType,
    t11FcSpSaTransEncryptKeyLen   Unsigned32,
    t11FcSpSaTransIntegrityAlg    AutonomousType,
    t11FcSpSaTransStorageType     StorageType,
    t11FcSpSaTransRowStatus       RowStatus
}

t11FcSpSaTransListIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "An index value that uniquely identifies a particular
         list of security transforms to be proposed, to be accepted,
         or already agreed upon."
    ::= { t11FcSpSaTransEntry 1 }

t11FcSpSaTransIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "An index value that uniquely identifies one security
         transform within a list identified by
         t11FcSpSaTransListIndex."
    ::= { t11FcSpSaTransEntry 2 }

t11FcSpSaTransSecurityProt OBJECT-TYPE
    SYNTAX      T11FcSpSecurityProtocolId
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The Security Protocol identifier that indicates
         whether this transform is for traffic to be protected
         using ESP_Header or using CT_Authentication."
    REFERENCE
        "- ANSI INCITS 426-2007, T11/Project 1570-D,
         Fibre Channel - Security Protocols (FC-SP),
         February 2007, section 6.3.2.2 and table 67."
    ::= { t11FcSpSaTransEntry 3 }

t11FcSpSaTransEncryptAlg OBJECT-TYPE

```

SYNTAX AutonomousType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "The Encryption Algorithm for this transform."
REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 6.3.2.3 and tables 69 & 70."
::= { t11FcSpSaTransEntry 4 }

t11FcSpSaTransEncryptKeyLen OBJECT-TYPE

SYNTAX Unsigned32
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "The key length in bits to be used with an encryption
 algorithm that has a variable length key. This object
 is ignored when the corresponding instance of
 t11FcSpSaTransEncryptAlg specifies an algorithm with a
 fixed length key."
REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 6.3.2.5 and table 77."
::= { t11FcSpSaTransEntry 5 }

t11FcSpSaTransIntegrityAlg OBJECT-TYPE

SYNTAX AutonomousType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "The Integrity Algorithm for this transform."
REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D,
 Fibre Channel - Security Protocols (FC-SP),
 February 2007, section 6.3.2.3 and tables 69 & 72."
::= { t11FcSpSaTransEntry 6 }

t11FcSpSaTransStorageType OBJECT-TYPE

SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "This object specifies the memory realization of
 the information in this row.

 Even if an instance of this object has the value

```

        'permanent(4)', none of the information in its row
        needs to be writable."
 ::= { t11FcSpSaTransEntry 7 }

```

t11FcSpSaTransRowStatus OBJECT-TYPE

```

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

```

```

    When an instance of t11FcSpSaPairTransListIndex points to
    a row in this table, values of object instances in the row
    cannot be modified nor can the row be deleted. Otherwise,
    a row can be modified or deleted at any time."

```

```

 ::= { t11FcSpSaTransEntry 8 }

```

```

--
-- Traffic Selectors for Drop & Bypass
--

```

t11FcSpSaTSelDrByTable OBJECT-TYPE

```

SYNTAX      SEQUENCE OF T11FcSpSaTSelDrByEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

```

```

    "A table containing Traffic Selectors to select which
    traffic is to be dropped or is to bypass further
    security processing."

```

REFERENCE

- ANSI INCITS 426-2007, T11/Project 1570-D,
Fibre Channel - Security Protocols (FC-SP),
February 2007, sections 4.6, 4.7, and 6.4.5.
- Use of IKEv2 in FC-SP, RFC 4595,
July 2006, section 4.4."

```

 ::= { t11FcSpSaConfig 4 }

```

t11FcSpSaTSelDrByEntry OBJECT-TYPE

```

SYNTAX      T11FcSpSaTSelDrByEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

```

```

    "Each entry represents one Traffic Selector having the
    security action of 'drop' or 'bypass', which is applied
    based on a precedence value, either to ingress traffic
    that is unprotected by FC-SP, or to all egress
    traffic on one or more interfaces (identified by
    t11FcSpSaIfIndex) to a particular Fabric (identified

```

by t11FcSpSaIfFabricIndex), and managed as part of the Fibre Channel management instance identified by fcmInstanceIndex.

The StorageType of a row in this table is specified by the instance of t11FcSpSaIfStorageType that is INDEX-ed by the same values of fcmInstanceIndex, t11FcSpSaIfIndex and t11FcSpSaIfFabricIndex."

```
INDEX { fcmInstanceIndex, t11FcSpSaIfIndex, t11FcSpSaIfFabricIndex,
        t11FcSpSaTSelDrByDirection, t11FcSpSaTSelDrByPrecedence }
 ::= { t11FcSpSaTSelDrByTable 1 }
```

```
T11FcSpSaTSelDrByEntry ::= SEQUENCE {
    t11FcSpSaTSelDrByDirection      T11FcSaDirection,
    t11FcSpSaTSelDrByPrecedence     T11FcSpPrecedence,
    t11FcSpSaTSelDrByAction         INTEGER,
    t11FcSpSaTSelDrByStartSrcAddr   FcAddressIdOrZero,
    t11FcSpSaTSelDrByEndSrcAddr     FcAddressIdOrZero,
    t11FcSpSaTSelDrByStartDstAddr   FcAddressIdOrZero,
    t11FcSpSaTSelDrByEndDstAddr     FcAddressIdOrZero,
    t11FcSpSaTSelDrByStartRctl      T11FcRoutingControl,
    t11FcSpSaTSelDrByEndRctl        T11FcRoutingControl,
    t11FcSpSaTSelDrByStartType      T11FcSpType,
    t11FcSpSaTSelDrByEndType        T11FcSpType,
    t11FcSpSaTSelDrByMatches        Counter64,
    t11FcSpSaTSelDrByRowStatus      RowStatus
}
```

t11FcSpSaTSelDrByDirection OBJECT-TYPE

SYNTAX T11FcSaDirection

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An indication of whether this Traffic Selector is for ingress or egress traffic."

```
::= { t11FcSpSaTSelDrByEntry 1 }
```

t11FcSpSaTSelDrByPrecedence OBJECT-TYPE

SYNTAX T11FcSpPrecedence

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The precedence of this Traffic Selector. If and when a frame is compared against multiple Traffic Selectors, and multiple of them have a match with the frame, the security action to be taken for the frame is that specified for the matching Traffic Selector having the numerically smallest precedence value."

```
::= { t11FcSpSaTSelDrByEntry 2 }
```

```
t11FcSpSaTSelDrByAction OBJECT-TYPE
    SYNTAX      INTEGER { drop(1), bypass(2) }
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The security action to be taken for a frame that
        matches this Traffic Selector."
    DEFVAL       { drop }
    ::= { t11FcSpSaTSelDrByEntry 3 }

t11FcSpSaTSelDrByStartSrcAddr OBJECT-TYPE
    SYNTAX      FcAddressIdOrZero (SIZE (3))
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The numerically smallest 24-bit value of a source address
        (S_ID) of a frame that will match with this Traffic
        Selector."
    DEFVAL       { '000000'h }
    ::= { t11FcSpSaTSelDrByEntry 4 }

t11FcSpSaTSelDrByEndSrcAddr OBJECT-TYPE
    SYNTAX      FcAddressIdOrZero (SIZE (3))
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The numerically largest 24-bit value of a source address
        (S_ID) of a frame that will match with this Traffic
        Selector."
    DEFVAL       { 'FFFFFF'h }
    ::= { t11FcSpSaTSelDrByEntry 5 }

t11FcSpSaTSelDrByStartDstAddr OBJECT-TYPE
    SYNTAX      FcAddressIdOrZero (SIZE (3))
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The numerically smallest 24-bit value of a destination
        address (D_ID) of a frame that will match with this
        Traffic Selector."
    DEFVAL       { '000000'h }
    ::= { t11FcSpSaTSelDrByEntry 6 }

t11FcSpSaTSelDrByEndDstAddr OBJECT-TYPE
    SYNTAX      FcAddressIdOrZero (SIZE (3))
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
```


"The numerically largest 24-bit value of a destination address (D_ID) of a frame that will match with this Traffic Selector."

DEFVAL { 'FFFFFF'h }
 ::= { t11FcSpSaTSelDrByEntry 7 }

t11FcSpSaTSelDrByStartRctl OBJECT-TYPE

SYNTAX T11FcRoutingControl

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The numerically smallest 8-bit value contained within a Routing Control (R_CTL) field of a frame that will match with this Traffic Selector."

DEFVAL { '00'h }
 ::= { t11FcSpSaTSelDrByEntry 8 }

t11FcSpSaTSelDrByEndRctl OBJECT-TYPE

SYNTAX T11FcRoutingControl

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The numerically largest 8-bit value contained within a Routing Control (R_CTL) field of a frame that will match with this Traffic Selector."

DEFVAL { 'FF'h }
 ::= { t11FcSpSaTSelDrByEntry 9 }

t11FcSpSaTSelDrByStartType OBJECT-TYPE

SYNTAX T11FcSpType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The numerically smallest of a range of possible 'type' values of frames that will match with this Traffic Selector."

DEFVAL { '0000'h }
 ::= { t11FcSpSaTSelDrByEntry 10 }

t11FcSpSaTSelDrByEndType OBJECT-TYPE

SYNTAX T11FcSpType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The numerically largest of a range of possible 'type' values of frames that will match with this Traffic Selector."

DEFVAL { 'FFFF'h }

```

 ::= { t11FcSpSaTSelDrByEntry 11 }

t11FcSpSaTSelDrByMatches OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The number of frames for which the action specified by
         the corresponding instance of t11FcSpSaTSelDrByAction was
         taken because of a match with this Traffic Selector.

         This counter has no discontinuities other than those
         that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaTSelDrByEntry 12 }

t11FcSpSaTSelDrByRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this row.  Values of object instances
         within the row can be modified at any time."
 ::= { t11FcSpSaTSelDrByEntry 13 }

--
-- Active Security Associations
--

t11FcSpSaPairTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11FcSpSaPairEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A table containing information about active
         bidirectional pairs of Security Associations."
 ::= { t11FcSpSaActive 1 }

t11FcSpSaPairEntry OBJECT-TYPE
    SYNTAX      T11FcSpSaPairEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Each entry contains information about one active
         bidirectional pair of Security Associations on an
         interface to a particular Fabric (identified by
         t11FcSpSaIfFabricIndex), managed as part of the Fibre
         Channel management instance identified by
         fcmInstanceIndex."

```

```

INDEX { fcmInstanceIndex, t11FcSpSaPairIfIndex,
         t11FcSpSaIfFabricIndex, t11FcSpSaPairInboundSpi }
 ::= { t11FcSpSaPairTable 1 }

```

```

T11FcSpSaPairEntry ::= SEQUENCE {
    t11FcSpSaPairIfIndex      InterfaceIndex,
    t11FcSpSaPairInboundSpi   T11FcSpiIndex,
    t11FcSpSaPairSecurityProt T11FcSpSecurityProtocolId,
    t11FcSpSaPairTransListIndex Unsigned32,
    t11FcSpSaPairTransIndex   Unsigned32,
    t11FcSpSaPairLifetimeLeft T11FcSpLifetimeLeft,
    t11FcSpSaPairLifetimeLeftUnits T11FcSpLifetimeLeftUnits,
    t11FcSpSaPairTerminate     INTEGER,
    t11FcSpSaPairInProtUnMatches Counter64,
    t11FcSpSaPairInDetReplays  Counter64,
    t11FcSpSaPairInBadXforms   Counter64,
    t11FcSpSaPairInGoodXforms  Counter64
}

```

```

t11FcSpSaPairIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This object identifies the interface to the particular
        Fabric on which this SA pair is active."
    ::= { t11FcSpSaPairEntry 1 }

```

```

t11FcSpSaPairInboundSpi OBJECT-TYPE
    SYNTAX      T11FcSpiIndex
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The SPI value that is used to indicate that an incoming
        frame was received on the ingress SA of this SA pair."
    ::= { t11FcSpSaPairEntry 2 }

```

```

t11FcSpSaPairSecurityProt OBJECT-TYPE
    SYNTAX      T11FcSpSecurityProtocolId
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The object indicates whether this SA uses ESP_Header to
        protect FC-2 frames, or CT_Authentication to protect Common
        Transport Information Units (CT_IUs)."
    ::= { t11FcSpSaPairEntry 3 }

```

```

t11FcSpSaPairTransListIndex OBJECT-TYPE

```

SYNTAX Unsigned32 (1..4294967295)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The combination of this value and the value of the
 corresponding instance of t11FcSpSaPairTransIndex
 identify the row in the t11FcSpSaTransTable that
 contains the transforms that are in use on this SA pair."
 ::= { t11FcSpSaPairEntry 4 }

t11FcSpSaPairTransIndex OBJECT-TYPE
SYNTAX Unsigned32 (1..4294967295)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The combination of this value and the value of the
 corresponding instance of t11FcSpSaPairTransListIndex
 identify the row in the t11FcSpSaTransTable that
 contains the transforms that are in use on this SA pair."
 ::= { t11FcSpSaPairEntry 5 }

t11FcSpSaPairLifetimeLeft OBJECT-TYPE
SYNTAX T11FcSpLifetimeLeft
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The remaining lifetime of this SA pair, given in the
 units specified by the value of the corresponding
 instance of t11FcSpSaPairLifetimeLeft."
 ::= { t11FcSpSaPairEntry 6 }

t11FcSpSaPairLifetimeLeftUnits OBJECT-TYPE
SYNTAX T11FcSpLifetimeLeftUnits
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The units in which the value of the corresponding
 instance of t11FcSpSaPairLifetimeLeft specifies the
 remaining lifetime of this SA pair."
 ::= { t11FcSpSaPairEntry 7 }

t11FcSpSaPairTerminate OBJECT-TYPE
SYNTAX INTEGER { noop(1), terminate(2) }
MAX-ACCESS read-write
STATUS current
DESCRIPTION

 "Setting this object to 'terminate' is a request
 to terminate this pair of Security Associations.

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

Setting this object to 'noop' has no effect."

::= { t11FcSpSaPairEntry 8 }

t11FcSpSaPairInProtUnMatches OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of frames received on this SA for which the SA's transforms were successfully applied to the frame, but the frame was still dropped because it did not match any of the SA's ingress Traffic Selectors.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."

::= { t11FcSpSaPairEntry 9 }

t11FcSpSaPairInDetReplays OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times that a replay has been detected on this Security Association. Note that a frame that is discarded because it is 'behind' the window, i.e., too old, is counted as a replay.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."

::= { t11FcSpSaPairEntry 10 }

t11FcSpSaPairInBadXforms OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times that a received frame was dropped because one of the transforms negotiated for this Security Association failed.

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."

::= { t11FcSpSaPairEntry 11 }

t11FcSpSaPairInGoodXforms OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current
 DESCRIPTION
 "The number of received frames for which the transforms negotiated for this Security Association, were successfully applied."

This counter has no discontinuities other than those that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaPairEntry 12 }

--
 -- Negotiated Ingress Traffic Selectors
 --

t11FcSpSaTSelNegInTable OBJECT-TYPE
 SYNTAX SEQUENCE OF T11FcSpSaTSelNegInEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "A table containing information about ingress Traffic Selectors that are in use on active Security Associations."
 REFERENCE
 "- ANSI INCITS 426-2007, T11/Project 1570-D, Fibre Channel - Security Protocols (FC-SP), February 2007, sections 4.6, 4.7, and 6.4.5.
 - Use of IKEv2 in FC-SP, RFC 4595, July 2006, section 4.4."
 ::= { t11FcSpSaActive 2 }

t11FcSpSaTSelNegInEntry OBJECT-TYPE
 SYNTAX T11FcSpSaTSelNegInEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "Each entry contains information about one ingress Traffic Selector that is in use on an active Security Association on an interface (identified by t11FcSpSaPairIfIndex) to a particular Fabric (identified by t11FcSpSaIfFabricIndex), managed as part of the Fibre Channel management instance identified by fcmInstanceIndex."
 INDEX { fcmInstanceIndex, t11FcSpSaPairIfIndex, t11FcSpSaIfFabricIndex, t11FcSpSaTSelNegInIndex }
 ::= { t11FcSpSaTSelNegInTable 1 }

T11FcSpSaTSelNegInEntry ::= SEQUENCE {
 t11FcSpSaTSelNegInIndex Unsigned32,
 t11FcSpSaTSelNegInInboundSpi T11FcSpiIndex,

```

t11FcSpSaTSelNegInStartSrcAddr  FcAddressIdOrZero,
t11FcSpSaTSelNegInEndSrcAddr    FcAddressIdOrZero,
t11FcSpSaTSelNegInStartDstAddr  FcAddressIdOrZero,
t11FcSpSaTSelNegInEndDstAddr    FcAddressIdOrZero,
t11FcSpSaTSelNegInStartRctl     T11FcRoutingControl,
t11FcSpSaTSelNegInEndRctl       T11FcRoutingControl,
t11FcSpSaTSelNegInStartType     T11FcSpType,
t11FcSpSaTSelNegInEndType       T11FcSpType,
t11FcSpSaTSelNegInUnpMtchDrops  Counter64
}

t11FcSpSaTSelNegInIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "An index value to distinguish an ingress Traffic Selector
         from all others currently in use by Security Associations
         on the same interface to a particular Fabric."
    ::= { t11FcSpSaTSelNegInEntry 1 }

t11FcSpSaTSelNegInInboundSpi OBJECT-TYPE
    SYNTAX      T11FcSpiIndex
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The SPI of the ingress SA on which this Traffic Selector
         is in use.

         This value can be used to find the SA pair's row in the
         t11FcSpSaPairTable."
    ::= { t11FcSpSaTSelNegInEntry 2 }

t11FcSpSaTSelNegInStartSrcAddr OBJECT-TYPE
    SYNTAX      FcAddressIdOrZero (SIZE (3))
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The numerically smallest 24-bit value of a source address
         (S_ID) of a frame that will match with this Traffic
         Selector."
    ::= { t11FcSpSaTSelNegInEntry 3 }

t11FcSpSaTSelNegInEndSrcAddr OBJECT-TYPE
    SYNTAX      FcAddressIdOrZero (SIZE (3))
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION

```

```
        "The numerically largest 24-bit value of a source address
        (S_ID) of a frame that will match with this Traffic
        Selector."
 ::= { t11FcSpSaTSelNegInEntry 4 }

t11FcSpSaTSelNegInStartDstAddr OBJECT-TYPE
    SYNTAX      FcAddressIdOrZero (SIZE (3))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The numerically smallest 24-bit value of a destination
        address (D_ID) of a frame that will match with this
        Traffic Selector."
 ::= { t11FcSpSaTSelNegInEntry 5 }

t11FcSpSaTSelNegInEndDstAddr OBJECT-TYPE
    SYNTAX      FcAddressIdOrZero (SIZE (3))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The numerically largest 24-bit value of a destination
        address (D_ID) of a frame that will match with this
        Traffic Selector."
 ::= { t11FcSpSaTSelNegInEntry 6 }

t11FcSpSaTSelNegInStartRctl OBJECT-TYPE
    SYNTAX      T11FcRoutingControl
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The numerically smallest 8-bit value contained within a
        Routing Control (R_CTL) field of a frame that will match
        with this Traffic Selector."
 ::= { t11FcSpSaTSelNegInEntry 7 }

t11FcSpSaTSelNegInEndRctl OBJECT-TYPE
    SYNTAX      T11FcRoutingControl
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The numerically largest 8-bit value contained within a
        Routing Control (R_CTL) field of a frame that will match
        with this Traffic Selector."
 ::= { t11FcSpSaTSelNegInEntry 8 }

t11FcSpSaTSelNegInStartType OBJECT-TYPE
    SYNTAX      T11FcSpType
    MAX-ACCESS  read-only
```



```

STATUS          current
DESCRIPTION
    "The numerically smallest of a range of possible 'type'
    values of frames that will match with this Traffic
    Selector."
 ::= { t11FcSpSaTSelNegInEntry 9 }

t11FcSpSaTSelNegInEndType OBJECT-TYPE
SYNTAX          T11FcSpType
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The numerically largest of a range of possible 'type'
    values of frames that will match with this Traffic
    Selector."
 ::= { t11FcSpSaTSelNegInEntry 10 }

t11FcSpSaTSelNegInUnpMtchDrops OBJECT-TYPE
SYNTAX          Counter64
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The number of times that a received frame was dropped
    because it matched with this Traffic Selector but the
    frame was not protected as negotiated for the Security
    Association identified by t11FcSpSaTSelNegInInboundSpi.

    This counter has no discontinuities other than those
    that all Counter64's have when sysUpTime=0."
 ::= { t11FcSpSaTSelNegInEntry 11 }

--
-- Negotiated Egress Traffic Selectors
--

t11FcSpSaTSelNegOutTable OBJECT-TYPE
SYNTAX          SEQUENCE OF T11FcSpSaTSelNegOutEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "A table containing information about egress Traffic
    Selectors that are in use on active Security
    Associations."
REFERENCE
    "- ANSI INCITS 426-2007, T11/Project 1570-D,
      Fibre Channel - Security Protocols (FC-SP),
      February 2007, sections 4.6, 4.7, and 6.4.5.
    - Use of IKEv2 in FC-SP, RFC 4595,
```

July 2006, section 4.4."
 ::= { t11FcSpSaActive 3 }

t11FcSpSaTSelNegOutEntry OBJECT-TYPE

SYNTAX T11FcSpSaTSelNegOutEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains information about one egress Traffic Selector that is in use on an active Security Association on an interface (identified by t11FcSpSaPairIfIndex) to a particular Fabric (identified by t11FcSpSaIfFabricIndex), managed as part of the Fibre Channel management instance identified by fcmInstanceIndex."

INDEX { fcmInstanceIndex, t11FcSpSaPairIfIndex,
 t11FcSpSaIfFabricIndex, t11FcSpSaTSelNegOutPrecedence }
 ::= { t11FcSpSaTSelNegOutTable 1 }

T11FcSpSaTSelNegOutEntry ::= SEQUENCE {

t11FcSpSaTSelNegOutPrecedence	T11FcSpPrecedence,
t11FcSpSaTSelNegOutInboundSpi	T11FcSpiIndex,
t11FcSpSaTSelNegOutStartSrcAddr	FcAddressIdOrZero,
t11FcSpSaTSelNegOutEndSrcAddr	FcAddressIdOrZero,
t11FcSpSaTSelNegOutStartDstAddr	FcAddressIdOrZero,
t11FcSpSaTSelNegOutEndDstAddr	FcAddressIdOrZero,
t11FcSpSaTSelNegOutStartRctl	T11FcRoutingControl,
t11FcSpSaTSelNegOutEndRctl	T11FcRoutingControl,
t11FcSpSaTSelNegOutStartType	T11FcSpType,
t11FcSpSaTSelNegOutEndType	T11FcSpType

}

t11FcSpSaTSelNegOutPrecedence OBJECT-TYPE

SYNTAX T11FcSpPrecedence

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The precedence of this Traffic Selector. If and when a frame is compared against multiple Traffic Selectors, and multiple of them have a match with the frame, the security action to be taken for the frame is that specified for the matching Traffic Selector having the numerically smallest precedence value."

::= { t11FcSpSaTSelNegOutEntry 1 }

t11FcSpSaTSelNegOutInboundSpi OBJECT-TYPE

SYNTAX T11FcSpiIndex

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The SPI of the ingress SA of the SA pair for which this Traffic Selector is in use on the egress SA.

This value can be used to find the SA pair's row in the t11FcSpSaPairTable."

::= { t11FcSpSaTSelNegOutEntry 2 }

t11FcSpSaTSelNegOutStartSrcAddr OBJECT-TYPE

SYNTAX FcAddressIdOrZero (SIZE (3))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The numerically smallest 24-bit value of a source address (S_ID) of a frame that will match with this Traffic Selector."

::= { t11FcSpSaTSelNegOutEntry 3 }

t11FcSpSaTSelNegOutEndSrcAddr OBJECT-TYPE

SYNTAX FcAddressIdOrZero (SIZE (3))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The numerically largest 24-bit value of a source address (S_ID) of a frame that will match with this Traffic Selector."

::= { t11FcSpSaTSelNegOutEntry 4 }

t11FcSpSaTSelNegOutStartDstAddr OBJECT-TYPE

SYNTAX FcAddressIdOrZero (SIZE (3))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The numerically smallest 24-bit value of a destination address (D_ID) of a frame that will match with this Traffic Selector."

::= { t11FcSpSaTSelNegOutEntry 5 }

t11FcSpSaTSelNegOutEndDstAddr OBJECT-TYPE

SYNTAX FcAddressIdOrZero (SIZE (3))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The numerically largest 24-bit value of a destination address (D_ID) of a frame that will match with this Traffic Selector."

::= { t11FcSpSaTSelNegOutEntry 6 }

```

t11FcSpSaTSelNegOutStartRctl OBJECT-TYPE
    SYNTAX      T11FcRoutingControl
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The numerically smallest 8-bit value contained within a
        Routing Control (R_CTL) field of a frame that will match
        with this Traffic Selector."
    ::= { t11FcSpSaTSelNegOutEntry 7 }

t11FcSpSaTSelNegOutEndRctl OBJECT-TYPE
    SYNTAX      T11FcRoutingControl
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The numerically largest 8-bit value contained within a
        Routing Control (R_CTL) field of a frame that will match
        with this Traffic Selector."
    ::= { t11FcSpSaTSelNegOutEntry 8 }

t11FcSpSaTSelNegOutStartType OBJECT-TYPE
    SYNTAX      T11FcSpType
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The numerically smallest of a range of possible 'type'
        values of frames that will match with this Traffic
        Selector."
    ::= { t11FcSpSaTSelNegOutEntry 9 }

t11FcSpSaTSelNegOutEndType OBJECT-TYPE
    SYNTAX      T11FcSpType
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The numerically largest of a range of possible 'type'
        values of frames that will match with this Traffic
        Selector."
    ::= { t11FcSpSaTSelNegOutEntry 10 }

--
-- Traffic Selectors index-ed by SPI
--

t11FcSpSaTSelSpiTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF T11FcSpSaTSelSpiEntry
    MAX-ACCESS   not-accessible
    STATUS       current

```

DESCRIPTION

"A table identifying the Traffic Selectors in use on particular Security Associations, INDEX-ed by their (ingress) SPI values."

::= { t11FcSpSaActive 4 }

t11FcSpSaTSelSpiEntry OBJECT-TYPE

SYNTAX T11FcSpSaTSelSpiEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry identifies one Traffic Selector in use on an SA pair on the interface (identified by t11FcSpSaPairIfIndex) to a particular Fabric (identified by t11FcSpSaIfFabricIndex), and managed as part of the Fibre Channel management instance identified by fcmInstanceIndex."

INDEX { fcmInstanceIndex, t11FcSpSaPairIfIndex,
t11FcSpSaIfFabricIndex,
t11FcSpSaTSelSpiInboundSpi, t11FcSpSaTSelSpiTrafSelIndex }
::= { t11FcSpSaTSelSpiTable 1 }

T11FcSpSaTSelSpiEntry ::= SEQUENCE {
t11FcSpSaTSelSpiInboundSpi T11FcSpiIndex,
t11FcSpSaTSelSpiTrafSelIndex Unsigned32,
t11FcSpSaTSelSpiDirection T11FcSaDirection,
t11FcSpSaTSelSpiTrafSelPtr Unsigned32
}

t11FcSpSaTSelSpiInboundSpi OBJECT-TYPE

SYNTAX T11FcSpiIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An SPI value that identifies the ingress Security Association of a particular SA pair."

::= { t11FcSpSaTSelSpiEntry 1 }

t11FcSpSaTSelSpiTrafSelIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An index value that distinguishes between the (potentially multiple) Traffic Selectors in use on this Security Association pair."

::= { t11FcSpSaTSelSpiEntry 2 }

t11FcSpSaTSelSpiDirection OBJECT-TYPE

```

SYNTAX          T11FcSaDirection
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object indicates whether this Traffic Selector
    is being used for ingress or for egress traffic."
 ::= { t11FcSpSaTSelSpiEntry 3 }

```

t11FcSpSaTSelSpiTrafSelPtr OBJECT-TYPE

```

SYNTAX          Unsigned32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This object contains a pointer into another table that
    can be used to obtain more information about this Traffic
    Selector.

```

If the corresponding instance of t11FcSpSaTSelSpiDirection has the value 'egress', then this object contains the value of t11FcSpSaTSelNegOutPrecedence in the row of t11FcSpSaTSelNegOutTable, which contains more information.

If the corresponding instance of t11FcSpSaTSelSpiDirection has the value 'ingress', then this object contains the value of t11FcSpSaTSelNegInIndex that identifies the row in t11FcSpSaTSelNegInTable containing more information."

```

 ::= { t11FcSpSaTSelSpiEntry 4 }

```

```

--
-- Notification information & control
--

```

t11FcSpSaControlTable OBJECT-TYPE

```

SYNTAX          SEQUENCE OF T11FcSpSaControlEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "A table of control and other information concerning
    the generation of notifications for events related
    to FC-SP Security Associations."
 ::= { t11FcSpSaControl 1 }

```

t11FcSpSaControlEntry OBJECT-TYPE

```

SYNTAX          T11FcSpSaControlEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "Each entry identifies information for the one or more

```

interfaces (identified by `t11FcSpSaIfIndex`) to a particular Fabric (identified by `t11FcSpSaIfFabricIndex`), and managed as part of the Fibre Channel management instance identified by `fcmInstanceIndex`.

The `StorageType` of a row in this table is specified by the instance of `t11FcSpSaIfStorageType` that is INDEX-ed by the same values of `fcmInstanceIndex`, `t11FcSpSaIfIndex`, and `t11FcSpSaIfFabricIndex`."

```
INDEX { fcmInstanceIndex, t11FcSpSaIfIndex,
        t11FcSpSaIfFabricIndex }
 ::= { t11FcSpSaControlTable 1 }
```

```
T11FcSpSaControlEntry ::= SEQUENCE {
    t11FcSpSaControlAuthFailEnable TruthValue,
    t11FcSpSaControlInboundSpi      T11FcSpiIndex,
    t11FcSpSaControlSource           FcAddressIdOrZero,
    t11FcSpSaControlDestination     FcAddressIdOrZero,
    t11FcSpSaControlFrame            OCTET STRING,
    t11FcSpSaControlElapsed          TimeTicks,
    t11FcSpSaControlSuppressed       Gauge32,
    t11FcSpSaControlWindow           Unsigned32,
    t11FcSpSaControlMaxNotifs        Unsigned32,
    t11FcSpSaControlLifeExcdEnable   TruthValue,
    t11FcSpSaControlLifeExcdSpi      T11FcSpiIndex,
    t11FcSpSaControlLifeExcdDir      T11FcSaDirection,
    t11FcSpSaControlLifeExcdTime     TimeStamp
}
```

`t11FcSpSaControlAuthFailEnable` OBJECT-TYPE

```
SYNTAX      TruthValue
MAX-ACCESS   read-write
STATUS       current
DESCRIPTION
```

"This object specifies whether a `t11FcSpSaNotifyAuthFailure` notification should be generated for the first occurrence of an Authentication failure within a time window for this Fabric."

```
::= { t11FcSpSaControlEntry 1 }
```

`t11FcSpSaControlInboundSpi` OBJECT-TYPE

```
SYNTAX      T11FcSpiIndex
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
```

"The SPI value of the ingress Security Association on which was received the last frame for which a `t11FcSpSaNotifyAuthFailure` was generated."

If no t11FcSpSaNotifyAuthFailure notifications have been generated, the value of this object is zero."
 ::= { t11FcSpSaControlEntry 2 }

t11FcSpSaControlSource OBJECT-TYPE

SYNTAX FcAddressIdOrZero

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The S_ID contained in the last frame for which a t11FcSpSaNotifyAuthFailure was generated.

If no t11FcSpSaNotifyAuthFailure notifications have been generated, the value of this object is the zero-length string."

::= { t11FcSpSaControlEntry 3 }

t11FcSpSaControlDestination OBJECT-TYPE

SYNTAX FcAddressIdOrZero

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The D_ID contained in the last frame for which a t11FcSpSaNotifyAuthFailure was generated.

If no t11FcSpSaNotifyAuthFailure notifications have been generated, the value of this object is the zero-length string."

::= { t11FcSpSaControlEntry 4 }

t11FcSpSaControlFrame OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0..256))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The binary content of the last frame for which a t11FcSpSaNotifyAuthFailure was generated. If more than 256 bytes of the frame are available, then this object contains the first 256 bytes. If less than 256 bytes of the frame are available, then this object contains the first N bytes, where N is greater or equal to zero.

If no t11FcSpSaNotifyAuthFailure notifications have been generated, the value of this object is the zero-length string."

::= { t11FcSpSaControlEntry 5 }

t11FcSpSaControlElapsed OBJECT-TYPE

SYNTAX TimeTicks
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"The elapsed time since the last generation of a
t11FcSpSaNotifyAuthFailure notification on the same
Fabric, or the value of sysUpTime if no
t11FcSpSaNotifyAuthFailure notifications have been
generated since the last restart."

::= { t11FcSpSaControlEntry 6 }

t11FcSpSaControlSuppressed OBJECT-TYPE

SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"The number of occurrences of an Authentication failure
on a Fabric that were suppressed because they occurred
on the same Fabric within the same time window as a
previous Authentication failure for which a
t11FcSpSaNotifyAuthFailure notification was generated.

The value of this object is reset to zero on a restart
of the network management subsystem, and whenever a
t11FcSpSaNotifyAuthFailure notification is generated.
In the event that the value of this object reaches its
maximum value, it remains at that value until it is
reset on the generation of the next
t11FcSpSaNotifyAuthFailure notification."

::= { t11FcSpSaControlEntry 7 }

t11FcSpSaControlWindow OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)
UNITS "seconds"
MAX-ACCESS read-write
STATUS current
DESCRIPTION

"The length of a time window that begins when a
t11FcSpSaNotifyAuthFailure notification is generated for
any Security Association on a particular Fabric. For the
duration of the time window, further Authentication failures
occurring for the same Security Association are counted but
no t11FcSpSaNotifyAuthFailure notification is generated.

When this object is modified before the end of a time
window, that time window is immediately terminated, i.e.,
the next Authentication failure on the relevant Fabric
after the modification will cause a new time window to

```

        begin with the new length."
DEFVAL    { 300 }
 ::= { t11FcSpSaControlEntry 8 }

t11FcSpSaControlMaxNotifs OBJECT-TYPE
SYNTAX      Unsigned32
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The maximum number of t11FcSpSaNotifyAuthFailure
    notifications to be generated per Fabric within a
    t11FcSpSaControlWindow time window. Subsequent
    Authentication failures occurring on the same Fabric
    in the same time window are counted, but no
    t11FcSpSaNotifyAuthFailure notification is generated.

    When this object is modified before the end of a time
    window, that time window is immediately terminated, i.e.,
    the next Authentication failure on the relevant Fabric
    after the modification will cause a new time window to
    begin with the new length."
DEFVAL    { 16 }
 ::= { t11FcSpSaControlEntry 9 }

t11FcSpSaControlLifeExcdEnable OBJECT-TYPE
SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object specifies whether t11FcSpSaNotifyLifeExceeded
    notifications should be generated for this Fabric."
DEFVAL    { true }
 ::= { t11FcSpSaControlEntry 10 }

t11FcSpSaControlLifeExcdSpi OBJECT-TYPE
SYNTAX      T11FcSpiIndex
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The SPI of the SA that was most recently terminated
    because its lifetime (in seconds or in passed bytes)
    was exceeded. Such terminations include those due to
    a failed attempt to renew an SA after its lifetime was
    exceeded."
 ::= { t11FcSpSaControlEntry 11 }

t11FcSpSaControlLifeExcdDir OBJECT-TYPE
SYNTAX      T11FcSaDirection

```

```

MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The direction of frame transmission on the SA that was
    most recently terminated because its lifetime (in seconds
    or in passed bytes) was exceeded."
 ::= { t11FcSpSaControlEntry 12 }

```

```
t11FcSpSaControlLifeExcdTime OBJECT-TYPE
```

```

SYNTAX        TimeStamp
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The time of the most recent termination of an SA
    due to its lifetime (in seconds or in passed bytes)
    being exceeded. Such terminations include those
    due to a failed attempt to renew an SA after its
    lifetime was exceeded."
 ::= { t11FcSpSaControlEntry 13 }

```

```
--
```

```
-- Notification definitions
```

```
--
```

```
t11FcSpSaNotifyAuthFailure NOTIFICATION-TYPE
```

```

OBJECTS       { t11FcSpSaControlInboundSpi,
                 t11FcSpSaControlSource,
                 t11FcSpSaControlDestination,
                 t11FcSpSaControlFrame,
                 t11FcSpSaControlElapsed,
                 t11FcSpSaControlSuppressed }

```

```
STATUS        current
```

```
DESCRIPTION
```

"When this notification is generated, it indicates the occurrence of an Authentication failure for a received FC-2 or CT_IU frame. The t11FcSpSaControlInboundSpi, t11FcSpSaControlSource, and t11FcSpSaControlDestination objects in the varbindlist are the frame's SPI, source and destination addresses, respectively. t11FcSpSaControlFrame provides the (beginning of the) frame's content if such is available.

This notification is generated only for the first occurrence of an Authentication failure on a Fabric within a time window. Subsequent occurrences of an Authentication Failure on the same Fabric within the same time window are counted but suppressed.

The value of t11FcSpSaControlElapsed contains (a lower bound on) the elapsed time since the last generation of this notification for the same Fabric. The value of t11FcSpSaControlSuppressed contains the number of generations which were suppressed in the time window after that last generation, or zero if unknown."

```
::= { t11FcSpSaMIBNotifications 1 }
```

```
t11FcSpSaNotifyLifeExceeded NOTIFICATION-TYPE
OBJECTS      { t11FcSpSaControlLifeExcdSpi,
                t11FcSpSaControlLifeExcdDir }
STATUS       current
DESCRIPTION
```

"This notification is generated when the lifetime (in seconds or in passed bytes) of an SA is exceeded, and the SA is either immediately terminated or is terminated because an attempt to renew the SA fails. The values of t11FcSpSaControlLifeExcdSpi and t11FcSpSaControlLifeExcdDir contain the SPI and direction of the terminated SA."

```
::= { t11FcSpSaMIBNotifications 2 }
```

```
--
-- Conformance
--
```

```
t11FcSpSaMIBCompliances
                        OBJECT IDENTIFIER ::= { t11FcSpSaMIBConformance 1 }
t11FcSpSaMIBGroups    OBJECT IDENTIFIER ::= { t11FcSpSaMIBConformance 2 }
```

```
t11FcSpSaMIBCompliance MODULE-COMPLIANCE
STATUS      current
DESCRIPTION
    "The compliance statement for entities that implement
    FC-SP Security Associations."
```

```
MODULE -- this module
MANDATORY-GROUPS
{
    t11FcSpSaCapabilityGroup,
    t11FcSpSaParamStatusGroup,
    t11FcSpSaSummaryCountGroup,
    t11FcSpSaProposalGroup,
    t11FcSpSaDropBypassGroup,
    t11FcSpSaActiveGroup,
    t11FcSpSaNotifInfoGroup,
    t11FcSpSaNotificationGroup
}
```

```
-- The following is an auxiliary (listed in an INDEX clause)
```

```
-- object for which the SMiv2 does not allow an OBJECT clause
-- to be specified, but for which this MIB has the following
-- compliance requirement:
--     OBJECT          t11FcSpSaIfIndex
--     DESCRIPTION
--         Compliance requires support for either one of:
--         - individual interfaces using ifIndex values, or
--         - the use of the zero value.

-- Write access is not required for any objects in this MIB module:

OBJECT          t11FcSpSaIfStorageType
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          t11FcSpSaTSelPropStorageType
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          t11FcSpSaTransStorageType
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          t11FcSpSaIfReplayPrevention
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          t11FcSpSaIfReplayWindowSize
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          t11FcSpSaIfTerminateAllSas
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          t11FcSpSaPropSecurityProt
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          t11FcSpSaPropTSelListIndex
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          t11FcSpSaPropTransListIndex
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          t11FcSpSaPropAcceptAlgorithm
```

MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaPropRowStatus
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropDirection
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropStartSrcAddr
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropEndSrcAddr
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropStartDstAddr
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropEndDstAddr
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropStartRctl
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropEndRctl
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropStartType
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropEndType
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelPropRowStatus
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTransSecurityProt

MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTransEncryptAlg
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTransEncryptKeyLen
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTransIntegrityAlg
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTransRowStatus
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelDrByAction
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelDrByStartSrcAddr
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelDrByEndSrcAddr
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelDrByStartDstAddr
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelDrByEndDstAddr
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelDrByStartRctl
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelDrByEndRctl
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	t11FcSpSaTSelDrByStartType

```

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

OBJECT        t11FcSpSaTSelDrByEndType
MIN-ACCESS    read-only
DESCRIPTION   "Write access is not required."

OBJECT        t11FcSpSaTSelDrByRowStatus
MIN-ACCESS    read-only
DESCRIPTION   "Write access is not required."

OBJECT        t11FcSpSaPairTerminate
MIN-ACCESS    read-only
DESCRIPTION   "Write access is not required."

OBJECT        t11FcSpSaControlAuthFailEnable
MIN-ACCESS    read-only
DESCRIPTION   "Write access is not required."

OBJECT        t11FcSpSaControlWindow
MIN-ACCESS    read-only
DESCRIPTION   "Write access is not required."

OBJECT        t11FcSpSaControlMaxNotifs
MIN-ACCESS    read-only
DESCRIPTION   "Write access is not required."

OBJECT        t11FcSpSaControlLifeExcdEnable
MIN-ACCESS    read-only
DESCRIPTION   "Write access is not required."

```

```
 ::= { t11FcSpSaMIBCompliances 1 }
```

```
-- Units of Conformance
```

```

t11FcSpSaCapabilityGroup OBJECT-GROUP
    OBJECTS { t11FcSpSaIfEspHeaderCapab,
               t11FcSpSaIfCTAuthCapab,
               t11FcSpSaIfIKEv2Capab,
               t11FcSpSaIfIkev2AuthCapab
             }
    STATUS   current
    DESCRIPTION
        "A collection of objects containing information
         related to capabilities of FC-SP entities."
 ::= { t11FcSpSaMIBGroups 1 }

```

```
t11FcSpSaParamStatusGroup OBJECT-GROUP
```



```

OBJECTS { t11FcSpSaIfStorageType,
          t11FcSpSaIfReplayPrevention,
          t11FcSpSaIfReplayWindowSize,
          t11FcSpSaIfDeadPeerDetections,
          t11FcSpSaIfTerminateAllSas
        }
STATUS   current
DESCRIPTION
    "A collection of objects containing parameters
    and status information related to FC-SP entities."
 ::= { t11FcSpSaMIBGroups 2 }

```

```

t11FcSpSaSummaryCountGroup OBJECT-GROUP
OBJECTS { t11FcSpSaIfOutDrops,
          t11FcSpSaIfOutBypasses,
          t11FcSpSaIfOutProcesses,
          t11FcSpSaIfOutUnMatcheds,
          t11FcSpSaIfInUnprotUnmtchDrops,
          t11FcSpSaIfInDetReplays,
          t11FcSpSaIfInUnprotMtchDrops,
          t11FcSpSaIfInBadXforms,
          t11FcSpSaIfInGoodXforms,
          t11FcSpSaIfInProtUnmtchs
        }
STATUS   current
DESCRIPTION
    "A collection of objects containing summary
    counters for FC-SP Security Associations."
 ::= { t11FcSpSaMIBGroups 3 }

```

```

t11FcSpSaProposalGroup OBJECT-GROUP
OBJECTS { t11FcSpSaPropSecurityProt,
          t11FcSpSaPropTSelListIndex,
          t11FcSpSaPropTransListIndex,
          t11FcSpSaPropAcceptAlgorithm,
          t11FcSpSaPropOutMatchSucceeds,
          t11FcSpSaPropRowStatus,
          t11FcSpSaTSelPropDirection,
          t11FcSpSaTSelPropStartSrcAddr,
          t11FcSpSaTSelPropEndSrcAddr,
          t11FcSpSaTSelPropStartDstAddr,
          t11FcSpSaTSelPropEndDstAddr,
          t11FcSpSaTSelPropStartRctl,
          t11FcSpSaTSelPropEndRctl,
          t11FcSpSaTSelPropStartType,
          t11FcSpSaTSelPropEndType,
          t11FcSpSaTSelPropStorageType,
          t11FcSpSaTSelPropRowStatus
        }

```

```

    }
    STATUS    current
    DESCRIPTION
        "A collection of objects containing information
        related to making and accepting proposals for
        FC-SP Security Associations."
    ::= { t11FcSpSaMIBGroups 4 }

t11FcSpSaDropBypassGroup OBJECT-GROUP
    OBJECTS { t11FcSpSaTSelDrByAction,
               t11FcSpSaTSelDrByStartSrcAddr,
               t11FcSpSaTSelDrByEndSrcAddr,
               t11FcSpSaTSelDrByStartDstAddr,
               t11FcSpSaTSelDrByEndDstAddr,
               t11FcSpSaTSelDrByStartRctl,
               t11FcSpSaTSelDrByEndRctl,
               t11FcSpSaTSelDrByStartType,
               t11FcSpSaTSelDrByEndType,
               t11FcSpSaTSelDrByMatches,
               t11FcSpSaTSelDrByRowStatus
            }
    STATUS    current
    DESCRIPTION
        "A collection of objects containing information
        about Traffic Selectors of traffic to drop or bypass
        for FC-SP Security."
    ::= { t11FcSpSaMIBGroups 5 }

t11FcSpSaActiveGroup OBJECT-GROUP
    OBJECTS { t11FcSpSaPairSecurityProt,
               t11FcSpSaPairTransListIndex,
               t11FcSpSaPairTransIndex,
               t11FcSpSaPairLifetimeLeft,
               t11FcSpSaPairLifetimeLeftUnits,
               t11FcSpSaPairTerminate,
               t11FcSpSaPairInProtUnMatches,
               t11FcSpSaPairInDetReplays,
               t11FcSpSaPairInBadXforms,
               t11FcSpSaPairInGoodXforms,
               t11FcSpSaTransSecurityProt,
               t11FcSpSaTransEncryptAlg,
               t11FcSpSaTransEncryptKeyLen,
               t11FcSpSaTransIntegrityAlg,
               t11FcSpSaTransStorageType,
               t11FcSpSaTransRowStatus,
               t11FcSpSaTSelNegInInboundSpi,
               t11FcSpSaTSelNegInStartSrcAddr,
               t11FcSpSaTSelNegInEndSrcAddr,
    
```

```

        t11FcSpSaTSelNegInStartDstAddr,
        t11FcSpSaTSelNegInEndDstAddr,
        t11FcSpSaTSelNegInStartRctl,
        t11FcSpSaTSelNegInEndRctl,
        t11FcSpSaTSelNegInStartType,
        t11FcSpSaTSelNegInEndType,
        t11FcSpSaTSelNegInUnpMtchDrops,
        t11FcSpSaTSelNegOutInboundSpi,
        t11FcSpSaTSelNegOutStartSrcAddr,
        t11FcSpSaTSelNegOutEndSrcAddr,
        t11FcSpSaTSelNegOutStartDstAddr,
        t11FcSpSaTSelNegOutEndDstAddr,
        t11FcSpSaTSelNegOutStartRctl,
        t11FcSpSaTSelNegOutEndRctl,
        t11FcSpSaTSelNegOutStartType,
        t11FcSpSaTSelNegOutEndType,
        t11FcSpSaTSelSpiDirection,
        t11FcSpSaTSelSpiTrafSelPtr
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects containing information related
        to currently active FC-SP Security Associations."
    ::= { t11FcSpSaMIBGroups 6 }

t11FcSpSaNotifInfoGroup OBJECT-GROUP
    OBJECTS { t11FcSpSaControlAuthFailEnable,
              t11FcSpSaControlInboundSpi,
              t11FcSpSaControlSource,
              t11FcSpSaControlDestination,
              t11FcSpSaControlFrame,
              t11FcSpSaControlElapsed,
              t11FcSpSaControlSuppressed,
              t11FcSpSaControlWindow,
              t11FcSpSaControlMaxNotifs,
              t11FcSpSaControlLifeExcdEnable,
              t11FcSpSaControlLifeExcdSpi,
              t11FcSpSaControlLifeExcdDir,
              t11FcSpSaControlLifeExcdTime
            }
    STATUS      current
    DESCRIPTION
        "A collection of objects containing information
        related to notifications of events concerning
        FC-SP Security Associations."
    ::= { t11FcSpSaMIBGroups 7 }

```

```
t11FcSpSaNotificationGroup NOTIFICATION-GROUP
  NOTIFICATIONS { t11FcSpSaNotifyAuthFailure,
                  t11FcSpSaNotifyLifeExceeded
                  }
  STATUS          current
  DESCRIPTION
    "A collection of notifications of events concerning
    FC-SP Security Associations."
  ::= { t11FcSpSaMIBGroups 8 }

END
```

7. IANA Considerations

IANA has made one MIB OID assignment, under the appropriate subtree, for each of the five MIB modules defined in this document.

8. Security Considerations

In this section, the first sub-section explains why this document does not define MIB objects for particular items of (management) information. This is followed by one sub-section for each of the MIB modules defined in section 6, listing their individual Security Considerations. The section concludes with Security Considerations common to all of these MIB modules.

The key word "RECOMMENDED" contained in this section is to be interpreted as described in BCP 14 [RFC2119].

8.1. Information Not Defined in This Document

This document doesn't define any MIB objects for the secrets that need to be known/determined by FC-SP entities in order to use DH-CHAP to authenticate each other. Such secrets are "highly sensitive" and need to be "strong secrets" (e.g., randomly generated and/or from an external source, see section 5.4.8 of [FC-SP]) rather than just passwords. Thus, such secrets need to be managed by mechanisms other than the MIB modules defined here.

8.2. The T11-FC-SP-TC-MIB Module

This MIB module defines some data types and assigns some Object Identifiers, for use as the syntax and as values of MIB objects, respectively, but it itself defines no MIB objects. Thus, there is no direct read or write access via a management protocol, such as SNMP, to these definitions. Nevertheless, it does include the assignment of enumerations and OIDs to represent cryptographic algorithms/transforms, and it is appropriate for such assignments to

be augmented with new assignments as and when new algorithms/transforms are available.

8.3. The T11-FC-SP-AUTHENTICATION-MIB Module

There are several management objects defined in this MIB module with a MAX-ACCESS clause of read-write. 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. These objects and their sensitivity/vulnerability are:

t11FcSpAuStorageType

- could cause changes in the configuration to be retained or not retained over restarts, against the wishes of management.

t11FcSpAuSendRejNotifyEnable

t11FcSpAuRcvRejNotifyEnable

- could cause the suppression of SNMP notifications (e.g., of authentication failures or protocol failures), or the disruption of network operations due to the generation of unwanted notifications.

t11FcSpAuDefaultLifetime

t11FcSpAuDefaultLifetimeUnits

- could cause the lifetimes of Security Associations to be extended longer than might be secure, or shortened to cause an increase in the overhead of using security.

t11FcSpAuRejectMaxRows

- could cause a smaller audit trail of Authentication rejects, thereby hiding the tracks of an attacker, or a larger audit trail of Authentication rejects causing resources to be wasted.

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. These are the tables and objects and their sensitivity/vulnerability:

t11FcSpAuEntityTable

- the capabilities of FC-SP Authentication entities in terms of what cryptographic algorithms they support, and various configuration parameters of FC-SP Authentication entities.

t11FcSpAuIfStatTable

- the mapping of which FC-SP Authentication entities operate on which interfaces.

t11FcSpAuRejectTable

- an audit trail of authentication failures and other Authentication Protocol failures.

8.4. The T11-FC-SP-ZONING-MIB Module

There are several management objects defined in this MIB module 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. These objects and their sensitivity/vulnerability are:

t11FcSpZsServerEnabled

- could cause FC-SP Zoning mode to be enabled or not enabled, against the wishes of management.

t11FcSpZoneSetHashStatus

- could cause an FC-SP implementation to recalculate the values of the Active Zone Set Hash and the Zone Set Database Hash more frequently than is required by management.

t11FcSpZsNotifyJoinSuccessEnable

t11FcSpZsNotifyJoinFailureEnable

- could cause the suppression of SNMP notifications that a Switch in one Fabric has successfully joined/failed to join with a Switch in another Fabric, 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. These are the objects and their sensitivity/vulnerability:

t11FcSpZsServerCapabilityObject

t11FcSpZsServerEnabled

- the FC-SP Zoning capabilities and status of the FC-SP implementation.

```
t11FcSpZoneSetHashStatus
t11FcSpActiveZoneSetHashType
t11FcSpActiveZoneSetHash
t11FcSpZoneSetDatabaseHashType
t11FcSpZoneSetDatabaseHash
    - the current values of the Active Zone Set Hash and the Zone
      Set Database Hash.
```

8.5. The T11-FC-SP-POLICY-MIB Module

There are many management objects defined in this MIB module 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. The objects and tables and their sensitivity/vulnerability are:

```
t11FcSpPoNaSummaryTable
t11FcSpPoNaSwListTable
t11FcSpPoNaSwMembTable
t11FcSpPoNaNoMembTable
t11FcSpPoNaCtDescrTable
t11FcSpPoNaSwConnTable
t11FcSpPoNaIpMgmtTable
    - could change the currently inactive FC-SP Fabric Policies, so
      as to allow unauthorized connectivity of Switches and/or
      Nodes to the network, or between Switches in the network, or,
      to prohibit such connectivity even when authorized.
```

```
t11FcSpPoNaIpMgmtTable
t11FcSpPoNaWkpDescrTable
    - could change the currently inactive FC-SP Fabric Policies, so
      as to allow unauthorized management access to Switches, or
      prohibit authorized management access to Switches.
```

```
t11FcSpPoNaSummaryTable
t11FcSpPoNaSwMembTable
t11FcSpPoNaNoMembTable
t11FcSpPoNaAttribTable
t11FcSpPoNaAuthProtTable
    - could change the currently inactive FC-SP Fabric Policies, so
      as to allow Security Associations with reduced security or
      require Security Associations that are unnecessarily secure.
```

t11FcSpPoOperActivate
t11FcSpPoOperDeActivate

- could cause the currently active FC-SP Fabric Policies to be de-activated and currently inactive FC-SP Fabric Policies (e.g., those modified as above) to be activated instead.

t11FcSpPoStorageType

- could cause changes in the configuration and/or in FC-SP Fabric Policies to be retained or not retained over restarts, against the wishes of management.

t11FcSpPoNotificationEnable

- could cause the suppression of SNMP notifications on the successful/unsuccessful activation/deactivation of Fabric Policies, and thereby hide successful/failed attempts to make unauthorized changes, or cause 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. These are the tables and their sensitivity/vulnerability:

t11FcSpPoTable
t11FcSpPoSummaryTable
t11FcSpPoSwMembTable
t11FcSpPoNoMembTable
t11FcSpPoCtDescrTable
t11FcSpPoSwConnTable
t11FcSpPoIpMgmtTable
t11FcSpPoWkpDescrTable
t11FcSpPoAttribTable
t11FcSpPoAuthProtTable

- the currently active FC-SP Fabric Policies that can be examined by an attacker looking for possible security vulnerabilities in the active policies.

8.6. The T11-FC-SP-SA-MIB Module

There are several management objects defined in this MIB module 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. These objects and their sensitivity/vulnerability are:

t11FcSpSaIfStorageType

t11FcSpSaTSelPropStorageType

t11FcSpSaTransStorageType

- could cause changes in configuration information related to FC-SP Security Associations to be retained or not retained over restarts, against the wishes of management.

t11FcSpSaIfReplayPrevention

t11FcSpSaIfReplayWindowSize

- could cause changes in the operation of anti-replay protection, thereby permitting an attacker to conduct replay attacks, or requiring FC-SP implementations to engage in unnecessary protection against replay.

t11FcSpSaIfTerminateAllSas

t11FcSpSaPairTerminate

- could cause FC-SP Security Associations to be aborted unnecessarily.

t11FcSpSaControlAuthFailEnable

- could cause the suppression of SNMP notifications on the occurrence of Authentication failures for received FC-2 or CT_IU frames, thereby hiding attempts to subvert security measures, or cause the disruption of network operations due to the generation of unwanted notifications.

t11FcSpSaControlLifeExcdEnable

- could cause the suppression of SNMP notifications on the occurrence of an FC-SP Security Association exceeding its lifetime, thereby possibly causing disruption to network usage due to a delay in determining the problem and/or re-establishing the Security Association.

`t11FcSpSaControlWindow`

- could cause the suppression of second and subsequent SNMP notifications on the occurrence of Authentication failures for received FC-2 or CT_IU frames, thereby masking repeated attempts to subvert security measures, or cause the disruption of network operations due to the generation of unwanted notifications.

`t11FcSpSaControlMaxNotifs`

- could cause the suppression of all SNMP notifications on the occurrence of Authentication failures for received FC-2 or CT_IU frames, thereby masking attempts to subvert security measures, or cause the disruption of network operations due to the generation of unwanted notifications.

`t11FcSpSaPropTable``t11FcSpSaTSelPropTable``t11FcSpSaTransTable`

- could cause an FC-SP entity to propose the setup of Security Associations that apply to a different selection of traffic and/or using different security transforms, such that some traffic has a reduced level of security that might improve an attacker's chance of subverting security, or an increased level of security that would involve unnecessary security processing, or cause the negotiation of Security Associations to fail to find commonly acceptable parameters such that no Security Associations can be established.

`t11FcSpSaTSelDrByTable`

- could cause an FC-SP entity to select different sets of traffic which are: a) to be sent/received without being protected by FC-SP security, thereby providing an attacker with access to read authentic traffic or the ability to introduce unauthentic traffic; or b) to be dropped instead of being sent/after being received, thereby causing disruption to network usage.

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. These are the tables and objects and their sensitivity/vulnerability:

`t11FcSpSaIfTable`

- information concerning the capabilities, parameters and status of an FC-SP entity's support for Security Associations.

`t11FcSpSaPropTable``t11FcSpSaSelPropTable``t11FcSpSaTransTable`

- information on the proposals that will be used by an FC-SP entity to negotiate Security Associations.

`t11FcSpSaSelDrByTable`

- information on which subsets of traffic an FC-SP entity will send or receive without being protected by FC-SP security, or will drop before sending/after receiving.

`t11FcSpSaPairTable``t11FcSpSaSelNegInTable``t11FcSpSaSelNegOutTable``t11FcSpSaSelSpiTable`

- information on which Security Associations are currently active, what subsets of traffic they are carrying, and what security protection is being given to them.

8.7. Recommendations Common to All MIB Modules

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.

Because the two algorithms currently specified for `T11FcSpPolicyHashFormat` are SHA-1 and SHA-256, the definition of `T11FcSpHashCalculationStatus` expresses a concern in regard to not

incrementally recomputing the hashes after each change when a series of multiple related changes are being made. This method of reducing computation is intended as a responsiveness measure (i.e., cooperating SNMP managers and agents can get things done faster), not as a Denial-of-Service (DoS) countermeasure. Nevertheless, implementations should also consider the DoS possibilities in these scenarios; potential countermeasures include: requiring authentication for SETs and the rate-limiting of SET operations if they can cause significant computation.

9. Normative References

- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.
- [RFC3411] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks", STD 62, RFC 3411, December 2002.
- [RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", RFC 4001, February 2005.
- [RFC4044] McCloghrie, K., "Fibre Channel Management MIB", RFC 4044, May 2005.
- [RFC4303] Kent, S., "IP Encapsulating Security Payload (ESP)", RFC 4303, December 2005.
- [RFC4306] Kaufman, C., Ed., "Internet Key Exchange (IKEv2) Protocol", RFC 4306, December 2005.

- [RFC4438] DeSanti, C., Gaonkar, V., Vivek, H., McCloghrie, K., and S. Gai, "Fibre-Channel Name Server MIB", RFC 4438, April 2006.
- [RFC4439] DeSanti, C., Gaonkar, V., McCloghrie, K., and S. Gai, "Fibre Channel Fabric Address Manager MIB", RFC 4439, March 2006.
- [RFC4936] DeSanti, C., Vivek, H., McCloghrie, K., and S. Gai, "Fibre Channel Zone Server MIB", RFC 4936, August 2007.
- [FC-FS-2] "Fibre Channel - Framing and Signaling-2 (FC-FS-2)", ANSI INCITS 424-2007, February 2007.
- [FC-GS-5] "Fibre Channel - Generic Services-5 (FC-GS-5)", ANSI INCITS 427-2006, December 2006.
- [FC-SP] "Fibre Channel - Security Protocols (FC-SP)", ANSI INCITS 426-2007, T11/Project 1570-D, February 2007.
- [FC-SW-4] "Fibre Channel - Switch Fabric-4 (FC-SW-4)", ANSI INCITS 418-2006, April 2006.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

10. Informative References

- [RFC1492] Finseth, C., "An Access Control Protocol, Sometimes Called TACACS", RFC 1492, July 1993.
- [RFC2741] Daniele, M., Wijnen, B., Ellison, M., and D. Francisco, "Agent Extensibility (AgentX) Protocol Version 1", RFC 2741, January 2000.
- [RFC2837] Teow, K., "Definitions of Managed Objects for the Fabric Element in Fibre Channel Standard", RFC 2837, May 2000.
- [RFC2865] Rigney, C., Willens, S., Rubens, A., and W. Simpson, "Remote Authentication Dial In User Service (RADIUS)", RFC 2865, June 2000.
- [RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.
- [RFC3588] Calhoun, P., Loughney, J., Guttman, E., Zorn, G., and J. Arkko, "Diameter Base Protocol", RFC 3588, September 2003.

- [RFC4595] Maino, F. and D. Black, "Use of IKEv2 in the Fibre Channel Security Association Management Protocol", RFC 4595, July 2006.
- [RFC4625] DeSanti, C., McCloghrie, K., Kode, S., and S. Gai, "Fibre Channel Routing Information MIB", RFC 4625, September 2006.
- [RFC4626] DeSanti, C., Gaonkar, V., McCloghrie, K., and S. Gai, "MIB for Fibre Channel's Fabric Shortest Path First (FSPF) Protocol", RFC 4626, September 2006.
- [RFC4668] Nelson, D., "RADIUS Authentication Client MIB for IPv6", RFC 4668, August 2006.
- [RFC4747] Kipp, S., Ramkumar, G., and K. McCloghrie, "The Virtual Fabrics MIB", RFC 4747, November 2006.
- [RFC4935] DeSanti, C., Vivek, H., McCloghrie, K., and S. Gai, "Fibre Channel Fabric Configuration Server MIB", RFC 4935, August 2007.
- [RFC4983] DeSanti, C., Vivek, H., McCloghrie, K., and S. Gai, "Fibre Channel Registered State Change Notification (RSCN) MIB", RFC 4983, August 2007.

11. Acknowledgements

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

T11 Chair: Robert Snively, Brocade
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 Ralph Weber, ENDL

The document was subsequently a work item of the IMSS Working Group (of the IETF), chaired by David Black (EMC Corporation). Bert Wijnen (Alcatel-Lucent) deserves many thanks for his thorough review of all five MIB modules in this (large!) document. We also wish to acknowledge Dan Romascanu (Avaya), the IETF Area Director, for his comments and assistance.

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