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**Stream Control Transmission Protocol
Management Information Base**
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Abstract

The Stream Control Transmission Protocol (SCTP) is a reliable transport protocol operating on top of a connectionless packet network such as IP. It is designed to transport PSTN signaling messages over the connectionless packet network, but is capable of broader applications.

This memo defines the Management Information Base (MIB) module which describes the minimum set of objects needed to manage the implementation of the SCTP.

Open Issues

- Remove this section (i.e. Open Issues).
- Remove Revision History
- IANA: Decide under which object identifier branch of the SNMP tree, SCTP should be placed. This value will be obtained when submitted to the IETF queue.
- RFC Editor: Change "xxxx" occurrences to the value assigned by IANA. [Section 3.1.3](#) and DESCRIPTION clause of the MODULE-IDENTITY.
- RFC Editor: Change "YYYY" occurrences to the RFC number assigned in DESCRIPTION clause of the MODULE-IDENTITY.

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1. Introduction

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This memo defines the Management Information Base (MIB) module which describes managed objects for implementations of the SCTP.

The document starts with a brief description of the SNMP framework and continues with the MIB explanation and security consideration sections among others.

The managed objects in this MIB module are based on [[RFC2012](#)] update: "Management Information Base for the Transmission Control Protocol (TCP)" referred as [[TCPMIB](#)] (work in progress), and [RFC 3291](#) "Textual Conventions for Internet Network Addresses" [[RFC3291](#)].

Terms related to the SCTP architecture are explained in [[RFC2960](#)]. Other specific abbreviations are listed below.

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 [[RFC2119](#)].

[1.1](#) Abbreviations

DNS	- Domain Name System
IANA	- Internet Assigned Numbers Authority
IETF	- Internet Engineering Task Force
IP	- Internet Protocol
MIB	- Management Information Base
RFC	- Request For Comments
RTT	- Retransmission Time Out
SCTP	- Stream Control Transmission Protocol
SMI	- Structure of Management Information
SNMP	- Simple Network Management Protocol
TCB	- Transmission Control Block
TCP	- Transmission Control Protocol

[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. MIB Structure

This chapter explains the main objects this MIB defines. A detailed view of the MIB structure with the OID values is below.

```

MIB-2 {1 3 6 1 2 1}
+--(xxxx)sctpMIB
|
|   +--(1) sctpObjects
|   |
|   |   +--(1) sctpStats
|   |   |
|   |   |   +-- <scalars>
|   |   |
|   |   +--(2)sctpParameters
|   |   |
|   |   |   +-- <scalars>
|   |   |
|   |   +--(3) sctpAssocTable
|   |   |
|   |   +--(4) sctpAssocLocalAddrTable
|   |   |
|   |   +--(5) sctpAssocRemAddrTable
|   |   |
|   |   +--(6) sctpLookupLocalPortTable
|   |   |
|   |   +--(7) sctpLookupRemPortTable
|   |   |
|   |   +--(8) sctpLookupRemHostNameTable
|   |   |
|   |   +--(9) sctpLookupRemPrimIPAddrTable
|   |   |
|   |   +--(10) sctpLookupRemIPAddrTable
|   |
|   +--(2)sctpMibConformance
|   |
|   |   +--(1) sctpMibCompliances
|   |   |
|   |   |   +--(1) sctpMibCompliance
|   |   |
|   |   +--(2) sctpMibGroups
|   |   |
|   |   |   +--(1) sctpLayerParamsGroup

```

```
|  
+--(2) sctpStatsGroup  
|
```

```
+--(3) sctpPerAssocParamsGroup
|
+--(4) sctpInverseGroup
```

The main groups are explained further in the MIB definition.

3.1 SCTP Objets

This branch contains the SCTP statistics and general parameters (both of them scalars) and the SCTP MIB tables.

3.1.1 SCTP Statistics

The SCTP MIB includes both Counter32s and Counter64s to deal with statistics. Counter64s are used for those counters, which are likely to wrap around in less than one hour, according to [[RFC2863](#)].

In addition Gauge32 is also used.

3.1.1.1 State-Related Statistics

These statistics are based on the TCP model, but adapted to the SCTP states. They store the number of successful association attempts, how many associations have been initiated by the local or the remote SCTP layer, and the number of associations terminated in a graceful (by means of SHUTDOWN procedure) or ungraceful way (by means of CLOSE procedure).

3.1.1.2 Statistics for traffic Measurements

This set of objects specifies statistics related to the whole SCTP layer. There are, e.g., statistics related to both SCTP packets and SCTP chunks.

Statistics related to a specific association, or local/remote IP addresses are defined inside its associated table.

3.1.2 SCTP Parameters

This section of the MIB contains the general variables for the SCTP protocol. Maximum, minimum, initial and default values are listed here.

SCTP RTO mechanism definition is based on the TCP MIB [[TCPMIB](#)]. In SCTP, only options 'other' and 'vanj' are valid since SCTP defines Van Jacobson's algorithm (vanj) as the one to be used to calculate RTO. 'Other' is left for future use.

3.1.3 MIB Tables

There are several tables included in the SCTP MIB. The first group deals with the SCTP association variables and is composed of a main and two extended tables. The second group is a bunch of tables used to perform reverse lookups.

It is NOT possible to create rows in any table (sctpAssocTable, sctpAssocLocalAddrTable, sctpRemAddrTable and Reverse Lookup tables) using SNMP.

It is NOT possible to delete rows in any table using SNMP except in sctpAssocTable under the particular conditions explained below.

3.1.3.1 Association Table

The sctpAssocTable is the main MIB table, where all the association related information is stored on a per association basis. It is structured according to expanded tables. The main table is called sctpAssocTable and is indexed by sctpAssocId (the association identification). This is a value that uniquely identifies an association. The MIB does not restrict what value must be written here, however it must be unique within the table.

The sctpAssoc index is also shared by two more tables:

- sctpAssocLocalAddrTable: to store the local IP address(-es).
- sctpAssocRemAddrTable: to store the remote addresses and the per-remote-address related information.

Entries in the sctpAssocTable are created when trying to establish the association, i.e., when sending the COOKIE-ECHO message (originating side) or the COOKIE-ACK message (server side). At this point, i.e., at established state, all entry fields are filled in with valid values.

Note: The following representation is a conceptual mode of describing the relationship between the tables in this MIB. Note that the real relationship of the tables is by sharing an index, so tables are not truly within tables. Every entry is explained when defining the corresponding objects in the MIB.

mib-2 {1 3 6 1 2 1}

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```

+--(xxxx)sctpMIB
|
+--(1) sctpObjects
| |
| |
| |
| |
| |
+--(3) sctpAssocTable
| |
| | +--(1) sctpAssocId (index)
| | |
| | +--(2) sctpAssocRemHostName
| | |
| | +--(3) sctpAssocLocalPort
| | |
| | +--(4) sctpAssocRemPort
| | |
| | +--(5) sctpAssocRemPrimAddrType
| | |
| | +--(6) sctpAssocRemPrimAddr
| | |
| | +--(7) sctpAssocHeartBeatInterval
| | |
| | +--(8) sctpAssocState
| | |
| | +--(9) sctpAssocInStreams
| | |
| | +--(10) sctpAssocOutStreams
| | |
| | +--(11) sctpAssocMaxRetr
| | |
| | +--(12) sctpAssocPrimProcess
| | |
| | +--(13) sctpAssocT1expires
| | |
| | +--(14) sctpAssocT2expires
| | |
| | +--(15) sctpAssocRtxChunks
| | |
| | +--(16) sctpAssocStartTime
| | |
| | +--(17) sctpAssocDiscontinuityTime
| |
|
+--(4) sctpAssocLocalAddrTable
| |
| | +--(-) sctpAssocId (shared index)
| |

```

```
|  +--(1) sctpAssocLocalAddrType(index)
|  |
|  +--(2) sctpAssocLocalAddr (index)
```

```

|   |
|   +---(3) sctpAssocLocalAddrStartTime
|   |
|   |
+---(5) sctpAssocRemAddrTable
|   |
|   |--(-) sctpAssocId (shared index)
|   |
|   +---(1) sctpAssocRemAddrType (index)
.   |
.   +---(2) sctpAssocRemAddr (index)
.   |
    +---(3) sctpAssocRemAddrActive
    |
    +---(4) sctpAssocRemAddrHBActive
    |
    +---(5) sctpAssocRemAddrRTO
    |
    +---(6) sctpAssocRemAddrMaxPathRtx
    |
    +---(7) sctpAssocRemAddrRtx
    |
    +---(8) sctpAssocRemAddrStartTime

```

Both sctpAssocLocalAddrTable and sctpAssocRemAddrTable are indexed by addresses. 'Addr' and 'AddrType' use the syntax InetAddress and InetAddressType defined in the Textual Conventions for Internet Network Address ([RFC3291](#)). The InetAddressType TC has codepoints for unknown, IPv4, IPv6, non-global IPv4, non-global IPv6, and DNS addresses, but only the IPv4 and IPv6 address types are required to be supported by implementations of this MIB module. Implementations that connect multiple zones are expected to support the non-global IPv4 and non-global IPv6 address types as well.

Note that DNS addresses are not used in this MIB module. They are always resolved to the on-the-wire form prior to connection setup, and the on-the-wire form is what appears in the MIB objects.

The sctpAssocLocalAddrTable table will have as many entries as local IP addresses have been defined for the association. The sctpAssocRemAddrTable table will contain as many entries as remote IP addresses are known to reach the peer. For the multihoming concept see reference [RFC2960](#).

To keep the name of the remote peer (when provided by the peer at initialization time), an entry has been created in the sctpAssocTable called sctpAssocRemHostName. When no DNS name is provided by the remote endpoint, this value will be NULL (zero-length string). Otherwise, the received DNS name will be stored here.

If it is necessary to abort an existing association, the value deleteTCB(9) must be written in the variable sctpAssocState. That is the only way to delete rows in any of the mentioned tables.

3.1.3.2 Reverse Lookup Table

There are five reverse lookup tables to help management applications efficiently access conceptual rows in other tables. These tables allow management applications to avoid expensive tree walks through large numbers of associations.

All of these tables are optional. If these tables are implemented, an entry in them must be created after the entry in the main table (sctpAssocTable) associated with it has been created. This ensures that the field indexing the lookup table exists.

The defined reverse lookup tables allow for performing a lookup using the following variables:

- Local Port: It allows a management application to find all the associations that use a specific local port
- Remote Port: It allows a management application to find all the associations that use a specific remote port
- Remote Host Name: It allows a management application to find all the associations with a specific host name.
- Remote Primary IP Address: It allows a management application to find all the associations that use a specific remote IP address as primary.
- Remote IP address: a management application to find all the associations that use a specific remote IP address.

As an example the picture below shows the table to look up by local port.

```
MIB-2 {1 3 6 1 2 1}
+--(xxx)sctpMIB
|
+--(1) sctpObjects
|  |
|  |
|  |
|  |
|  |
```

```
| |
| +--(6) sctpLookupLocalPortTable
```

```

|   |   |
.   .   +--(-) sctpAssocLocalPort (shared index)
.   .   |
      +--(-) sctpAssocId (shared index)
      |
      +--(1) sctpLookupLocalPortStartTime

```

It is not possible for the operator to either create or delete rows in these tables. The rows in this table will dynamically appear and be removed as the corresponding entries in sctpAssocTable are.

3.2 Conformance

The conformance section recommends as optional all the inverse lookup tables in this MIB. General layer and per association parameters and statistics are considered mandatory.

IP addresses use the global IPv4 and global IPv6 address formats. Unknown value and DNS name formats are not used. Names, if present, are stored in the sctpRemoteHostName variable.

4. Definitions

SCTP-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, Integer32, Unsigned32, Gauge32,
Counter32, Counter64, mib-2

FROM SNMPv2-SMI -- [RFC2578](#)
TimeStamp, TruthValue

FROM SNMPv2-TC -- [RFC2579](#)

MODULE-COMPLIANCE, OBJECT-GROUP
FROM SNMPv2-CONF -- [RFC2580](#)

InetAddressType, InetAddress, InetPortNumber
FROM INET-ADDRESS-MIB; -- [RFC3291](#)

sctpMIB MODULE-IDENTITY

LAST-UPDATED "200306040000Z" -- 4th June 2003

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DESCRIPTION

"The MIB module for managing SCTP implementations.

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this MIB module is part of RFC YYYY; see the RFC itself for
full legal notices. "

REVISION "200306040000Z" -- 4th June 2003

DESCRIPTION " Initial version, published as RFC YYYY"

-- RFC Editor: to assign YYYY

::= { mib-2 xxxx }

-- IANA: to assign xxxx

-- RFC Editor: to change xxxx into the value assigned by IANA

-- the SCTP base variables group

sctpObjects OBJECT IDENTIFIER ::= { sctpMIB 1 }

```
sctpStats    OBJECT IDENTIFIER ::= { sctpObjects 1 }  
sctpParams   OBJECT IDENTIFIER ::= { sctpObjects 2 }
```

```
-- STATISTICS
```

```
-- *****
```

```
-- STATE-RELATED STATISTICS
```

```
sctpCurrEstab OBJECT-TYPE
```

```
SYNTAX          Gauge32
```

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

```
STATUS          current
```

```
DESCRIPTION
```

"The number of associations for which the current state is either ESTABLISHED, SHUTDOWN-RECEIVED or SHUTDOWN-PENDING."

```
REFERENCE
```

"[Section 4 in RFC2960](#) covers the SCTP Association state diagram."

```
::= { sctpStats 1 }
```

```
sctpActiveEstabs OBJECT-TYPE
```

```
SYNTAX          Counter32
```

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

```
STATUS          current
```

```
DESCRIPTION
```

"The number of times that associations have made a direct transition to the ESTABLISHED state from the COOKIE-ECHOED state: COOKIE-ECHOED -> ESTABLISHED. The upper layer initiated the association attempt."

```
REFERENCE
```

"[Section 4 in RFC2960](#) covers the SCTP Association state diagram."

```
::= { sctpStats 2 }
```

```
sctpPassiveEstabs OBJECT-TYPE
```

```
SYNTAX          Counter32
```

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

```
STATUS          current
```

```
DESCRIPTION
```

"The number of times that associations have made a direct transition to the ESTABLISHED state from the CLOSED state: CLOSED -> ESTABLISHED. The remote endpoint initiated the association attempt."

```
REFERENCE
```

"[Section 4 in RFC2960](#) covers the SCTP Association state

diagram."

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```
::= { sctpStats 3 }
```

sctpAborted OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times that associations have made a direct transition to the CLOSED state from any state using the primitive 'ABORT': AnyState --Abort--> CLOSED. Ungraceful termination of the association."

REFERENCE

"[Section 4 in RFC2960](#) covers the SCTP Association state diagram."

```
::= { sctpStats 4 }
```

sctpShutdowns OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times that associations have made a direct transition to the CLOSED state from either the SHUTDOWN-SENT state or the SHUTDOWN-ACK-SENT state. Graceful termination of the association."

REFERENCE

"[Section 4 in RFC2960](#) covers the SCTP Association state diagram."

```
::= { sctpStats 5 }
```

-- OTHER LAYER STATISTICS

sctpOutOfBlues OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of out of the blue packets received by the host. An out of the blue packet is an SCTP packet correctly formed, including the proper checksum, but for which the receiver was unable to identify an appropriate association."

REFERENCE

"[Section 8.4 in RFC2960](#) deals with the Out-Of-The-Blue (OOTB) packet definition and procedures."

```
::= { sctpStats 6 }
```

sctpChecksumErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SCTP packets received with an invalid checksum."

REFERENCE

"The checksum is located at the end of the SCTP packet as per [Section 3.1 in RFC2960](#). [RFC3309](#) updates SCTP to use a 32 bit CRC checksum."

::= { sctpStats 7 }

sctpOutCtrlChunks OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SCTP control chunks sent (retransmissions are not included). Control chunks are those chunks different from DATA."

REFERENCE

"Sections [1.3.5](#) and [1.4](#) in [RFC2960](#) refer to control chunk as those chunks different from those that contain user information, i.e. DATA chunks."

::= { sctpStats 8 }

sctpOutOrderChunks OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SCTP ordered data chunks sent (retransmissions are not included)."

REFERENCE

"[Section 3.3.1 in RFC2960](#) defines the ordered data chunk."

::= { sctpStats 9 }

sctpOutUnorderChunks OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SCTP unordered chunks (data chunks in which the

U bit is set to 1) sent (retransmissions are not included)."
REFERENCE
"[Section 3.3.1 in RFC2960](#) defines the unordered data chunk."

```
::= { sctpStats 10 }
```

sctpInCtrlChunks OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SCTP control chunks received (no duplicate chunks included)."

REFERENCE

"Sections [1.3.5](#) and [1.4](#) in [RFC2960](#) refer to control chunk as those chunks different from those that contain user information, i.e. DATA chunks."

```
::= { sctpStats 11 }
```

sctpInOrderChunks OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SCTP ordered data chunks received (no duplicate chunks included)."

REFERENCE

"[Section 3.3.1 in RFC2960](#) defines the ordered data chunk."

```
::= { sctpStats 12 }
```

sctpInUnorderChunks OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SCTP unordered chunks (data chunks in which the U bit is set to 1) received (no duplicate chunks included)."

REFERENCE

"[Section 3.3.1 in RFC2960](#) defines the unordered data chunk."

```
::= { sctpStats 13 }
```

sctpFragUsrMsgs OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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"The number of user messages that have to be fragmented because of the MTU."

::= { sctpStats 14 }

sctpReasmUsrMsgs OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of user messages reassembled, after conversion into DATA chunks."

REFERENCE

"[Section 6.9 in RFC2960](#) includes a description of the reassembly process."

::= { sctpStats 15 }

sctpOutSCTPPacks OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SCTP packets sent. Retransmitted DATA chunks are included."

::= { sctpStats 16 }

sctpInSCTPPacks OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of SCTP packets received. Duplicates are included."

::= { sctpStats 17 }

sctpDiscontinuityTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime on the most recent occasion at which any one or more of this general statistics counters suffered a discontinuity. The relevant counters are the specific

instances associated with this interface of any Counter32 or Counter64 object contained in the SCTP layer statistics

(defined below sctpStats branch). If no such discontinuities have occurred since the last re-initialization of the local management subsystem, then this object contains a zero value."

REFERENCE

"The inclusion of this object is recommended by [RFC2578](#)."

::= { sctpStats 18 }

-- PROTOCOL GENERAL VARIABLES

-- *****

sctpRtoAlgorithm OBJECT-TYPE

SYNTAX INTEGER {
 other(1), -- Other new one. Future use
 vanj(2) -- Van Jacobson's algorithm
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The algorithm used to determine the timeout value (T3-rtx) used for re-transmitting unacknowledged chunks."

REFERENCE

"[Section 6.3.1](#) and 6.3.2 in [RFC2960](#) cover the RTO calculation and retransmission timer rules."

DEFVAL {vanj} -- vanj(2)

::= { sctpParams 1 }

sctpRtoMin OBJECT-TYPE

SYNTAX Unsigned32
 UNITS "milliseconds"
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"The minimum value permitted by a SCTP implementation for the retransmission timeout value, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout value.

A retransmission time value of zero means immediate retransmission.

The value of this object has to be lower than or equal to stcpRtoMax's value."

DEFVAL {1000} -- milliseconds

::= { sctpParams 2 }

sctpRtoMax OBJECT-TYPE

SYNTAX Unsigned32
UNITS "milliseconds"
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The maximum value permitted by a SCTP implementation for the retransmission timeout value, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout value.

A retransmission time value of zero means immediate retransmission.

The value of this object has to be greater than or equal to sctpRtoMin's value."

DEFVAL {60000} -- milliseconds

::= { sctpParams 3 }

sctpRtoInitial OBJECT-TYPE

SYNTAX Unsigned32
UNITS "milliseconds"
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The initial value for the retransmission timer.

A retransmission time value of zero means immediate retransmission."

DEFVAL {3000} -- milliseconds

::= { sctpParams 4 }

sctpMaxAssocs OBJECT-TYPE

SYNTAX Integer32 (-1 | 0..2147483647)
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The limit on the total number of associations the entity can support. In entities where the maximum number of associations is dynamic, this object should contain the value -1."

::= { sctpParams 5 }

sctpValCookieLife OBJECT-TYPE

SYNTAX
UNITS

Unsigned32
"milliseconds"

```
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "Valid cookie life in the 4-way start-up handshake procedure."
REFERENCE
    "Section 5.1.3 in RFC2960 explains the cookie generation
    process. Recommended value is per section 14 in RFC2960."
DEFVAL {60000} -- milliseconds

 ::= { sctpParams 6 }
```

```
sctpMaxInitRetr OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The maximum number of retransmissions at the start-up phase
        (INIT and COOKIE ECHO chunks). "
    REFERENCE
        "Section 5.1.4, 5.1.6 in RFC2960 refers to Max.Init.Retransmit
        parameter. Recommended value is per section 14 in RFC2960."
    DEFVAL {8} -- number of attempts

 ::= { sctpParams 7 }
```

```
-- TABLES
-- *****
```

```
-- the SCTP Association TABLE
```

```
-- The SCTP association table contains information about each
-- association in which the local endpoint is involved.
```

```
sctpAssocTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF SctpAssocEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing SCTP association-specific information."

 ::= { sctpObjects 3 }
```

```
sctpAssocEntry OBJECT-TYPE
```

SYNTAX
MAX-ACCESS

SctpAssocEntry
not-accessible

```

STATUS          current
DESCRIPTION
    "General common variables and statistics for the whole
    association."
INDEX           { sctpAssocId }

 ::= { sctpAssocTable 1 }

```

```

SctpAssocEntry ::= SEQUENCE {
    sctpAssocId                Unsigned32,
    sctpAssocRemHostName       OCTET STRING,
    sctpAssocLocalPort         InetPortNumber,
    sctpAssocRemPort           InetPortNumber,
    sctpAssocRemPrimAddrType   InetAddressType,
    sctpAssocRemPrimAddr       InetAddress,
    sctpAssocHeartBeatInterval Unsigned32,
    sctpAssocState             INTEGER,
    sctpAssocInStreams         Unsigned32,
    sctpAssocOutStreams        Unsigned32,
    sctpAssocMaxRetr           Unsigned32,
    sctpAssocPrimProcess       Unsigned32,
    sctpAssocT1expires         Counter32,      -- Statistic
    sctpAssocT2expires         Counter32,      -- Statistic
    sctpAssocRtxChunks         Counter32,      -- Statistic
    sctpAssocStartTime         TimeStamp,
    sctpAssocDiscontinuityTime TimeStamp
}

```

sctpAssocId OBJECT-TYPE

```

SYNTAX          Unsigned32 (1..4294967295)
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "Association Identification. Value identifying the
    association. "

 ::= { sctpAssocEntry 1 }

```

sctpAssocRemHostName OBJECT-TYPE

```

SYNTAX          OCTET STRING (SIZE(0..255))
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The peer's DNS name. This object needs to have the same
    format as the encoding in the DNS protocol. This implies that
    the domain name can be up to 255 octets long, each octet being

```

0<=x<=255 as value with US-ASCII A-Z having a case insensitive matching.

If no DNS domain name was received from the peer at init time (embedded in the INIT or INIT-ACK chunk), this object is meaningless. In such cases the object MUST contain a zero-length string value. Otherwise, it contains the remote host name received at init time."

::= { sctpAssocEntry 2 }

sctpAssocLocalPort OBJECT-TYPE

SYNTAX InetPortNumber (1..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The local SCTP port number used for this association."

::= { sctpAssocEntry 3 }

sctpAssocRemPort OBJECT-TYPE

SYNTAX InetPortNumber (1..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The remote SCTP port number used for this association."

::= { sctpAssocEntry 4 }

sctpAssocRemPrimAddrType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The internet type of primary remote IP address. "

::= { sctpAssocEntry 5 }

sctpAssocRemPrimAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The primary remote IP address. The type of this address is determined by the value of sctpAssocRemPrimAddrType.

The client side will know this value after INIT_ACK message reception, the server side will know this value when sending

INIT_ACK message. However, values will be filled in at established(4) state."

```
::= { sctpAssocEntry 6 }
```

sctpAssocHeartBeatInterval OBJECT-TYPE

SYNTAX Unsigned32

UNITS "milliseconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current heartbeat interval..

Zero value means no HeartBeat, even when the concerned
sctpAssocRemAddrHBFlag object is true."

DEFVAL {30000} -- milliseconds

```
::= { sctpAssocEntry 7 }
```

sctpAssocState OBJECT-TYPE

SYNTAX INTEGER {
closed(1),
cookieWait(2),
cookieEchoed(3),
established(4),
shutdownPending(5),
shutdownSent(6),
shutdownReceived(7),
shutdownAckSent(8),
deleteTCB(9)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The state of this SCTP association.

As in TCP, deleteTCB(9) is the only value that may be set by a
management station. If any other value is received, then the
agent must return a wrongValue error.

If a management station sets this object to the value
deleteTCB(9), then this has the effect of deleting the TCB (as
defined in SCTP) of the corresponding association on the
managed node, resulting in immediate termination of the
association.

As an implementation-specific option, an ABORT chunk may be
sent from the managed node to the other SCTP endpoint as a
result of setting the deleteTCB(9) value. The ABORT chunk

implies an ungraceful association shutdown."
REFERENCE

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"[Section 4 in RFC2960](#) covers the SCTP Association state diagram."

::= { sctpAssocEntry 8 }

sctpAssocInStreams OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Inbound Streams according to the negotiation at association start up."

REFERENCE

"[Section 1.3 in RFC2960](#) includes a definition of stream.
[Section 5.1.1 in RFC2960](#) covers the streams negotiation process."

::= { sctpAssocEntry 9 }

sctpAssocOutStreams OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Outbound Streams according to the negotiation at association start up. "

REFERENCE

"[Section 1.3 in RFC2960](#) includes a definition of stream.
[Section 5.1.1 in RFC2960](#) covers the streams negotiation process."

::= { sctpAssocEntry 10 }

sctpAssocMaxRetr OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum number of data retransmissions in the association context. This value is specific for each association and the upper layer can change it by calling the appropriate primitives. This value has to be smaller than the addition of all the maximum number for all the paths (sctpAssocRemAddrMaxPathRtx).

A value of zero value means no retransmissions."

DEFVAL {10} -- number of attempts

```
::= { sctpAssocEntry 11 }
```

sctpAssocPrimProcess OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object identifies the system level process which holds primary responsibility for the SCTP association.

Wherever possible, this should be the system's native unique identification number. The special value 0 can be used to indicate that no primary process is known.

Note that the value of this object can be used as a pointer into the swRunTable of the HOST-RESOURCES-MIB(if the value is smaller than 2147483647) or into the sysApplElmtRunTable of the SYSAPPL-MIB."

::= { sctpAssocEntry 12 }

-- Association Statistics

sctpAssocT1expires OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The T1 timer determines how long to wait for an acknowledgement after sending an INIT or COOKIE-ECHO chunk. This object reflects the number of times the T1 timer expires without having received the acknowledgement.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of sctpAssocDiscontinuityTime."

REFERENCE

"[Section 5 in RFC2960](#)."

::= { sctpAssocEntry 13 }

sctpAssocT2expires OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The T2 timer determines how long to wait for an acknowledgement after sending a SHUTDOWN or SHUTDOWN-ACK

chunk. This object reflects the number of times that T2- timer expired.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of sctpAssocDiscontinuityTime."

REFERENCE

"[Section 9.2 in RFC2960](#)."

::= { sctpAssocEntry 14 }

sctpAssocRtxChunks OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"When T3-rtx expires, the DATA chunks that triggered the T3 timer will be re-sent according with the retransmissions rules. Every DATA chunk that was included in the SCTP packet that triggered the T3-rtx timer must be added to the value of this counter.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of sctpAssocDiscontinuityTime."

REFERENCE

"[Section 6 in RFC2960](#) covers the retransmission process and rules."

::= { sctpAssocEntry 15 }

sctpAssocStartTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at the time that the association represented by this row enters the ESTABLISHED state, i.e. the sctpAssocState object is set to established(4). The value of this object will be zero:

- before the association enters the established(4) state, or
- if the established(4) state was entered prior to the last re-initialization of the local network management subsystem."

::= { sctpAssocEntry 16 }

sctpAssocDiscontinuityTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime on the most recent occasion at which any one or more of this SCTP association counters suffered a discontinuity. The relevant counters are the specific instances associated with this interface of any Counter32 or Counter64 object contained in the sctpAssocTable or sctpLocalAddrTable or sctpRemAddrTable. If no such discontinuities have occurred since the last re-initialization of the local management subsystem, then this object contains a zero value. "

REFERENCE

"The inclusion of this object is recommended by [RFC2578](#)."

::= { sctpAssocEntry 17 }

-- Expanded tables: Including Multi-home feature

-- Local Address TABLE

-- *****

sctpAssocLocalAddrTable OBJECT-TYPE

SYNTAX SEQUENCE OF SctpAssocLocalAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Expanded table of sctpAssocTable based on the AssocId index. This table shows data related to each local IP address which is used by this association."

::= { sctpObjects 4 }

sctpAssocLocalAddrEntry OBJECT-TYPE

SYNTAX SctpAssocLocalAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Local information about the available addresses. There will be an entry for every local IP address defined for this association.
Implementors need to be aware that if the size of

sctpAssocLocalAddr exceeds 114 octets then OIDs of column
instances in this table will have more than 128 sub-

identifiers and cannot be accessed using SNMPv1, SNMPv2c, or
SNMPv3."

```
INDEX      {      sctpAssocId,    -- shared index
                sctpAssocLocalAddrType,
                sctpAssocLocalAddr }
```

```
::= { sctpAssocLocalAddrTable 1 }
```

```
SctpAssocLocalAddrEntry ::= SEQUENCE {
    sctpAssocLocalAddrType      InetAddressType,
    sctpAssocLocalAddr          InetAddress,
    sctpAssocLocalAddrStartTime  TimeStamp
}
```

sctpAssocLocalAddrType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Internet type of local IP address used for this association."

```
::= { sctpAssocLocalAddrEntry 1 }
```

sctpAssocLocalAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of a local IP address available for this
association. The type of this address is determined by the
value of sctpAssocLocalAddrType."

```
::= { sctpAssocLocalAddrEntry 2 }
```

sctpAssocLocalAddrStartTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at the time that this row was
created."

```
::= { sctpAssocLocalAddrEntry 3 }
```



```
-- Remote Addresses TABLE
-- *****
```

```
sctpAssocRemAddrTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF SctpAssocRemAddrEntry
```

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

```
STATUS          current
```

```
DESCRIPTION
```

```
"Expanded table of sctpAssocTable based on the AssocId index.
This table shows data related to each remote peer IP address
which is used by this association."
```

```
::= { sctpObjects 5 }
```

```
sctpAssocRemAddrEntry OBJECT-TYPE
```

```
SYNTAX          SctpAssocRemAddrEntry
```

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

```
STATUS          current
```

```
DESCRIPTION
```

```
"Information about the most important variables for every
remote IP address. There will be an entry for every remote IP
address defined for this association."
```

```
Implementors need to be aware that if the size of
sctpAssocRemAddr exceeds 114 octets then OIDs of column
instances in this table will have more than 128 sub-
identifiers and cannot be accessed using SNMPv1, SNMPv2c, or
SNMPv3."
```

```
INDEX { sctpAssocId,  -- shared index
        sctpAssocRemAddrType,
        sctpAssocRemAddr }
```

```
::= { sctpAssocRemAddrTable 1 }
```

```
SctpAssocRemAddrEntry ::= SEQUENCE {
```

```
    sctpAssocRemAddrType      InetAddressType,
```

```
    sctpAssocRemAddr          InetAddress,
```

```
    sctpAssocRemAddrActive    TruthValue,
```

```
    sctpAssocRemAddrHBAActive TruthValue,
```

```
    sctpAssocRemAddrRTO       Unsigned32,
```

```
    sctpAssocRemAddrMaxPathRtx Unsigned32,
```

```
    sctpAssocRemAddrRtx       Counter32,      -- Statistic
```

```
    sctpAssocRemAddrStartTime TimeStamp
```

```
}
```

sctpAssocRemAddrType OBJECT-TYPE
SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Internet type of a remote IP address available for this association."

::= { sctpAssocRemAddrEntry 1 }

sctpAssocRemAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of a remote IP address available for this association. The type of this address is determined by the value of sctpAssocLocalAddrType."

::= { sctpAssocRemAddrEntry 2 }

sctpAssocRemAddrActive OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object gives information about the reachability of this specific remote IP address.

When the object is set to 'true' (1), the remote IP address is understood as Active. Active means that the threshold of no answers received from this IP address has not been reached.

When the object is set to 'false' (2), the remote IP address is understood as Inactive. Inactive means that either no heartbeat or any other message was received from this address, reaching the threshold defined by the protocol."

REFERENCE

"The remote transport states are defined as Active and Inactive in the SCTP, [RFC2960](#)."

::= { sctpAssocRemAddrEntry 3 }

sctpAssocRemAddrHBActive OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object indicates whether the optional Heartbeat check associated to one destination transport address is activated or not (value equal to true or false, respectively). "

::= { sctpAssocRemAddrEntry 4 }

sctpAssocRemAddrRTO OBJECT-TYPE -- T3-rtx- Timer

SYNTAX Unsigned32

UNITS "milliseconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current Retransmission Timeout. T3-rtx timer as defined in the protocol SCTP."

REFERENCE

"[Section 6.3 in RFC2960](#) deals with the Retransmission Timer Management."

::= { sctpAssocRemAddrEntry 5 }

sctpAssocRemAddrMaxPathRtx OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Maximum number of DATA chunks retransmissions allowed to a remote IP address before it is considered inactive, as defined in [RFC2960](#)."

REFERENCE

"[Section 8.2](#), 8.3 and 14 in [RFC2960](#)."

DEFVAL {5} -- number of attempts

::= { sctpAssocRemAddrEntry 6 }

-- Remote Address Statistic

sctpAssocRemAddrRtx OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of DATA chunks retransmissions to this specific IP address. When T3-rtx expires, the DATA chunk that triggered the T3 timer will be re-sent according to the retransmissions rules. Every DATA chunk that is included in a SCTP packet and was transmitted to this specific IP address before, will be

included in this counter.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of sctpAssocDiscontinuityTime."

::= { sctpAssocRemAddrEntry 7 }

sctpAssocRemAddrStartTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at the time that this row was created."

::= { sctpAssocRemAddrEntry 8 }

-- ASSOCIATION INVERSE TABLE

-- *****

-- BY LOCAL PORT

sctpLookupLocalPortTable OBJECT-TYPE

SYNTAX SEQUENCE OF SctpLookupLocalPortEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"With the use of this table, a list of associations which are using the specified local port can be retrieved."

::= { sctpObjects 6 }

sctpLookupLocalPortEntry OBJECT-TYPE

SYNTAX SctpLookupLocalPortEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table is indexed by local port and association ID. Specifying a local port, we would get a list of the associations whose local port is the one specified."

INDEX { sctpAssocLocalPort,
sctpAssocId }

::= { sctpLookupLocalPortTable 1 }

```
SctpLookupLocalPortEntry ::= SEQUENCE {  
    sctpLookupLocalPortStartTime      TimeStamp
```

```
}
```

```
sctpLookupLocalPortStartTime OBJECT-TYPE
```

```
SYNTAX          TimeStamp
```

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

```
STATUS          current
```

```
DESCRIPTION
```

```
    "The value of sysUpTime at the time that this row was created.
```

```
    As the table will be created after the sctpAssocTable
    creation, this value could be equal to the sctpAssocStartTime
    object from the main table."
```

```
::= { sctpLookupLocalPortEntry 1 }
```

```
-- BY REMOTE PORT
```

```
sctpLookupRemPortTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF SctpLookupRemPortEntry
```

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

```
STATUS          current
```

```
DESCRIPTION
```

```
    "With the use of this table, a list of associations which are
    using the specified remote port can be got"
```

```
::= { sctpObjects 7 }
```

```
sctpLookupRemPortEntry OBJECT-TYPE
```

```
SYNTAX          SctpLookupRemPortEntry
```

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

```
STATUS          current
```

```
DESCRIPTION
```

```
    "This table is indexed by remote port and association ID.
    Specifying a remote port we would get a list of the
    associations whose local port is the one specified "
```

```
INDEX          { sctpAssocRemPort,
                  sctpAssocId }
```

```
::= { sctpLookupRemPortTable 1 }
```

```
SctpLookupRemPortEntry ::= SEQUENCE {
```

```
    sctpLookupRemPortStartTime          TimeStamp
```

```
}
```

sctpLookupRemPortStartTime OBJECT-TYPE

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SYNTAX TimeStamp
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of sysUpTime at the time that this row was created.

 As the table will be created after the sctpAssocTable
 creation, this value could be equal to the sctpAssocStartTime
 object from the main table."

::= { sctpLookupRemPortEntry 1 }

-- BY REMOTE HOST NAME

sctpLookupRemHostNameTable OBJECT-TYPE
SYNTAX SEQUENCE OF SctpLookupRemHostNameEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "With the use of this table, a list of associations with that
 particular host can be retrieved."

::= { sctpObjects 8 }

sctpLookupRemHostNameEntry OBJECT-TYPE
SYNTAX SctpLookupRemHostNameEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "This table is indexed by remote host name and association ID.
 Specifying a host name we would get a list of the associations
 specifying that host name as the remote one.

 Implementors need to be aware that if the size of
 sctpAssocRemHostName exceeds 115 octets then OIDs of column
 instances in this table will have more than 128 sub-
 identifiers and cannot be accessed using SNMPv1, SNMPv2c, or
 SNMPv3."

INDEX { sctpAssocRemHostName,
 sctpAssocId }

::= { sctpLookupRemHostNameTable 1 }

SctpLookupRemHostNameEntry ::= SEQUENCE {

```
sctpLookupRemHostNameStartTime  
}
```

TimeStamp

sctpLookupRemHostNameStartTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at the time that this row was created.

As the table will be created after the sctpAssocTable creation, this value could be equal to the sctpAssocStartTime object from the main table."

::= { sctpLookupRemHostNameEntry 1 }

-- BY REMOTE PRIMARY IP ADDRESS

sctpLookupRemPrimIPAddrTable OBJECT-TYPE

SYNTAX SEQUENCE OF SctpLookupRemPrimIPAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"With the use of this table, a list of associations that have the specified IP address as primary within the remote set of active addresses can be retrieved."

::= { sctpObjects 9 }

sctpLookupRemPrimIPAddrEntry OBJECT-TYPE

SYNTAX SctpLookupRemPrimIPAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table is indexed by primary address and association ID. Specifying a primary address, we would get a list of the associations that have the specified remote IP address marked as primary.

Implementors need to be aware that if the size of sctpAssocRemPrimAddr exceeds 114 octets then OIDs of column instances in this table will have more than 128 sub-identifiers and cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3."

INDEX { sctpAssocRemPrimAddrType,
 sctpAssocRemPrimAddr,
 sctpAssocId }

::= { sctpLookupRemPrimIPAddrTable 1 }


```
SctpLookupRemPrimIPAddrEntry ::= SEQUENCE {  
    sctpLookupRemPrimIPAddrStartTime      TimeStamp  
}
```

sctpLookupRemPrimIPAddrStartTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of SysUpTime at the time that this row was created.

As the table will be created after the sctpAssocTable
creation, this value could be equal to the sctpAssocStartTime
object from the main table."

```
::= { sctpLookupRemPrimIPAddrEntry 1 }
```

-- BY REMOTE IP ADDRESS

sctpLookupRemIPAddrTable OBJECT-TYPE

SYNTAX SEQUENCE OF SctpLookupRemIPAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"With the use of this table, a list of associations that have
the specified IP address as one of the remote ones can be
retrieved. "

```
::= { sctpObjects 10 }
```

sctpLookupRemIPAddrEntry OBJECT-TYPE

SYNTAX SctpLookupRemIPAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table is indexed by a remote IP address and association
ID. Specifying an IP address we would get a list of the
associations that have the specified IP address included
within the set of remote IP addresses."

INDEX { sctpAssocRemAddrType,
 sctpAssocRemAddr,
 sctpAssocId }

```
::= { sctpLookupRemIPAddrTable 1 }
```

SctpLookupRemIPAddrEntry ::= SEQUENCE {

```
sctpLookupRemIPAddrStartTime      TimeStamp
}
```

sctpLookupRemIPAddrStartTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of SysUpTime at the time that this row was created.

As the table will be created after the sctpAssocTable
creation, this value could be equal to the sctpAssocStartTime
object from the main table."

::= { sctpLookupRemIPAddrEntry 1 }

-- 4.1 Conformance Information

sctpMibConformance OBJECT IDENTIFIER ::= { sctpMIB 2 }

sctpMibCompliances OBJECT IDENTIFIER ::= { sctpMibConformance 1 }

sctpMibGroups OBJECT IDENTIFIER ::= { sctpMibConformance 2 }

-- 4.1.1 Units of conformance

--

-- MODULE GROUPS

--

sctpLayerParamsGroup OBJECT-GROUP

OBJECTS { sctpRtoAlgorithm,
sctpRtoMin,
sctpRtoMax,
sctpRtoInitial,
sctpMaxAssocs,
sctpValCookieLife,
sctpMaxInitRetr
}

STATUS current

DESCRIPTION

"Common parameters for the SCTP layer, i.e. for all the
associations. They can usually be referred to as configuration
parameters."

```
::= { sctpMibGroups 1 }
```

sctpStatsGroup OBJECT-GROUP

```
OBJECTS { sctpCurrEstab,
          sctpActiveEstabs,
          sctpPassiveEstabs,
          sctpAborted,
          sctpShutdowns,
          sctpOutOfBlues,
          sctpChecksumErrors,
          sctpOutCtrlChunks,
          sctpOutOrderChunks,
          sctpOutUnorderChunks,
          sctpInCtrlChunks,
          sctpInOrderChunks,
          sctpInUnorderChunks,
          sctpFragUsrMsgs,
          sctpReasmUsrMsgs,
          sctpOutSCTPPacks,
          sctpInSCTPPacks,
          sctpDiscontinuityTime,
          sctpAssocT1expired,
          sctpAssocT2expired,
          sctpAssocRtxChunks,
          sctpAssocRemAddrRtx
        }
```

STATUS current

DESCRIPTION

"Statistics group. It includes the objects to collect state changes in the SCTP protocol local layer and flow control statistics."

::= { sctpMibGroups 2 }

sctpPerAssocParamsGroup OBJECT-GROUP

```
OBJECTS { sctpAssocRemHostName,
          sctpAssocLocalPort,
          sctpAssocRemPort,
          sctpAssocRemPrimAddrType,
          sctpAssocRemPrimAddr,
          sctpAssocHeartBeatInterval,
          sctpAssocState,
          sctpAssocInStreams,
          sctpAssocOutStreams,
          sctpAssocMaxRetr,
          sctpAssocPrimProcess,
          sctpAssocStartTime,
```

sctpAssocDiscontinuityTime,
sctpAssocLocalAddrStartTime,
sctpAssocRemAddrActive,

```
        sctpAssocRemAddrHBAActive,  
        sctpAssocRemAddrRTO,  
        sctpAssocRemAddrMaxPathRtx,  
        sctpAssocRemAddrStartTime  
    }
```

STATUS current

DESCRIPTION

"The SCTP group of objects to manage per-association parameters. These variables include all the SCTP basic features."

::= { sctpMibGroups 3 }

sctpPerAssocStatsGroup OBJECT-GROUP

OBJECTS

```
{ sctpAssocT1expireds,  
  sctpAssocT2expireds,  
  sctpAssocRtxChunks,  
  sctpAssocRemAddrRtx  
}
```

STATUS current

DESCRIPTION

"Per Association Statistics group. It includes the objects to collect flow control statistics per association."

::= { sctpMibGroups 4 }

sctpInverseGroup OBJECT-GROUP

```
OBJECTS { sctpLookupLocalPortStartTime,  
          sctpLookupRemPortStartTime,  
          sctpLookupRemHostNameStartTime,  
          sctpLookupRemPrimIPAddrStartTime,  
          sctpLookupRemIPAddrStartTime  
}
```

STATUS current

DESCRIPTION

"Objects used in the inverse lookup tables."

::= { sctpMibGroups 5 }

-- 4.1.2 Compliance Statements

--

-- MODULE COMPLIANCES

--

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sctpMibCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for SNMP entities which implement this SCTP MIB Module.

There are a number of INDEX objects that cannot be represented in the form of OBJECT clauses in SMIV2, but for which we have the following compliance requirements, expressed in OBJECT clause form in this description clause:

```
-- OBJECT      sctpAssocLocalAddrType
-- SYNTAX      InetAddressType {ipv4(1), ipv6(2)}
-- DESCRIPTION
--      It is only required to have IPv4 and IPv6 addresses without
--      zone indices.
--      The address with zone indices is required if an
--      implementation can connect multiple zones.
--
-- OBJECT      sctpAssocLocalAddr
-- SYNTAX      InetAddress (SIZE(4|16))
-- DESCRIPTION
--      An implementation is only required to support globally
--      unique IPv4 and IPv6 addresses.
--
-- OBJECT      sctpAssocRemAddrType
-- SYNTAX      InetAddressType {ipv4(1), ipv6(2)}
-- DESCRIPTION
--      It is only required to have IPv4 and IPv6 addresses without
--      zone indices.
--      The address with zone indices is required if an
--      implementation can connect multiple zones.
--
-- OBJECT      sctpAssocRemAddr
-- SYNTAX      InetAddress (SIZE(4|16))
-- DESCRIPTION
--      An implementation is only required to support globally
--      unique IPv4 and IPv6 addresses.
--
" -- closes DESCRIPTION clause of MODULE-COMPLIANCE
```

MODULE -- this module

```
MANDATORY-GROUPS { sctpLayerParamsGroup,
                    sctpPerAssocParamsGroup,
```

```
sctpStatsGroup,  
sctpPerAssocStatsGroup  
}
```

```
OBJECT sctpAssocRemPrimAddrType
SYNTAX InetAddressType { ipv4(1),
                        ipv6(2)
                        }

DESCRIPTION
    "It is only required to have IPv4 and IPv6 addresses
    without zone indices.

    The address with zone indices is required if an
    implementation can connect multiple zones."

OBJECT sctpAssocRemPrimAddr
SYNTAX InetAddress (SIZE(4|16))
DESCRIPTION
    "An implementation is only required to support globally
    unique IPv4 and globally unique IPv6 addresses."

OBJECT sctpAssocState
WRITE-SYNTAX INTEGER { deleteTCB(9) }
MIN-ACCESS read-only
DESCRIPTION
    "Only the deleteTCB(9) value MAY be set by a management
    station at most. A read-only option is also considered to
    be compliant with this MIB module description."

GROUP sctpInverseGroup
DESCRIPTION
    "Objects used in inverse lookup tables. This should be
    implemented, at the discretion of the implementers, for
    easier lookups in the association tables"

 ::= { sctpMibCompliances 1 }
```

END

5. Compiling Notes

When compiling the MIB module warnings similar to the following may occur:

- warning: index of row 'sctpAssocLocalAddrEntry' can exceed OID size limit by 141 subidentifier(s)

- warning: index of row `sctpAssocRemAddrEntry' can exceed OID
size limit by 141 subidentifier(s)

- warning: index of row `sctpLookupRemHostNameEntry' can exceed OID size limit by 140 subidentifier(s)
- warning: index of row `sctpLookupRemPrimIPAddrEntry' can exceed OID size limit by 141 subidentifier(s)
- warning: index of row `sctpLookupRemIPAddrEntry' can exceed OID size limit by 141 subidentifier(s)

These warnings are due to the fact that the row objects have index objects of type InetAddress or OCTET STRING whose size limit is 255 octets, and if that size limit were reached the names of column instances in those rows would exceed the 128 sub-identifier limit imposed by current versions of the SNMP. Actual limitations for the index object sizes are noted in the conceptual row DESCRIPTION clauses. For the InetAddress index objects these size limits will not be reached with any of the address types in current use.

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7. Security Considerations

There are management objects defined in this MIB that have 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 are the tables and objects and their sensitivity/vulnerability:

- o The sctpAssocState object has a MAX-ACCESS clause of read-write, which allows termination of an arbitrary connection. Unauthorized

access could cause a denial of service.

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:

- o The sctpAssocTable, sctpAssocLocalAddressTable, sctpAssocRemAddressTable and the lookup tables contain objects providing information on the active associations on the device, local and peer's IP addresses, the status of these associations and the associated processes. This information may be used by an attacker to launch attacks against known/unknown weakness in certain protocols / applications.

- o The sctpAssocTable contains objects providing information on local and remote ports objects, that can be used to identify what ports are open on the machine and can thus suggest what attacks are likely to succeed, without the attacker having to run a port scanner.

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 implementers 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.

The above objects also have privacy implications, i.e., they disclose who is connecting to what hosts. These are sensitive from a perspective of preventing traffic analysis, and also to protect individual privacy.

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