                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.

Table of Contents

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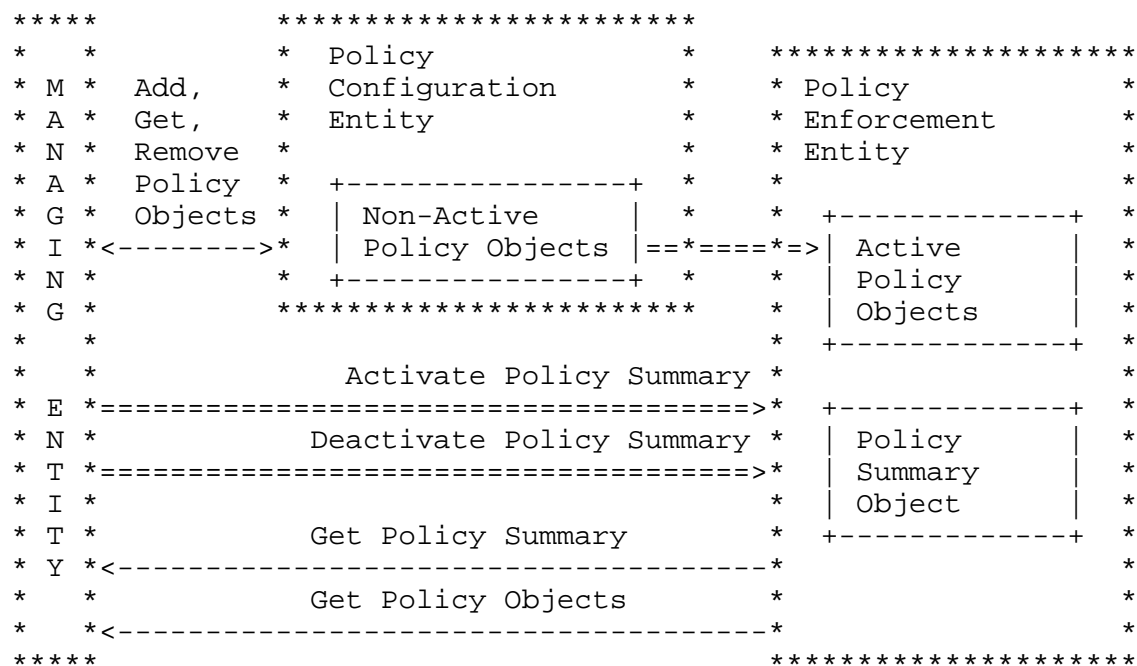
   Note that the arrows in the picture above are used to indicate the
   movement of "data", rather than the direction of "messages", e.g.,
   for a "Get" (with no data) in one direction which invokes a
   "Response" (typically with data) in the reverse direction, the
   diagram has arrows only for the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

```
      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

```
     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.

9. Normative References

   [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,
              Rose, M. and S. Waldbusser, "Structure of Management
              Information Version 2 (SMIv2)", STD 58, RFC 2578, April
              1999.

   [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,
              Rose, M. and S. Waldbusser, "Textual Conventions for
              SMIv2", STD 58, RFC 2579, April 1999.

   [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,
              Rose, M. and S. Waldbusser, "Conformance Statements for
              SMIv2", STD 58, RFC 2580, April 1999.

   [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group
              MIB", RFC 2863, June 2000.

   [RFC3411] Harrington, D., Presuhn, R., and B. Wijnen, "An
              Architecture for Describing Simple Network Management
              Protocol (SNMP) Management Frameworks", STD 62, RFC 3411,
              December 2002.

   [RFC4001] Daniele, M., Haberman, B., Routhier, S., and J.
              Schoenwaelder, "Textual Conventions for Internet Network
              Addresses", RFC 4001, February 2005.

   [RFC4044] McCloghrie, K., "Fibre Channel Management MIB", RFC 4044,
              May 2005.

   [RFC4303] Kent, S., "IP Encapsulating Security Payload (ESP)", RFC
              4303, December 2005.

   [RFC4306] Kaufman, C., Ed., "Internet Key Exchange (IKEv2)
              Protocol", RFC 4306, December 2005.

   [RFC4438] DeSanti, C., Gaonkar, V., Vivek, H., McCloghrie, K., and
              S. Gai, "Fibre-Channel Name Server MIB", RFC 4438, April
              2006.

   [RFC4439] DeSanti, C., Gaonkar, V., McCloghrie, K., and S. Gai,
              "Fibre Channel Fabric Address Manager MIB", RFC 4439,
              March 2006.

   [RFC4936] DeSanti, C., Vivek, H., McCloghrie, K., and S. Gai, "Fibre
              Channel Zone Server MIB", RFC 4936, August 2007.

   [FC-FS-2] "Fibre Channel - Framing and Signaling-2 (FC-FS-2)",
              ANSI INCITS 424-2007, February 2007.

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

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

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

   [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
              Requirement Levels", BCP 14, RFC 2119, March 1997.

10. Informative References

   [RFC1492] Finseth, C., "An Access Control Protocol, Sometimes Called
              TACACS", RFC 1492, July 1993.

   [RFC2741] Daniele, M., Wijnen, B., Ellison, M., and D. Francisco,
              "Agent Extensibility (AgentX) Protocol Version 1", RFC
              2741, January 2000.

   [RFC2837] Teow, K., "Definitions of Managed Objects for the Fabric
              Element in Fibre Channel Standard", RFC 2837, May 2000.

   [RFC2865] Rigney, C., Willens, S., Rubens, A., and W. Simpson,
              "Remote Authentication Dial In User Service (RADIUS)", RFC
              2865, June 2000.

   [RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart,
              "Introduction and Applicability Statements for Internet-
              Standard Management Framework", RFC 3410, December 2002.

   [RFC3588] Calhoun, P., Loughney, J., Guttman, E., Zorn, G., and J.
              Arkko, "Diameter Base Protocol", RFC 3588, September 2003.

   [RFC4595]   Maino, F. and D. Black, "Use of IKEv2 in the Fibre Channel
               Security Association Management Protocol", RFC 4595, July
               2006.

   [RFC4625]   DeSanti, C., McCloghrie, K., Kode, S., and S. Gai, "Fibre
               Channel Routing Information MIB", RFC 4625, September
               2006.

   [RFC4626]   DeSanti, C., Gaonkar, V., McCloghrie, K., and S. Gai, "MIB
               for Fibre Channel's Fabric Shortest Path First (FSPF)
               Protocol", RFC 4626, September 2006.

   [RFC4668]   Nelson, D., "RADIUS Authentication Client MIB for IPv6",
               RFC 4668, August 2006.

   [RFC4747]   Kipp, S., Ramkumar, G., and K. McCloghrie, "The Virtual
               Fabrics MIB", RFC 4747, November 2006.

   [RFC4935]   DeSanti, C., Vivek, H., McCloghrie, K., and S. Gai, "Fibre
               Channel Fabric Configuration Server MIB", RFC 4935, August
               2007.

   [RFC4983]   DeSanti, C., Vivek, H., McCloghrie, K., and S. Gai, "Fibre
               Channel Registered State Change Notification (RSCN) MIB",
               RFC 4983, August 2007.

11. Acknowledgements

Authors' Addresses

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

   Fabio Maino
   Cisco Systems, Inc.
   170 West Tasman Drive
   San Jose, CA 95134 USA
   Phone: +1 408 853-7530
   EMail: fmaino@cisco.com

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

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