                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:

```
*****           ***********************
*   *           *  Policy              *   *********************
* M *  Add,     *  Configuration       *   * Policy            *
* A *  Get,     *  Entity              *   * Enforcement       *
* N *  Remove   *                      *   * Entity            *
* A *  Policy   *  +----------------+   *   *                   *
* G *  Objects  *  | Non-Active     |   *   *  +-------------+  *
* I *<-------->*  | Policy Objects |==*====*=>| Active      |  *
* N *           *  +----------------+   *   *  | Policy      |  *
* G *           ***********************   *  | Objects     |  *
*   *                                     *  +-------------+  *
*   *            Activate Policy Summary  *                   *
* E *===================================>*  +-------------+  *
* N *            Deactivate Policy Summary *  | Policy      |  *
* T *===================================>*  | Summary     |  *
* I *                                     *  | Object      |  *
* T *            Get Policy Summary       *  +-------------+  *
* Y *<----------------------------------*                   *
*   *            Get Policy Objects       *                   *
*   *<----------------------------------*                   *
*****                                     *********************
```
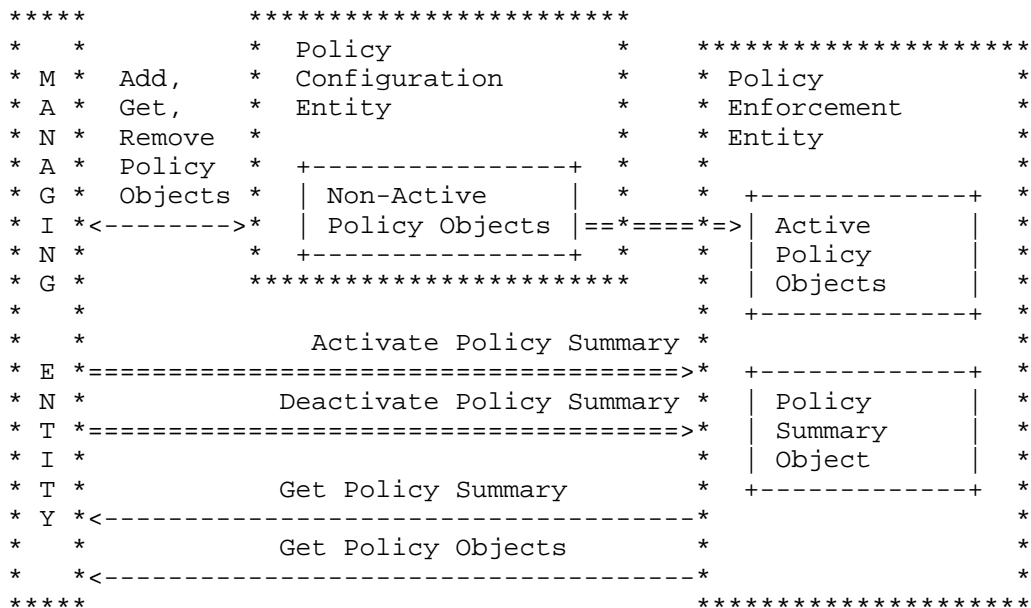
   Note that the arrows in the picture above are used to indicate the
   movement of "data", rather than the direction of "messages", e.g.,
   for a "Get" (with no data) in one direction which invokes a
   "Response" (typically with data) in the reverse direction, the
   diagram has arrows only for the "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
              "   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 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),
                        authELSNotSupported(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),
                        authELSNotSupported(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 * 1st-octet) + 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 }

t11FcSpAuthHmacSha1L96 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 }

t11FcSpAuthHmacSha1L160 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."
        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 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
              "       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 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 t11FamEnable, t11FamFabricName, and
                   t11FamConfigDomainIdType objects defined in the
                   T11-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 t11FamEnable, t11FamFabricName, and
                   t11FamConfigDomainIdType must be read-only and reflect the
                   active Policy Objects. For example, the value of
                   t11FamFabricName must reflect the value of
                   t11FcSpPoAdminFabricName."
         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.
                    - 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."
         ::= { t11FcSpPoEntry 3 }

t11FcSpPoActivatedTimeStamp 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."
         ::= { t11FcSpPoEntry 4 }

--
-- The table of Policy Summary Objects
--

t11FcSpPoSummaryTable OBJECT-TYPE
         SYNTAX   SEQUENCE OF T11FcSpPoSummaryEntry
         MAX-ACCESS   not-accessible
         STATUS   current
         DESCRIPTION
                   "A table of information about active Policy Objects listed
                   within FC-SP Policy Summary Objects."
         ::= { t11FcSpPoActive 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."

De Santi, et al.   Standards Track   [Page 98]
```

```
     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
            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,
             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 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 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

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```
     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
            "        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 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.

         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-2 179 }

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,
    t11FcSpSaPairInProtUnMatchs    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 }

    t11FcSpSaPairInProtUnMatchs 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,
                 t11FcSpSaPairInProtUnMatchs,
                 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
          t11FcSpSaTSelPropTable
          t11FcSpSaTransTable
             - information on the proposals that will be used by an FC-SP
               entity to negotiate Security Associations.

          t11FcSpSaTSelDrByTable
             - 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
          t11FcSpSaTSelNegInTable
          t11FcSpSaTSelNegOutTable
          t11FcSpSaTSelSpiTable
             - 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.

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