

**Definitions of Managed Objects
for the SONET/SDH Interface Type**

October 19, 1998

AToM MIB Working Group

Kaj Tesink
Bellcore
331 Newman Springs Road
Red Bank, NJ 07701

kaj@bellcore.com

1. Status of this Memo

This document is an Internet-Draft. Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as ``work in progress.''

To learn the current status of any Internet-Draft, please check the ``1id-abstracts.txt' listing contained in the Internet- Drafts Shadow Directories on ftp.ietf.org (US East Coast), nic.nordu.net (Europe), ftp.isi.edu (US West Coast), or munnari.oz.au (Pacific Rim).

Copyright Notice

Copyright (C) The Internet Society (1998). All Rights Reserved.

Expires 4/19/1999

[Page 1]

2. Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it defines objects for managing Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) interfaces. This document is a companion to the documents that define Managed Objects for the DS1/E1/DS2/E2 and DS3/E3 Interface Types [\[24\]](#)[\[25\]](#).

Textual Conventions used in this MIB are defined in [\[6\]](#) and [\[36\]](#).

This memo replaces [RFC1595](#) [\[30\]](#). Changes relative to [RFC1595](#) are summarized in the MIB module's REVISION clause.

3. The SNMP Network Management Framework

The SNMP Management Framework presently consists of five major components:

- 0 An overall architecture, described in [RFC 2271](#) [1].**
- 0 Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in [RFC 1155](#) [2], [RFC 1212](#) [3] and [RFC 1215](#) [4]. The second version, called SMIV2, is described in [RFC 1902](#) [5], [RFC 1903](#) [6] and [RFC 1904](#) [7].**
- 0 Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in [RFC 1157](#) [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in [RFC 1901](#) [9] and [RFC 1906](#) [10]. The third version of the message protocol is called SNMPv3 and described in [RFC 1906](#) [10], [RFC 2272](#) [11] and [RFC 2274](#) [12].**
- 0 Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in [RFC 1157](#) [8]. A second set of protocol operations and associated PDU formats is described in [RFC 1905](#) [13].**
- 0 A set of fundamental applications described in [RFC 2273](#) [14] and the view-based access control mechanism described in [RFC 2275](#) [15].**

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (e.g., use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during

Expires 4/19/1999

[Page 3]

the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

4. Overview

These objects are used when the particular media being used to realize an interface is a SONET/SDH interface. At present, this applies to these values of the ifType variable in the Internet-standard MIB:

sonet (39), sonetPath (50), sonetVT (51)

The definitions contained herein are based on the SONET/SDH specifications in ANSI T1.105 and T1.106-1988 [[19](#)][[20](#)][[21](#)] and CCITT G.707, 708, 709, and G.783 [[26](#)][[27](#)][[28](#)][[29](#)].

4.1. Use of the ifTable

This section specifies how the MIB II interfaces group, as defined in [[23](#)], is used for SONET/SDH interfaces. The SONET/SDH layers support several multiplexing possibilities.

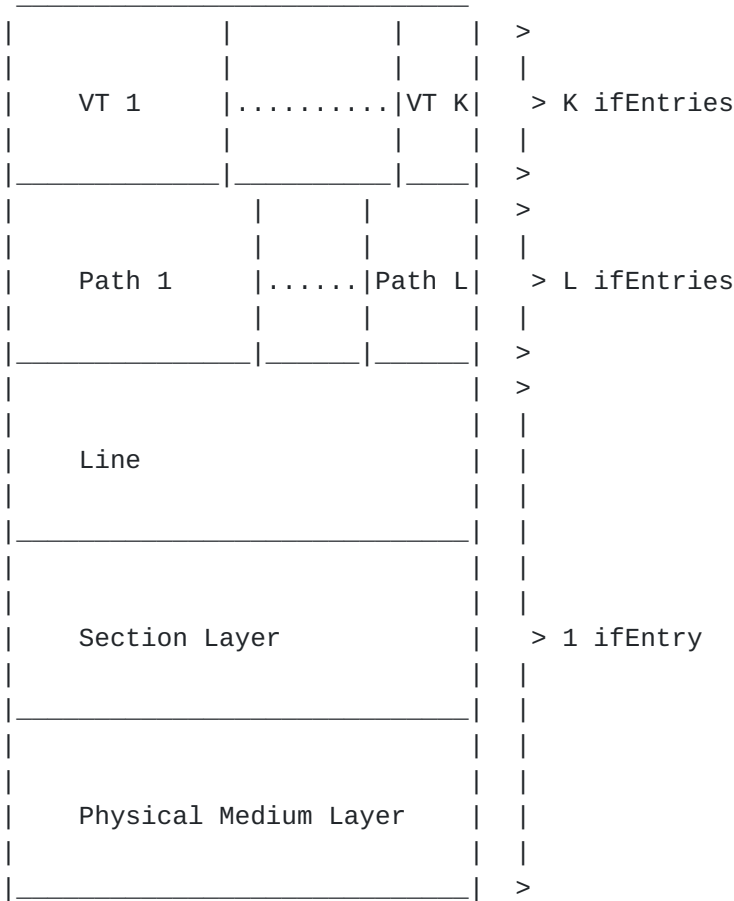
For example in SONET, an Synchronous Transport Signal 3 (STS-3) has 3 SONET Paths, and a STS-3c has 1 SONET Path. Another example could be a STS-12 having 4 SONET STS-3c Paths. Similarly, a SONET Synchronous Payload Envelope (SPE) can carry many Virtual Tributaries (VTs), for example, one SONET SPE can carry 28 VT1.5s. It is important to note that an SPE and a VT in SONET is collectively referred to as a Virtual Container (VC) in SDH. Also, an STS is called Synchronous Transport Module (STM) in SDH.

Not all SONET/SDH equipment terminates all SONET/SDH layers. For example, a SONET/SDH STE regenerator terminates SONET/SDH Sections only, and is transparent for all layers above that. SONET/SDH Add-Drop multiplexers and Digital Cross Connect Systems terminate SONET/SDH Lines. SONET/SDH Terminal Multiplexers may also terminate SONET/SDH Paths and VTs/VCs.

MIB II [[16](#)], as extended by [[23](#)], accommodates these cases by appropriate use of the MIB II system group, and the interfaces group. The system group can name and describe the type of managed resource. The interfaces group defines which SONET/SDH layers apply, how these layers are configured and multiplexed. This is achieved by proper representation of SONET/SDH Layers by ifEntries as defined in [[23](#)], as follows:

Expires 4/19/1999

[Page 5]



Use of ifTable for a SONET/SDH port

The exact configuration and multiplexing of the layers is maintained in the ifStackTable [23].

4.2. Use of ifTable for SONET/SDH Medium/Section/Line Layer

Only the ifGeneralInformationGroup needs to be supported.

ifTable Object Use for combined SONET/SDH
Medium/Section/Line Layer

=====	
ifIndex	Interface index.
ifDescr	SONET/SDH Medium/Section/Line
ifType	sonet(39)

Expires 4/19/1999

[Page 6]

ifSpeed	Speed of line rate for SONET/SDH, (e.g., 155520000 bps).
ifPhysAddress	The value of the Circuit Identifier. If no Circuit Identifier has been assigned this object should have an octet string with zero length.
ifAdminStatus	Supports read-only access. The desired administrative status of the interface.
ifOperStatus	The value testing(3) is not used. This object assumes the value down(2), if the objects sonetSectionCurrentStatus and sonetLineCurrentStatus have any other value than sonetSectionNoDefect(1) and sonetLineNoDefect(1), respectively.
ifLastChange	sysUpTime at the last change in ifOperStatus.
ifName	Textual name of the interface or an OCTET STRING of zero length.
ifLinkUpDownTrapEnable	Default value is enabled(1). Just read-only access may be supported.
ifHighSpeed	Speed of line in Mega-bits per second (e.g., 155 Mbps)
ifConnectorPresent	Set to true(1).
ifAlias	The (non-volatile) alias name for this interface as assigned by the network manager.

[4.3.](#) Use of ifTable for SONET/SDH Paths

Only the ifGeneralInformationGroup needs to be supported.

ifTable Object	Use for SONET/SDH Paths
=====	
ifIndex	Interface index.
ifDescr	SONET/SDH Path

Expires 4/19/1999

[Page 7]

ifType	sonetPath(50)
ifSpeed	set to speed of SONET/SDH path (e.g., an STS-1 path has a rate of 50112000 bps.)
ifPhysAddress	Circuit Identifier or OCTET STRING of zero length.
ifAdminStatus	Supports read-only access. The desired administrative status of the interface.
ifOperStatus	This object assumes the value down(2), if the object sonetPathCurrentStatus has any other value than sonetPathNoDefect(1).
ifLastChange	sysUpTime at the last change in ifOperStatus.
ifName	Textual name of the interface or an OCTET STRING of zero length.
ifLinkUpDownTrapEnable	Default value is disabled(2). Just read-only access may be supported.
ifHighSpeed	Set to rate of SONET/SDH path in Mega-bits per second.
ifConnectorPresent	Set to false(2).
ifAlias	The (non-volatile) alias name for this interface as assigned by the network manager.

[4.4.](#) Use of ifTable for SONET/SDH VTs/VCs

Only the ifGeneralInformationGroup needs to be supported.

ifTable Object	Use for SONET/SDH VTs/VCs
=====	
ifIndex	Interface index.
ifDescr	SONET/SDH VT/VC
ifType	sonetVT(51)

Expires 4/19/1999

[Page 8]

ifSpeed	Set to speed of VT/VC (e.g., a VT1.5 has a rate of 1728000 bps.)
ifPhysAddress	Circuit Identifier or OCTET STRING of zero length.
ifAdminStatus	Supports read-only access. The desired administrative status of the interface.
ifOperStatus	This object assumes the value down(2), if the object sonetVTCurrentStatus has any other value than sonetVTNoDefect(1).
ifLastChange	sysUpTime at the last change in ifOperStatus.
ifName	Textual name of the interface or an OCTET STRING of zero length.
ifLinkUpDownTrapEnable	Default value is disabled(2). Just read-only access may be supported.
ifHighSpeed	Set to rate of VT in Mega-bits per second.
ifConnectorPresent	Set to false(2).
ifAlias	The (non-volatile) alias name for this interface as assigned by the network manager.

4.5. SONET/SDH Terminology

The terminology used in this document to describe error conditions on a SONET circuit as monitored by a SONET system are from the T1.231 [22][31][35]. The terminology used in this document to describe error conditions on a SDH circuit as monitored by a SDH system are from the CCITT G.783 [29]. Only the SONET Performance Monitoring terminology is defined in this document. The definitions for SDH Performance Monitoring terms are similar but not identical, and they can be found in [29]. If the definition in this document does not match the definition in the T1.231 document, the implementer should follow the definition described in this document. In some cases other or additional references are used as compared with the ones cited above. This will be indicated in the text.

Expires 4/19/1999

[Page 9]

Section Loss Of Frame Failure (Out of Frame Event, Severely Errored Frame Defect)

An Out of Frame (OOF) event (or Severely Errored Frame defect) is the occurrence of four contiguous errored frame alignment words. A frame alignment word occupies the A1 and A2 bytes of an STS frame, and is defined in T1.105. The SEF defect is terminated when two contiguous error-free frame words are detected. Any implementation of the frame recovery circuitry which achieves realignment following an OOF within the 250 microsecond (two frames) interval implied by this definition is acceptable.

A Loss of Frame (LOF) defect is declared when an OOF/SEF defect persists for a period of 3 milliseconds. The LOF defect is terminated when the incoming signal remains continuously in-frame for a period of 1 ms to 3 ms.

A LOF failure is declared when the LOF defect persists for a period of 2.5 +/- 0.5 seconds, except when an LOS defect or failure is present. The LOF failure is cleared when the LOS failure is declared, or when the LOF defect is absent for 10 +/- 0.5 seconds.

Loss of Signal

The Loss of Signal (LOS) defect is declared when no transitions are detected on the incoming signal (before descrambling). The LOS defect is detected upon observing 2.3 to 100 microseconds of no transitions. The LOS defect is cleared after a 125 microsecond interval (one frame) during which no LOS defect is detected.

The LOS failure is declared when the LOS defect persists for a period of 2.5 +/- 0.5 seconds, or if LOS defect is present when the criteria for LOF failure declaration have been met. The LOS failure is cleared when the LOS defect is absent for a period of 10 +/- 0.5 seconds. Declaration of LOS failure clears any existing LOF failure. Clearing the LOS failure allows immediate declaration of the LOF failure if conditions warrant.

STS-Path Loss of Pointer

A Loss of Pointer (LOP) defect is declared when either a valid pointer is not detected in eight consecutive frames, or when eight consecutive frames are detected

Expires 4/19/1999

[Page 10]

with the New Data Flag (NDF) set to "1001" without a valid concatenation indicator (see ANSI T1.105). A LOP defect is terminated when either a valid pointer with a normal NDF set to "0110", or a valid concatenation indicator is detected for three contiguous frames. Incoming STS-Path AIS shall not result in the declaration of a LOP defect.

An STS-Path LOP failure is declared when the STS-Path LOP defect persists for a period of 2.5 +/- 0.5 seconds. A STS-Path LOP failure is cleared when the STS-Path LOP defect is absent for 10 +/- 0.5 seconds.

VT Loss of Pointer

A VT LOP defect is declared when either a valid pointer is not detected in eight consecutive VT superframes, or when eight consecutive VT superframes are detected with the NDF set to "1001" without a valid concatenation indicator. A VT LOP defect is terminated when either a valid pointer with a normal NDF set to "0110", or a valid concatenation indicator is detected for three contiguous VT superframes. Incoming VT-Path AIS shall not result in declaring a VT LOP defect.

A VT LOP failure is declared when the VT LOP defect persists for 2.5 +/- 0.5 seconds. A VT LOP failure is cleared when the VT LOP defect is absent for 10 +/- 0.5 seconds.

Line Alarm Indication Signal

A Line Alarm Indication Signal (L-AIS) is defined in ANSI T1.105. The following criteria are specific to the L-AIS defect:

-- Line AIS defect is detected as a "111" pattern in bits 6, 7, and 8 of the K2 byte in five consecutive frames.

-- Line AIS defect is terminated when bits 6, 7, and 8 of the K2 byte do not contain the code "111" for five consecutive frames.

A Line AIS failure is declared when the Line AIS defect persists for a period of 20.5 +/- 0.5 seconds. A Line AIS failure is cleared when the Line AIS defect is absent

Expires 4/19/1999

[Page 11]

for 10 +/- 0.5 seconds.

STS-Path Alarm Indication Signal

The STS-Path Alarm Indication Signal (AIS) is defined in ANSI T1.105 as all ones in bytes H1, H2, and H3 as well as all ones in the entire STS SPE. The following criteria are specific to the STS-Path AIS defect:

-- STS-Path AIS defect is detected as all ones in bytes H1 and H2 in three contiguous frames.

-- The STS-Path AIS defect is terminated when a valid STS Pointer is detected with the NDF set to "1001" (inverted) for one frame, or "0110" (normal) for three contiguous frames.

An STS-Path AIS failure is declared when the STS-Path AIS defect persists for 2.5 +/- 0.5 seconds. An STS-Path AIS failure is cleared when the STS-Path AIS defect is absent for 10 +/- 0.5 seconds.

VT-Path Alarm Indication Signal

The VT-Path Alarm Indication Signal (AIS) is only applicable for VTs in the floating mode of operation. VT-Path AIS is used to alert the downstream VT Path Terminating Entity (PTE) of an upstream failure. Upon detection of a failure, Line AIS, or STS-Path AIS, an STS PTE will generate downstream VT-Path AIS if the STS Synchronous Payload Envelope (SPE) is carrying floating VTs. VT-Path AIS is specified in ANSI T1.105 as all ones in bytes V1, V2, V3, and V4, as well as all ones in the entire VT SPE. The following criteria are specific to VT-Path AIS defect:

-- VT-Path AIS defect is detected by a VT PTE as all ones in bytes V1 and V2 in three contiguous VT superframes.

-- VT-Path AIS defect is terminated when valid VT pointer with a valid VT size is detected with the NDF set to "1001" (inverted) for one VT superframe, or "0110" (normal) for three contiguous VT superframes are detected.

A VT-Path AIS failure is declared when the VT-Path AIS

Expires 4/19/1999

[Page 12]

defect persists for 2.5 +/- 0.5 seconds. A VT-Path AIS failure is cleared when the VT-Path AIS defect is absent for 10 +/- 0.5 seconds.

Line Remote Defect Indication

Line Remote Defect Indication (RDI) (aka Line FERF) signal is the occurrence of a "110" pattern in bit positions 6, 7, and 8 of the K2 byte in STS-1 #1 of the STS-N signal. Line RDI is defined in ANSI T1.105. The following criteria are specific to Line RDI defect:

-- Line RDI defect is a "110" code in bits 6, 7, and 8 of the K2 byte of in STS-1 #1 in x consecutive frames, where x = 5 [31][35] or 10 [35].

-- Line RDI defect is terminated when any code other than "110" is detected in bits 6, 7, and 8 of the K2 byte in x consecutive frames, where x = 5 [31][35] or 10 [35].

A Line Remote Failure Indication (RFI) failure is declared when the incoming Line RDI defects lasts for 2.5 +/- 0.5 seconds. The Line RFI failure is cleared when no Line RDI defects are detected for 10 +/- 0.5 seconds.

STS-Path Remote Defect Indication

STS-Path RDI (aka STS-Path FERF) signal shall be generated within 100 milliseconds by the STS PTE upon detection of an AIS or LOP defect. Transmission of the STS-Path RDI signal shall cease within 100 milliseconds when the STS PTE no longer detects STS-Path AIS or STS-Path LOP defect. The STS-Path RDI shall accurately report the presence or absence of STS-Path AIS or STS-Path LOP defects. STS-Path RDI defect is defined in ANSI T1.105. The following requirements are specific to the STS-Path RDI defect:

-- STS-Path RDI is detected by all STS PTEs. STS-Path RDI is detected by the upstream STS PTE as a "1" in bit five of the Path Status byte (G1) for x consecutive frames, where x = 5 [31] or 10 [35].

-- Removal of STS-Path Remote Defect Indication is detected by a "0" in bit 5 of the G1 byte in x consecutive frames, where x = 5 [31] or 10 [35].

Expires 4/19/1999

[Page 13]

An STS-Path Remote Failure Indication (RFI) failure is declared when the incoming STS-Path RDI defects lasts for 2.5 +/- 0.5 seconds. The STS-Path RFI failure is cleared when no STS-Path RDI defects are detected for 10 +/- 0.5 seconds.

VT-Path Remote Defect Indication

VT Path RDI (aka VT Path FERF) signal shall be generated within 100 milliseconds by the VT PTE upon detection of a VT-Path AIS or LOP defect. Transmission of the VT-Path RDI signal shall cease within 100 milliseconds when the VT PTE no longer detects VT-Path AIS or VT-Path LOP defect. The VT-Path RDI shall accurately report the presence or absence of VT-Path AIS or VT-Path LOP defects. VT-Path RDI defect is defined in ANSI T1.105. The following requirements are specific to VT-Path RDI defect:

-- VT-Path RDI defect is the occurrence of a "1" in bit 4 of the VT-Path Overhead byte (V5) in x consecutive frames, where x = 5 [31] or 10 [35].

-- VT-Path RDI defect is terminated when a "0" is detected in bit 4 of the VT-Path Overhead byte (V5) for x consecutive frames, where x = 5 [31] or 10 [35].

A VT-Path Remote Failure Indication (RFI) (derived) failure is declared when the incoming VT-Path RDI defects lasts for 2.5 +/- 0.5 seconds. The VT-Path RFI failure is cleared when no VT-Path RDI defects are detected for 10 +/- 0.5 seconds.

VT-Path Remote Failure Indication

The VT-Path RFI signal is only required for the case of byte synch mapped DS1s where the DS1 frame bit is not mapped. The VT-Path RFI is specified in ANSI T1.105, where it is currently called VT path yellow. When provided, the VT-Path RFI signal is used to indicate the occurrence of far-end failures. When the VT-Path RFI is not provided, far-end failures are derived from local timing of the VT-Path RDI defect. The VT-Path RFI failure is declared within 5 ms of detecting the incoming VT-Path RFI Signal. The VT-Path Remote Failure Indication (RFI) failure is cleared within 50 ms of detecting the removal of the incoming VT-Path RFI signal.

Expires 4/19/1999

[Page 14]

Coding Violation

Coding Violations (CV) are Bit Interleaved Parity (BIP) errors that are detected in the incoming signal. CV counters are incremented for each BIP error detected. That is, each BIP-8 can detect up to eight errors per STS-N frame, with each error incrementing the CV counter. Section CVs shall be collected using the BIP-8 in the B1 byte located in the Section Overhead of STS-1 #1. Line CVs shall be collected using the BIP-8s in B2 bytes located in the Line Overhead of each STS-1 (since all CVs on an STS-N line are counted together, this is equivalent to counting each error in the BIP-8*N contained in the B2 bytes of the STS-N Line Overhead). Thus, on an STS-N signal, up to 8 x N CVs may occur in each frame. Path CVs shall be collected using the BIP-8 in the B3 byte of the STS-Path Overhead of the STS SPE. VT CVs shall be collected using the BIP-2 in the V5 overhead byte of the floating VT.

Errored Seconds

At each layer, an Errored Second (ES) is a second with one or more Coding Violations at that layer OR one or more incoming defects (e.g., SEF, LOS, AIS, LOP) at that layer has occurred.

Severely Errored Seconds

According to [22][31][32][34][35] at each layer, an Severely Errored Second (SES) is a second with x or more CVs at that layer, or a second during which at least one or more incoming defects at that layer has occurred. The values of x in RFC1595[30] were based on [22] and [32] (see Appendix B). These values have subsequently been relaxed in [31][34][35]. In addition, according to G.826 [33] SESs are measured as a percentage of errored blocks.

To deal with these sets of definitions this memo defines an object sonetSESThresholdSet that determines the correct interpretation of SES. For backward compatibility, if this object is not implemented the interpretation of Appendix B shall apply. Otherwise, a more recent interpretation is suggested. An agent is not required to support all sets of definitions.

Note that if a manager changes the value of this object all SES statistics collected prior to this change shall

Expires 4/19/1999

[Page 15]

be invalidated.

Severely Errored Framing Seconds

A Severely Errored Framing Second (SEFS) is a seconds with containing one or more SEF events. This counter is only counted at the Section Layer.

Unavailable Seconds

At the Line, Path, and VT layers, an unavailable second is calculated by counting the number of seconds that the interface is unavailable. At each layer, the SONET/SDH interface is said to be unavailable at the onset of 10 contiguous SESSs. The 10 SESSs are included in unavailable time. Once unavailable, the SONET/SDH interface becomes available at the onset of 10 contiguous seconds with no SESSs. The 10 seconds with no SESSs are excluded from unavailable time. With respect to the SONET/SDH error counts at each layer, all counters at that layer are incremented while the SONET/SDH interface is deemed available at that layer. While the interface is deemed unavailable at that layer, the only count that is incremented is UASs at that layer.

Note that this definition implies that the agent cannot determine until after a ten second interval has passed whether a given one-second interval belongs to available or unavailable time. If the agent chooses to update the various performance statistics in real time then it must be prepared to retroactively reduce the ES, SES, and SEFS counts by 10 and increase the UAS count by 10 when it determines that available time has been entered. It must also be prepared to reduce the CV count by the number of violations counted since the onset of unavailable time. The agent must be similarly prepared to retroactively decrease the UAS count by 10 and increase the ES and CV counts as necessary upon entering available time. A special case exists when the 10 second period leading to available or unavailable time crosses a 900 second statistics window boundary, as the foregoing description implies that the CV, ES, SES, SEFS, and UAS counts the PREVIOUS interval must be adjusted. In this case successive GETs of the affected sonetPathIntervalSES and sonetPathIntervalUAS objects (and the analogous Line and VT objects also) objects will return differing values if the first GET occurs during the first few seconds of the

Expires 4/19/1999

[Page 16]

window.

According to ANSI T1.231 unavailable time begins at the _onset_ of 10 contiguous severely errored seconds -- that is, unavailable time starts with the _first_ of the 10 contiguous SESs. Also, while an interface is deemed unavailable all counters for that interface are frozen except for the UAS count. It follows that an implementation which strictly complies with this standard must _not_ increment any counters other than the UAS count -- even temporarily -- as a result of anything that happens during those 10 seconds. Since changes in the signal state lag the data to which they apply by 10 seconds, an ANSI-compliant implementation must pass the one-second statistics through a 10-second delay line prior to updating any counters. That can be done by performing the following steps at the end of each one second interval.

- i) Read near/far end CV counter and alarm status flags from the hardware.
- ii) Accumulate the CV counts for the preceding second and compare them to the ES and SES threshold for the layer in question. Update the signal state and shift the one-second CV counts and ES/SES flags into the 10-element delay line. Note that far-end one-second statistics are to be flagged as "absent" during any second in which there is an incoming defect at the layer in question or at any lower layer.
- iii) Update the current interval statistics using the signal state from the _previous_ update cycle and the one-second CV counts and ES/SES flags shifted out of the 10-element delay line.

This approach is further described in [Appendix A](#). An agent may choose to use this approach in lieu of retroactive adjustments to the counters.

In any case, a linkDown trap shall be sent only after the agent has determined for certain that the unavailable state has been entered, but the time on the trap will be that of the first UAS (i.e., 10 seconds earlier). A linkUp trap shall be handled similarly.

Expires 4/19/1999

[Page 17]

Unequipped

If a Path or VT connection is not provisioned (idle) the SONET equipment will signal this state by transmitting the Path or VT Signal Label as follows:

- byte C2 of the STS Path Overhead equal to 0 for an unequipped Path,
- byte V5 of the VT Path Overhead equal to 0 for an unequipped VT.

Signal Label Mismatch

A Path or VT connection is not correctly provisioned if a received Path or VT Signal Label mismatch occurs. A received Signal Label is considered mismatched if it does not equal either the locally provisioned value or the value 'equipped non-specific' (1 hex). Note that any received non-zero Signal Label is considered a locally provisioned value of 'equipped non-specific'. Only in-service, provisioned Path Terminating equipment can detect mismatched Signal labels. It is considered provisioned if it has been configured for a mapping and has been assigned signals to and from which the mapping takes place. While a Path is unequipped or has mismatched signal labels ES/SES counts continue, but these conditions do not themselves contribute to ES/SES.

Circuit Identifier

This is a character string specified by the circuit vendor, and is useful when communicating with the vendor during the troubleshooting process.

Expires 4/19/1999

[Page 18]

5. Object Definitions

SONET-MIB DEFINITIONS ::= BEGIN

IMPORTS

```
MODULE-IDENTITY, OBJECT-TYPE,
Integer32, transmission
    FROM SNMPv2-SMI
DisplayString, TruthValue
    FROM SNMPv2-TC
MODULE-COMPLIANCE, OBJECT-GROUP
    FROM SNMPv2-CONF
ifIndex
    FROM IF-MIB
PerfCurrentCount, PerfIntervalCount
    FROM PerfHist-TC-MIB;
```

-- This is the MIB module for the SONET/SDH Interface objects.

sonetMIB MODULE-IDENTITY

```
LAST-UPDATED "9810190000Z"
ORGANIZATION "IETF ATOM MIB Working Group"
CONTACT-INFO
    "Kaj Tesink
    Bellcore
    Tel: (732) 758-5254
    Fax: (732) 758-2269
    E-mail: kaj@bellcore.com."
```

DESCRIPTION

"The MIB module to describe
SONET/SDH interfaces objects."

REVISION "9810190000Z"

DESCRIPTION

"The key changes made to this MIB module
since its initial publication in [RFC 1595](#)
are as follows.

- (1) The MODULE-IDENTITY has been updated to reflect the changes to the MIB.
- (2) Where applicable, the textual conventions PerfCurrentCount and PerfIntervalCount from PerfHist-TC-MIB have been used in place of Gauge32.

Expires 4/19/1999

[Page 19]

- (3) An agent now has the option to delay updates to the various performance counts in lieu of performing retroactive adjustments upon entering into or exiting from unavailable time. This implementation option is described in [Appendix A](#) of this memo.
- (4) In order to make the SONET-MIB more useful for circuit provisioning, the formerly read-only objects sonetMediumType, sonetMediumLineCoding, sonetMediumLineType, and sonetMediumCircuitIdentifier have been given a MAX-ACCESS of read-write. The MIN-ACCESS remains read-only.
- (5) The DESCRIPTION clause for sonetMediumTimeElapsed has been updated to describe its behaviour if the duration of the current interval exceeds the maximum value.
- (6) The DESCRIPTION clause for sonetMediumValidIntervals has been updated to describe its behaviour when some intervals may be unavailable, and the object sonetMediumInvalidIntervals has been added to keep count of the number of missing intervals (if any).
- (7) The object sonetMediumLoopbackConfig has been added to enable or disable loopback configurations.
- (8) Because the error count thresholds for declaring severely errored seconds that are specified in ANSI T1.231-1993, ITU-T G.826-1995, and ANSI T1.231-1997 are all different from each other and from the thresholds specified in [RFC 1595](#), an enumerated INTEGER object sonetSESthresholdSet has been added to allow an agent to specify which threshold set is in use. Text has been added to [Section 4](#) stating that if this object is not implemented the thresholds specified in [RFC 1595](#) should be assumed, and the table containing those thresholds has been moved to [Appendix B](#) of this memo.
- (9) A column with SYNTAX TruthValue has been added to each interval table. The purpose of the additional column is to indicate, for each interval, whether the data is valid in the sense intended by ANSI T1.231 clause 9.1.2.2 [\[31\]](#)[\[35\]](#). The objects in question are:

sonetSectionIntervalValidData

Expires 4/19/1999

[Page 20]

```
sonetLineIntervalValidData
sonetFarEndLineIntervalValidData
sonetPathIntervalValidData
sonetFarEndPathIntervalValidData
sonetVTIntervalValidData
sonetFarEndVTIntervalValidData
```

(10) The ranges for sonetPathCurrentStatus and sonetVTCurrentStatus have been made consistent with the DESCRIPTION clauses.

(11) The conformance information has been updated. Previous conformance information from [RFC 1595](#) has been deprecated. Some typographical errors in the deprecated section have been corrected in order to prevent MIB compilation errors."

REVISION "9401030000Z"

DESCRIPTION

"The [RFC1595](#) version of this MIB module."

::= { transmission 39 }

-- This is the MIB module for the SONET/SDH objects

sonetObjects OBJECT IDENTIFIER ::= { sonetMIB 1 }

sonetObjectsPath OBJECT IDENTIFIER ::= { sonetMIB 2 }

sonetObjectsVT OBJECT IDENTIFIER ::= { sonetMIB 3 }

-- groups in the SONET/SDH MIB module

sonetMedium OBJECT IDENTIFIER ::= { sonetObjects 1 }

sonetSection OBJECT IDENTIFIER ::= { sonetObjects 2 }

sonetLine OBJECT IDENTIFIER ::= { sonetObjects 3 }

sonetFarEndLine OBJECT IDENTIFIER ::= { sonetObjects 4 }

sonetPath OBJECT IDENTIFIER ::= { sonetObjectsPath 1 }

Expires 4/19/1999

[Page 21]

sonetFarEndPath	OBJECT IDENTIFIER ::= { sonetObjectsPath 2 }
sonetVT	OBJECT IDENTIFIER ::= { sonetObjectsVT 1 }
sonetFarEndVT	OBJECT IDENTIFIER ::= { sonetObjectsVT 2 }

-- the SONET/SDH Medium group

-- SONET/SDH interfaces for some applications may be electrical
-- interfaces and not optical interfaces. This group handles
-- the configuration information for both optical SONET/SDH
-- interfaces and electrical SONET/SDH interfaces.

sonetMediumTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetMediumEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH Medium table."

::= { sonetMedium 1 }

sonetMediumEntry OBJECT-TYPE

SYNTAX SonetMediumEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH Medium table."

INDEX { ifIndex }

::= { sonetMediumTable 1 }

SonetMediumEntry ::=

SEQUENCE {

sonetMediumType	INTEGER,
sonetMediumTimeElapsed	Integer32,
sonetMediumValidIntervals	Integer32,
sonetMediumLineCoding	INTEGER,
sonetMediumLineType	INTEGER,
sonetMediumCircuitIdentifier	DisplayString,
sonetMediumInvalidIntervals	Integer32,
sonetMediumLoopbackConfig	BITS

}

sonetMediumType OBJECT-TYPE

SYNTAX INTEGER {
 sonet(1),
 sdh(2)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

Expires 4/19/1999

[Page 23]

"This variable identifies whether a SONET
or a SDH signal is used across this interface."
::= { sonetMediumEntry 1 }

sonetMediumTimeElapsed OBJECT-TYPE

SYNTAX Integer32 (1..900)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of seconds, including partial seconds,
that have elapsed since the beginning of the current
measurement period. If, for some reason, such as an
adjustment in the system's time-of-day clock, the
current interval exceeds the maximum value, the
agent will return the maximum value."

::= { sonetMediumEntry 2 }

sonetMediumValidIntervals OBJECT-TYPE

SYNTAX Integer32 (0..96)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of previous 15-minute intervals
for which data was collected.

A SONET/SDH interface must be capable
of supporting at least n intervals.

The minimum value of n is 4.

The default of n is 32.

The maximum value of n is 96.

The value will be <n> unless the measurement was
(re-)started within the last (<n>*15) minutes, in which
case the value will be the number of complete 15
minute intervals for which the agent has at least
some data. In certain cases (e.g., in the case
where the agent is a proxy) it is possible that some
intervals are unavailable. In this case, this
interval is the maximum interval number for
which data is available. "

::= { sonetMediumEntry 3 }

sonetMediumLineCoding OBJECT-TYPE

SYNTAX INTEGER {

sonetMediumOther(1),

sonetMediumB3ZS(2),

sonetMediumCMI(3),

Expires 4/19/1999

[Page 24]

```
        sonetMediumNRZ(4),
        sonetMediumRZ(5)
    }
MAX-ACCESS read-write
STATUS current
DESCRIPTION
    "This variable describes the line coding for
    this interface. The B3ZS and CMI are used for
    electrical SONET/SDH signals (STS-1 and STS-3).
    The Non-Return to Zero (NRZ) and the Return
    to Zero are used for optical SONET/SDH signals."
 ::= { sonetMediumEntry 4 }
```

sonetMediumLineType OBJECT-TYPE

```
SYNTAX INTEGER {
    sonetOther(1),
    sonetShortSingleMode(2),
    sonetLongSingleMode(3),
    sonetMultiMode(4),
    sonetCoax(5),
    sonetUTP(6)
}
MAX-ACCESS read-write
STATUS current
DESCRIPTION
    "This variable describes the line type for
    this interface. The line types are
    Short and Long Range
    Single Mode fiber or Multi-Mode fiber interfaces,
    and coax and UTP for electrical interfaces. The
    value sonetOther should be used when the Line Type is
    not one of the listed values."
 ::= { sonetMediumEntry 5 }
```

sonetMediumCircuitIdentifier OBJECT-TYPE

```
SYNTAX DisplayString (SIZE (0..255))
MAX-ACCESS read-write
STATUS current
DESCRIPTION
    "This variable contains the transmission
    vendor's circuit identifier, for the
    purpose of facilitating troubleshooting.
    Note that the circuit identifier, if available,
    is also represented by ifPhysAddress."
 ::= { sonetMediumEntry 6 }
```

Expires 4/19/1999

[Page 25]

sonetMediumInvalidIntervals OBJECT-TYPE

SYNTAX Integer32 (0..96)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of intervals in the range from 0 to sonetMediumValidIntervals for which no data is available. This object will typically be zero except in cases where the data for some intervals are not available (e.g., in proxy situations)."

::= { sonetMediumEntry 7 }

sonetMediumLoopbackConfig OBJECT-TYPE

SYNTAX BITS {
sonetNoLoop(0),
sonetFacilityLoop(1),
sonetTerminalLoop(2),
sonetOtherLoop(3) }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The current loopback state of the SONET/SDH interface. The values mean:

sonetNoLoop

Not in the loopback state. A device that is not capable of performing a loopback on this interface shall always return this value.

sonetFacilityLoop

The received signal at this interface is looped back out through the corresponding transmitter in the return direction.

sonetTerminalLoop

The signal that is about to be transmitted is connected to the associated incoming receiver.

sonetOtherLoop

Loopbacks that are not defined here."

::= { sonetMediumEntry 8 }

sonetSESthresholdSet OBJECT-TYPE

Expires 4/19/1999

[Page 26]

```
SYNTAX    INTEGER {
            other(1),
            bellcore1991(2),
            ansi1993(3),
            itu1995(4),
            ansi1997(5)
            }
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
    "An enumerated integer indicating which
    recognized set of SES thresholds that
    the agent uses for determining severely
    errored seconds and unavailable time.

    other(1)
        None of the following.

    bellcore1991(2)
        Bellcore TR-NWT-000253, 1991 [32], or
        ANSI T1M1.3/93-005R2, 1993 [22].
        See also Appendix B.

    ansi1993(3)
        ANSI T1.231, 1993 [31], or
        Bellcore GR-253-CORE, Issue 2, 1995 [34]

    itu1995(4)
        ITU Recommendation G.826, 1995 [33]

    ansi1997(5)
        ANSI T1.231, 1997 [35]

    If a manager changes the value of this
    object then the SES statistics collected
    prior to this change must be invalidated."
::= { sonetMedium 2 }
```

Expires 4/19/1999

[Page 27]

```
-- the SONET/SDH Section group

-- this group consists of 2 tables:
-- - the SONET/SDH Section Current Table
-- - the SONET/SDH Section Interval Table


-- the SONET/SDH Section Current Table

-- The SONET/SDH Section
-- current table contains various statistics
-- being collected for the current 15 minute interval.

sonetSectionCurrentTable OBJECT-TYPE
    SYNTAX  SEQUENCE OF SonetSectionCurrentEntry
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION
        "The SONET/SDH Section Current table."
    ::= { sonetSection 1 }

sonetSectionCurrentEntry OBJECT-TYPE
    SYNTAX  SonetSectionCurrentEntry
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION
        "An entry in the SONET/SDH Section Current table."
    INDEX   { ifIndex }
    ::= { sonetSectionCurrentTable 1 }

SonetSectionCurrentEntry ::=
    SEQUENCE {
        sonetSectionCurrentStatus      Integer32,
        sonetSectionCurrentESS          PerfCurrentCount,
        sonetSectionCurrentSESS         PerfCurrentCount,
        sonetSectionCurrentSEFSS        PerfCurrentCount,
        sonetSectionCurrentCVs          PerfCurrentCount
    }

sonetSectionCurrentStatus OBJECT-TYPE
    SYNTAX  Integer32 (1..6)
    MAX-ACCESS read-only
    STATUS   current
```

Expires 4/19/1999

[Page 28]

DESCRIPTION

"This variable indicates the status of the interface.
The sonetSectionCurrentStatus is a bit map represented as a sum, therefore, it can represent multiple defects simultaneously.
The sonetSectionNoDefect should be set if and only if no other flag is set.

The various bit positions are:

- 1 sonetSectionNoDefect
- 2 sonetSectionLOS
- 4 sonetSectionLOF"

::= { sonetSectionCurrentEntry 1 }

sonetSectionCurrentESs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Errored Seconds encountered by a SONET/SDH Section in the current 15 minute interval."

::= { sonetSectionCurrentEntry 2 }

sonetSectionCurrentSESSs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Severely Errored Seconds encountered by a SONET/SDH Section in the current 15 minute interval."

::= { sonetSectionCurrentEntry 3 }

sonetSectionCurrentSEFSS OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of

Expires 4/19/1999

[Page 29]

Severely Errored Framing Seconds
encountered by a SONET/SDH Section in the current
15 minute interval."

::= { sonetSectionCurrentEntry 4 }

sonetSectionCurrentCVs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Coding
Violations encountered by a

SONET/SDH Section in the current 15 minute interval."

::= { sonetSectionCurrentEntry 5 }

-- the SONET/SDH Section Interval Table

-- The SONET/SDH Section Interval Table

-- contains various statistics

-- collected by each system over a maximum

-- of the previous 24 hours of

-- operation. The past 24 hours may be broken into 96

-- completed 15 minute intervals.

-- A system is required to store at

-- least 4 completed 15 minute interval.

-- The default value is 32 intervals.

sonetSectionIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetSectionIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH Section Interval table."

::= { sonet[Section 2](#) }

sonetSectionIntervalEntry OBJECT-TYPE

SYNTAX SonetSectionIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH Section Interval table."

INDEX { ifIndex,
sonetSectionIntervalNumber }

::= { sonetSectionIntervalTable 1 }

SonetSectionIntervalEntry ::=

SEQUENCE {

sonetSectionIntervalNumber Integer32,
sonetSectionIntervalESS PerfIntervalCount,
sonetSectionIntervalSESS PerfIntervalCount,
sonetSectionIntervalSEFSS PerfIntervalCount,
sonetSectionIntervalCVs PerfIntervalCount,
sonetSectionIntervalValidData TruthValue

}

sonetSectionIntervalNumber OBJECT-TYPE

SYNTAX Integer32 (1..96)

MAX-ACCESS not-accessible

STATUS current

Expires 4/19/1999

[Page 31]

DESCRIPTION

"A number between 1 and 96, which identifies the interval for which the set of statistics is available. The interval identified by 1 is the most recently completed 15 minute interval, and the interval identified by N is the interval immediately preceding the one identified by N-1."

::= { sonetSectionIntervalEntry 1 }

sonetSectionIntervalESS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Errored Seconds encountered by a SONET/SDH Section in a particular 15-minute interval in the past 24 hours."

::= { sonetSectionIntervalEntry 2 }

sonetSectionIntervalSESS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Severely Errored Seconds encountered by a SONET/SDH Section in a particular 15-minute interval in the past 24 hours."

::= { sonetSectionIntervalEntry 3 }

sonetSectionIntervalSEFSS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Severely Errored Framing Seconds encountered by a SONET/SDH Section in a particular 15-minute interval in the past 24 hours."

Expires 4/19/1999

[Page 32]

```
::= { sonetSectionIntervalEntry 4 }
```

sonetSectionIntervalCVs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Coding
Violations encountered by a
SONET/SDH Section in a particular 15-minute interval
in the past 24 hours."

```
::= { sonetSectionIntervalEntry 5 }
```

sonetSectionIntervalValidData OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates if the data for this
interval is valid."

```
::= { sonetSectionIntervalEntry 6 }
```

```
-- the SONET/SDH Line group

-- this group consists of 2 tables:
-- - the SONET/SDH Line Current Table
-- - the SONET/SDH Line Interval Table

-- the SONET/SDH Line Current Table

-- The SONET/SDH Line
-- current table contains various statistics
-- being collected for the current 15 minute interval.
```

```
sonetLineCurrentTable OBJECT-TYPE
    SYNTAX SEQUENCE OF SonetLineCurrentEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "The SONET/SDH Line Current table."
    ::= { sonetLine 1 }
```

```
sonetLineCurrentEntry OBJECT-TYPE
    SYNTAX SonetLineCurrentEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "An entry in the SONET/SDH Line Current table."
    INDEX { ifIndex }
    ::= { sonetLineCurrentTable 1 }
```

```
SonetLineCurrentEntry ::=
    SEQUENCE {
        sonetLineCurrentStatus      Integer32,
        sonetLineCurrentESS         PerfCurrentCount,
        sonetLineCurrentSESS        PerfCurrentCount,
        sonetLineCurrentCVs         PerfCurrentCount,
        sonetLineCurrentUASS        PerfCurrentCount
    }
```

```
sonetLineCurrentStatus OBJECT-TYPE
    SYNTAX Integer32 (1..6)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
```

Expires 4/19/1999

[Page 34]

"This variable indicates the status of the interface. The sonetLineCurrentStatus is a bit map represented as a sum, therefore, it can represent multiple defects simultaneously. The sonetLineNoDefect should be set if and only if no other flag is set.

The various bit positions are:

- 1 sonetLineNoDefect
- 2 sonetLineAIS
- 4 sonetLineRDI"

::= { sonetLineCurrentEntry 1 }

sonetLineCurrentESS OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Errored Seconds encountered by a SONET/SDH Line in the current 15 minute interval."

::= { sonetLineCurrentEntry 2 }

sonetLineCurrentSESS OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Severely Errored Seconds encountered by a SONET/SDH Line in the current 15 minute interval."

::= { sonetLineCurrentEntry 3 }

sonetLineCurrentCVs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Coding

Violations encountered by a
SONET/SDH Line in the current 15 minute interval."
::= { sonetLineCurrentEntry 4 }

sonetLineCurrentUASS OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Unavailable Seconds
encountered by a SONET/SDH Line in the current 15
minute
interval."

::= { sonetLineCurrentEntry 5 }

-- the SONET/SDH Line Interval Table

-- The SONET/SDH Line Interval Table

-- contains various statistics

-- collected by each system over a maximum

-- of the previous 24 hours of

-- operation. The past 24 hours may be broken into 96

-- completed 15 minute intervals.

-- A system is required to store at

-- least 4 completed 15 minute interval.

-- The default value is 32 intervals.

sonetLineIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetLineIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH Line Interval table."

::= { sonetLine 2 }

sonetLineIntervalEntry OBJECT-TYPE

SYNTAX SonetLineIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH Line Interval table."

INDEX { ifIndex,
sonetLineIntervalNumber }

::= { sonetLineIntervalTable 1 }

SonetLineIntervalEntry ::=

SEQUENCE {

sonetLineIntervalNumber Integer32,

sonetLineIntervalESS PerfIntervalCount,

sonetLineIntervalSESS PerfIntervalCount,

sonetLineIntervalCVs PerfIntervalCount,

sonetLineIntervalUASS PerfIntervalCount,

sonetLineIntervalValidData TruthValue

}

sonetLineIntervalNumber OBJECT-TYPE

SYNTAX Integer32 (1..96)

MAX-ACCESS not-accessible

STATUS current

Expires 4/19/1999

[Page 37]

DESCRIPTION

"A number between 1 and 96, which identifies the interval for which the set of statistics is available. The interval identified by 1 is the most recently completed 15 minute interval, and the interval identified by N is the interval immediately preceding the one identified by N-1."

::= { sonetLineIntervalEntry 1 }

sonetLineIntervalESs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Errored Seconds encountered by a SONET/SDH Line in a particular 15-minute interval in the past 24 hours."

::= { sonetLineIntervalEntry 2 }

sonetLineIntervalSESSs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Severely Errored Seconds encountered by a SONET/SDH Line in a particular 15-minute interval in the past 24 hours."

::= { sonetLineIntervalEntry 3 }

sonetLineIntervalCVs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Coding Violations encountered by a SONET/SDH Line in a particular 15-minute interval in the past 24 hours."

Expires 4/19/1999

[Page 38]

```
::= { sonetLineIntervalEntry 4 }
```

sonetLineIntervalUASS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Unavailable Seconds encountered by a SONET/SDH Line in a particular 15-minute interval in the past 24 hours."

```
::= { sonetLineIntervalEntry 5 }
```

sonetLineIntervalValidData OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates if the data for this interval is valid."

```
::= { sonetLineIntervalEntry 6 }
```

Expires 4/19/1999

[Page 39]


```
-- The SONET/SDH Far End Line group.  
-- This group may only be implemented by SONET/SDH (LTes)  
-- systems that provide for a far end block error (FEBE)  
-- information at the SONET/SDH Line Layer.
```

```
-- This group consists of two tables:  
--     SONET/SDH Far End Line Current Table  
--     SONET/SDH Far End Line Interval Table
```

```
-- The SONET/SDH Far End Line Current Table
```

```
-- The SONET/SDH Far End Line Current table contains  
-- various statistics being  
-- collected for the current 15 minute interval.  
-- The statistics are collected from the far end  
-- block error code (FEBE)  
-- within the third Z2 byte of the Line Overhead  
-- in Broadband ISDN applications.  
-- The definitions are the same as described for  
-- the near-end information.
```

```
sonetFarEndLineCurrentTable OBJECT-TYPE
```

```
    SYNTAX  SEQUENCE OF SonetFarEndLineCurrentEntry
```

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

```
    STATUS  current
```

```
    DESCRIPTION
```

```
        "The SONET/SDH Far End Line Current table."
```

```
    ::= { sonetFarEndLine 1 }
```

```
sonetFarEndLineCurrentEntry OBJECT-TYPE
```

```
    SYNTAX  SonetFarEndLineCurrentEntry
```

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

```
    STATUS  current
```

```
    DESCRIPTION
```

```
        "An entry in the SONET/SDH Far End Line Current table."
```

```
    INDEX   { ifIndex }
```

```
    ::= { sonetFarEndLineCurrentTable 1 }
```

```
SonetFarEndLineCurrentEntry ::=
```

```
    SEQUENCE {
```

```
        sonetFarEndLineCurrentESs      PerfCurrentCount,
```

```
        sonetFarEndLineCurrentSESSs    PerfCurrentCount,
```

```
        sonetFarEndLineCurrentCVs      PerfCurrentCount,
```

Expires 4/19/1999

[Page 40]

```
        sonetFarEndLineCurrentUASs      PerfCurrentCount
    }
```

sonetFarEndLineCurrentESS OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far
End Errored Seconds encountered by a SONET/SDH
interface in the current 15 minute interval."

::= { sonetFarEndLineCurrentEntry 1 }

sonetFarEndLineCurrentSESS OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Far End Severely Errored Seconds
encountered by a SONET/SDH Medium/Section/Line
interface in the current 15 minute
interval."

::= { sonetFarEndLineCurrentEntry 2 }

sonetFarEndLineCurrentCVs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Far End Coding Violations reported via
the far end block error count
encountered by a
SONET/SDH Medium/Section/Line
interface in the current 15 minute interval."

::= { sonetFarEndLineCurrentEntry 3 }

sonetFarEndLineCurrentUASs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Far End Unavailable Seconds

Expires 4/19/1999

[Page 41]

```
    encountered by a
    SONET/SDH Medium/Section/Line
    interface in the current 15 minute interval."
 ::= { sonetFarEndLineCurrentEntry 4 }
```

-- The SONET/SDH Far End Line Interval Table

-- The SONET/SDH Far End Line Interval Table

-- contains various statistics

-- collected by each system over a maximum

-- of the previous 24 hours of

-- operation. The past 24 hours may be broken into 96

-- completed 15 minute intervals.

-- A system is required to store at

-- least 4 completed 15 minute interval.

-- The default value is 32 intervals.

sonetFarEndLineIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetFarEndLineIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH Far End Line Interval table."

::= { sonetFarEndLine 2 }

sonetFarEndLineIntervalEntry OBJECT-TYPE

SYNTAX SonetFarEndLineIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH Far
End Line Interval table."

INDEX { ifIndex,
sonetFarEndLineIntervalNumber }

::= { sonetFarEndLineIntervalTable 1 }

SonetFarEndLineIntervalEntry ::=

SEQUENCE {

sonetFarEndLineIntervalNumber	Integer32,
sonetFarEndLineIntervalESS	PerfIntervalCount,
sonetFarEndLineIntervalSESS	PerfIntervalCount,
sonetFarEndLineIntervalCVs	PerfIntervalCount,
sonetFarEndLineIntervalUASS	PerfIntervalCount,
sonetFarEndLineIntervalValidData	TruthValue

}

sonetFarEndLineIntervalNumber OBJECT-TYPE

SYNTAX Integer32 (1..96)

MAX-ACCESS not-accessible

Expires 4/19/1999

[Page 43]

STATUS current

DESCRIPTION

"A number between 1 and 96, which identifies the interval for which the set of statistics is available. The interval identified by 1 is the most recently completed 15 minute interval, and the interval identified by N is the interval immediately preceding the one identified by N-1."

::= { sonetFarEndLineIntervalEntry 1 }

sonetFarEndLineIntervalESS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far End Errored Seconds encountered by a SONET/SDH Line interface in a particular 15-minute interval in the past 24 hours."

::= { sonetFarEndLineIntervalEntry 2 }

sonetFarEndLineIntervalSESS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far End Severely Errored Seconds encountered by a SONET/SDH Line interface in a particular 15-minute interval in the past 24 hours."

::= { sonetFarEndLineIntervalEntry 3 }

sonetFarEndLineIntervalCVs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far End Coding Violations reported via the far end block error count encountered by a

Expires 4/19/1999

[Page 44]

SONET/SDH Line
interface in a particular 15-minute interval
in the past 24 hours."
 ::= { sonetFarEndLineIntervalEntry 4 }

sonetFarEndLineIntervalUASS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Far End Unavailable Seconds
encountered by a
SONET/SDH Line
interface in a particular 15-minute interval
in the past 24 hours."

::= { sonetFarEndLineIntervalEntry 5 }

sonetFarEndLineIntervalValidData OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates if the data for this
interval is valid."

::= { sonetFarEndLineIntervalEntry 6 }

Expires 4/19/1999

[Page 45]

```
-- the SONET/SDH Path group

-- this group consists of 2 tables:
-- - the SONET/SDH Path Current Table
-- - the SONET/SDH Path Interval Table

-- the SONET/SDH Path Current Table

-- The SONET/SDH Path
-- current table contains various statistics
-- being collected for the current 15 minute interval.
```

```
sonetPathCurrentTable OBJECT-TYPE
    SYNTAX  SEQUENCE OF SonetPathCurrentEntry
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION
        "The SONET/SDH Path Current table."
    ::= { sonetPath 1 }
```

```
sonetPathCurrentEntry OBJECT-TYPE
    SYNTAX  SonetPathCurrentEntry
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION
        "An entry in the SONET/SDH Path Current table."
    INDEX   { ifIndex }
    ::= { sonetPathCurrentTable 1 }
```

```
SonetPathCurrentEntry ::=
    SEQUENCE {
        sonetPathCurrentWidth      INTEGER,
        sonetPathCurrentStatus     Integer32,
        sonetPathCurrentESS        PerfCurrentCount,
        sonetPathCurrentSESS       PerfCurrentCount,
        sonetPathCurrentCVs        PerfCurrentCount,
        sonetPathCurrentUASS       PerfCurrentCount
    }
```

```
sonetPathCurrentWidth OBJECT-TYPE
    SYNTAX  INTEGER {
        sts1(1),
        sts3cSTM1(2),
```

Expires 4/19/1999

[Page 46]

```
        sts12cSTM4(3),
        sts24c(4),
        sts48cSTM16(5)
    }
```

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A value that indicates the type of the SONET/SDH Path. For SONET, the assigned types are the STS-Nc SPEs, where N = 1, 3, 12, 24, and 48. STS-1 is equal to 51.84 Mbps. For SDH, the assigned types are the STM-Nc VCs, where N = 1, 4, and 16."

```
::= { sonetPathCurrentEntry 1 }
```

sonetPathCurrentStatus OBJECT-TYPE

SYNTAX Integer32 (1..62)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates the status of the interface. The sonetPathCurrentStatus is a bit map represented as a sum, therefore, it can represent multiple defects simultaneously. The sonetPathNoDefect should be set if and only if no other flag is set.

The various bit positions are:

- 1 sonetPathNoDefect
- 2 sonetPathSTSLOP
- 4 sonetPathSTSAIS
- 8 sonetPathSTSRDI
- 16 sonetPathUnequipped
- 32 sonetPathSignalLabelMismatch"

```
::= { sonetPathCurrentEntry 2 }
```

sonetPathCurrentESs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Errored

Expires 4/19/1999

[Page 47]

Seconds encountered by a SONET/SDH
Path in the current 15 minute interval."
::= { sonetPathCurrentEntry 3 }

sonetPathCurrentSESS OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Severely Errored Seconds
encountered by a SONET/SDH Path in the current 15
minute
interval."

::= { sonetPathCurrentEntry 4 }

sonetPathCurrentCVs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Coding
Violations encountered by a
SONET/SDH Path in the current 15 minute interval."

::= { sonetPathCurrentEntry 5 }

sonetPathCurrentUASs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Unavailable Seconds
encountered by a Path in the current
15 minute interval."

::= { sonetPathCurrentEntry 6 }

Expires 4/19/1999

[Page 48]

-- the SONET/SDH Path Interval Table

-- The SONET/SDH Path Interval Table

-- contains various statistics

-- collected by each system over a maximum

-- of the previous 24 hours of

-- operation. The past 24 hours may be broken into 96

-- completed 15 minute intervals.

-- A system is required to store at

-- least 4 completed 15 minute interval.

-- The default value is 32 intervals.

sonetPathIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetPathIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH Path Interval table."

::= { sonetPath 2 }

sonetPathIntervalEntry OBJECT-TYPE

SYNTAX SonetPathIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH Path Interval table."

INDEX { ifIndex,
sonetPathIntervalNumber }

::= { sonetPathIntervalTable 1 }

SonetPathIntervalEntry ::=

SEQUENCE {

sonetPathIntervalNumber	Integer32,
sonetPathIntervalESS	PerfIntervalCount,
sonetPathIntervalSESS	PerfIntervalCount,
sonetPathIntervalCVs	PerfIntervalCount,
sonetPathIntervalUASS	PerfIntervalCount,
sonetPathIntervalValidData	TruthValue

}

sonetPathIntervalNumber OBJECT-TYPE

SYNTAX Integer32 (1..96)

MAX-ACCESS not-accessible

Expires 4/19/1999

[Page 49]

STATUS current

DESCRIPTION

"A number between 1 and 96, which identifies the interval for which the set of statistics is available. The interval identified by 1 is the most recently completed 15 minute interval, and the interval identified by N is the interval immediately preceding the one identified by N-1."

::= { sonetPathIntervalEntry 1 }

sonetPathIntervaleSSs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Errored Seconds encountered by a SONET/SDH Path in a particular 15-minute interval in the past 24 hours."

::= { sonetPathIntervalEntry 2 }

sonetPathIntervalSESs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Severely Errored Seconds encountered by a SONET/SDH Path in a particular 15-minute interval in the past 24 hours."

::= { sonetPathIntervalEntry 3 }

sonetPathIntervalCVs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Coding Violations encountered by a SONET/SDH Path in a particular 15-minute interval in the past 24 hours."

Expires 4/19/1999

[Page 50]

```
::= { sonetPathIntervalEntry 4 }
```

sonetPathIntervalUASS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Unavailable Seconds
encountered by a Path in a
particular 15-minute interval
in the past 24 hours."

```
::= { sonetPathIntervalEntry 5 }
```

sonetPathIntervalValidData OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates if the data for this
interval is valid."

```
::= { sonetPathIntervalEntry 6 }
```


-- The SONET/SDH Far End Path group

-- This group consists of two tables:

-- - SONET/SDH Far End Path Current Table

-- - SONET/SDH Far End Path Interval Table

-- The SONET/SDH Far End Path Current Table

-- The SONET/SDH Far End Path Current table

-- contains various statistics

-- being collected for the current 15 minute interval.

-- The statistics are collected from

-- the far end block error code

-- (FEBE) within the G1 byte of the Path Overhead.

-- The definitions are the same as described for

-- the near-end information.

sonetFarEndPathCurrentTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetFarEndPathCurrentEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH Far End Path Current table."

::= { sonetFarEndPath 1 }

sonetFarEndPathCurrentEntry OBJECT-TYPE

SYNTAX SonetFarEndPathCurrentEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH Far End Path Current table."

INDEX { ifIndex }

::= { sonetFarEndPathCurrentTable 1 }

SonetFarEndPathCurrentEntry ::=

SEQUENCE {

sonetFarEndPathCurrentESs	PerfCurrentCount,
sonetFarEndPathCurrentSESSs	PerfCurrentCount,
sonetFarEndPathCurrentCVs	PerfCurrentCount,
sonetFarEndPathCurrentUASSs	PerfCurrentCount

}

sonetFarEndPathCurrentESs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The counter associated with the number of Far
 End Errored Seconds encountered by a SONET/SDH
 interface in the current 15 minute interval."
::= { sonetFarEndPathCurrentEntry 1 }

sonetFarEndPathCurrentSESS OBJECT-TYPE

SYNTAX PerfCurrentCount
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The counter associated with the number of
 Far End Severely Errored Seconds
 encountered by a SONET/SDH Path
 interface in the current 15 minute
 interval."
::= { sonetFarEndPathCurrentEntry 2 }

sonetFarEndPathCurrentCVs OBJECT-TYPE

SYNTAX PerfCurrentCount
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The counter associated with the number of
 Far End Coding Violations reported via
 the far end block error count
 encountered by a
 SONET/SDH Path interface in
 the current 15 minute interval."
::= { sonetFarEndPathCurrentEntry 3 }

sonetFarEndPathCurrentUASS OBJECT-TYPE

SYNTAX PerfCurrentCount
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The counter associated with the number of
 Far End Unavailable Seconds
 encountered by a
 SONET/SDH Path interface in
 the current 15 minute interval."
::= { sonetFarEndPathCurrentEntry 4 }

-- The SONET/SDH Far End Path Interval Table

-- The SONET/SDH Far End Path Interval Table

-- contains various statistics

-- collected by each system over a maximum

-- of the previous 24 hours of

-- operation. The past 24 hours may be broken into 96

-- completed 15 minute intervals.

-- A system is required to store at

-- least 4 completed 15 minute interval.

-- The default value is 32 intervals.

sonetFarEndPathIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetFarEndPathIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH Far End Path Interval table."

::= { sonetFarEndPath 2 }

sonetFarEndPathIntervalEntry OBJECT-TYPE

SYNTAX SonetFarEndPathIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH Far
End Path Interval table."

INDEX { ifIndex,
sonetFarEndPathIntervalNumber }

::= { sonetFarEndPathIntervalTable 1 }

SonetFarEndPathIntervalEntry ::=

SEQUENCE {

sonetFarEndPathIntervalNumber	Integer32,
sonetFarEndPathIntervalESS	PerfIntervalCount,
sonetFarEndPathIntervalSESS	PerfIntervalCount,
sonetFarEndPathIntervalCVs	PerfIntervalCount,
sonetFarEndPathIntervalUASS	PerfIntervalCount,
sonetFarEndPathIntervalValidData	TruthValue

}

sonetFarEndPathIntervalNumber OBJECT-TYPE

SYNTAX Integer32 (1..96)

MAX-ACCESS not-accessible

STATUS current

Expires 4/19/1999

[Page 54]

DESCRIPTION

"A number between 1 and 96, which identifies the interval for which the set of statistics is available. The interval identified by 1 is the most recently completed 15 minute interval, and the interval identified by N is the interval immediately preceding the one identified by N-1."

::= { sonetFarEndPathIntervalEntry 1 }

sonetFarEndPathIntervalESS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far End Errored Seconds encountered by a SONET/SDH Path interface in a particular 15-minute interval in the past 24 hours."

::= { sonetFarEndPathIntervalEntry 2 }

sonetFarEndPathIntervalSESS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far End Severely Errored Seconds encountered by a SONET/SDH Path interface in a particular 15-minute interval in the past 24 hours."

::= { sonetFarEndPathIntervalEntry 3 }

sonetFarEndPathIntervalCVs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far End Coding Violations reported via the far end block error count encountered by a SONET/SDH Path interface"

Expires 4/19/1999

[Page 55]

in a particular 15-minute interval
in the past 24 hours."
::= { sonetFarEndPathIntervalEntry 4 }

sonetFarEndPathIntervalUASs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Far End Unavailable Seconds
encountered by a
SONET/SDH Path interface in
a particular 15-minute interval
in the past 24 hours."

::= { sonetFarEndPathIntervalEntry 5 }

sonetFarEndPathIntervalValidData OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates if the data for this
interval is valid."

::= { sonetFarEndPathIntervalEntry 6 }

Expires 4/19/1999

[Page 56]

-- the SONET/SDH Virtual Tributary group

-- this group consists of 2 tables:

-- - the SONET/SDH VT Current Table

-- - the SONET/SDH VT Interval Table

-- For SDH signals, virtual tributaries are

-- called VCs instead of VTs

-- A VT1.5 = VC11

-- A VT2 = VC12

-- A VT3 = none

-- A VT6 = VC3

-- the SONET/SDH VT Current Table

-- The SONET/SDH VT current table

-- contains various statistics

-- being collected for the

-- current 15 minute interval.

sonetVTCurrentTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetVTCurrentEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH VT Current table."

::= { sonetVT 1 }

sonetVTCurrentEntry OBJECT-TYPE

SYNTAX SonetVTCurrentEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH VT Current table."

INDEX { ifIndex }

::= { sonetVTCurrentTable 1 }

SonetVTCurrentEntry ::=

SEQUENCE {

sonetVTCurrentWidth INTEGER,

sonetVTCurrentStatus Integer32,

sonetVTCurrentESS PerfCurrentCount,

sonetVTCurrentSESS PerfCurrentCount,

Expires 4/19/1999

[Page 57]

sonetVTCurrentCVs	PerfCurrentCount,
sonetVTCurrentUASs	PerfCurrentCount

}

sonetVTCurrentWidth OBJECT-TYPE

SYNTAX INTEGER {
 vtWidth15VC11(1),
 vtWidth2VC12(2),
 vtWidth3(3),
 vtWidth6VC2(4),
 vtWidth6c(5)
 }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A value that indicates the type of the SONE
 VT and SDH VC. Assigned widths are
 VT1.5/VC11, VT2/VC12, VT3, VT6/VC2, and VT6c."

::= { sonetVTCurrentEntry 1 }

sonetVTCurrentStatus OBJECT-TYPE

SYNTAX Integer32 (1..126)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates the
 status of the interface.
 The sonetVTCurrentStatus
 is a bit map represented
 as a sum, therefore,
 it can represent multiple defects
 and failures
 simultaneously.
 The sonetVTNoDefect should be
 set if and only if
 no other flag is set.

The various bit positions are:

1	sonetVTNoDefect
2	sonetVTLOP
4	sonetVTPathAIS
8	sonetVTPathRDI
16	sonetVTPathRFI
32	sonetVTUnequipped
64	sonetVTSignalLabelMismatch"

Expires 4/19/1999

[Page 58]

```
::= { sonetVTCurrentEntry 2 }
```

```
sonetVTCurrentESs OBJECT-TYPE
```

```
    SYNTAX  PerfCurrentCount
```

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

```
    STATUS  current
```

```
    DESCRIPTION
```

```
        "The counter associated with the number of Errored  
        Seconds encountered by a SONET/SDH  
        VT in the current 15 minute interval."
```

```
::= { sonetVTCurrentEntry 3 }
```

```
sonetVTCurrentSESSs OBJECT-TYPE
```

```
    SYNTAX  PerfCurrentCount
```

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

```
    STATUS  current
```

```
    DESCRIPTION
```

```
        "The counter associated with the number of  
        Severely Errored Seconds  
        encountered by a SONET/SDH VT in the current 15 minute  
        interval."
```

```
::= { sonetVTCurrentEntry 4 }
```

```
sonetVTCurrentCVs OBJECT-TYPE
```

```
    SYNTAX  PerfCurrentCount
```

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

```
    STATUS  current
```

```
    DESCRIPTION
```

```
        "The counter associated with the number of Coding  
        Violations encountered by a  
        SONET/SDH VT in the current 15 minute interval."
```

```
::= { sonetVTCurrentEntry 5 }
```

```
sonetVTCurrentUASSs OBJECT-TYPE
```

```
    SYNTAX  PerfCurrentCount
```

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

```
    STATUS  current
```

```
    DESCRIPTION
```

```
        "The counter associated with the number of  
        Unavailable Seconds  
        encountered by a VT in the current  
        15 minute interval."
```

```
::= { sonetVTCurrentEntry 6 }
```

Expires 4/19/1999

[Page 59]

-- the SONET/SDH VT Interval Table

-- The SONET/SDH VT Interval Table

-- contains various statistics

-- collected by each system over a maximum

-- of the previous 24 hours of

-- operation. The past 24 hours may be broken into 96

-- completed 15 minute intervals.

-- A system is required to store at

-- least 4 completed 15 minute interval.

-- The default value is 32 intervals.

sonetVTIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetVTIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH VT Interval table."

::= { sonetVT 2 }

sonetVTIntervalEntry OBJECT-TYPE

SYNTAX SonetVTIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH VT Interval table."

INDEX { ifIndex,
sonetVTIntervalNumber }

::= { sonetVTIntervalTable 1 }

SonetVTIntervalEntry ::=

SEQUENCE {

sonetVTIntervalNumber Integer32,

sonetVTIntervalESS PerfIntervalCount,

sonetVTIntervalSESS PerfIntervalCount,

sonetVTIntervalCVs PerfIntervalCount,

sonetVTIntervalUASS PerfIntervalCount,

sonetVTIntervalValidData TruthValue

}

sonetVTIntervalNumber OBJECT-TYPE

SYNTAX Integer32 (1..96)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

Expires 4/19/1999

[Page 60]

"A number between 1 and 96, which identifies the interval for which the set of statistics is available. The interval identified by 1 is the most recently completed 15 minute interval, and the interval identified by N is the interval immediately preceding the one identified by N-1."

::= { sonetVTIntervalEntry 1 }

sonetVTIntervalESs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Errored Seconds encountered by a SONET/SDH VT in a particular 15-minute interval in the past 24 hours."

::= { sonetVTIntervalEntry 2 }

sonetVTIntervalSESSs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Severely Errored Seconds encountered by a SONET/SDH VT in a particular 15-minute interval in the past 24 hours."

::= { sonetVTIntervalEntry 3 }

sonetVTIntervalCVs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Coding Violations encountered by a SONET/SDH VT in a particular 15-minute interval in the past 24 hours."

::= { sonetVTIntervalEntry 4 }

sonetVTIntervalUASSs OBJECT-TYPE

Expires 4/19/1999

[Page 61]

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Unavailable Seconds
encountered by a VT in a particular 15-minute interval
in the past 24 hours."

::= { sonetVTIntervalEntry 5 }

sonetVTIntervalValidData OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates if the data for this
interval is valid."

::= { sonetVTIntervalEntry 6 }

-- The SONET/SDH Far End VT group

-- This group consists of two tables:

-- SONET/SDH Far End VT Current Table

-- SONET/SDH Far End VT Interval Table

-- The SONET/SDH Far End VT Current

-- The SONET/SDH Far End VT Current table

-- contains various statistics

-- being collected for the current 15 minute interval.

-- The statistics are collected from

-- the far end block error code

-- (FEBE) within the G1 byte of the VT Overhead.

-- The definitions are the same as described for

-- the near-end information.

sonetFarEndVTCurrentTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetFarEndVTCurrentEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH Far End VT Current table."

::= { sonetFarEndVT 1 }

sonetFarEndVTCurrentEntry OBJECT-TYPE

SYNTAX SonetFarEndVTCurrentEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH Far End VT Current table."

INDEX { ifIndex }

::= { sonetFarEndVTCurrentTable 1 }

SonetFarEndVTCurrentEntry ::=

SEQUENCE {

sonetFarEndVTCurrentESs	PerfCurrentCount,
sonetFarEndVTCurrentSESSs	PerfCurrentCount,
sonetFarEndVTCurrentCVs	PerfCurrentCount,
sonetFarEndVTCurrentUASSs	PerfCurrentCount

}

sonetFarEndVTCurrentESs OBJECT-TYPE

Expires 4/19/1999

[Page 63]

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far
End Errored Seconds encountered by a SONET/SDH
interface in the current 15 minute interval."

::= { sonetFarEndVTCurrentEntry 1 }

sonetFarEndVTCurrentSESS OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Far End Severely Errored Seconds
encountered by a SONET/SDH VT interface
in the current 15 minute
interval."

::= { sonetFarEndVTCurrentEntry 2 }

sonetFarEndVTCurrentCVs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Far End Coding Violations reported via
the far end block error count
encountered by a
SONET/SDH VT interface
in the current 15 minute interval."

::= { sonetFarEndVTCurrentEntry 3 }

sonetFarEndVTCurrentUASS OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Far End Unavailable Seconds
encountered by a
SONET/SDH VT interface
in the current 15 minute interval."

::= { sonetFarEndVTCurrentEntry 4 }

Expires 4/19/1999

[Page 64]

-- The SONET/SDH Far End VT Interval Table

-- The SONET/SDH Far End VT Interval Table

-- contains various statistics

-- collected by each system over a maximum

-- of the previous 24 hours of

-- operation. The past 24 hours may be broken into 96

-- completed 15 minute intervals.

-- A system is required to store at

-- least 4 completed 15 minute interval.

-- The default value is 32 intervals.

sonetFarEndVTIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF SonetFarEndVTIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The SONET/SDH Far End VT Interval table."

::= { sonetFarEndVT 2 }

sonetFarEndVTIntervalEntry OBJECT-TYPE

SYNTAX SonetFarEndVTIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the SONET/SDH Far
End VT Interval table."

INDEX { ifIndex,
sonetFarEndVTIntervalNumber }

::= { sonetFarEndVTIntervalTable 1 }

SonetFarEndVTIntervalEntry ::=

SEQUENCE {

sonetFarEndVTIntervalNumber	Integer32,
sonetFarEndVTIntervalESS	PerfIntervalCount,
sonetFarEndVTIntervalSESS	PerfIntervalCount,
sonetFarEndVTIntervalCVs	PerfIntervalCount,
sonetFarEndVTIntervalUASS	PerfIntervalCount,
sonetFarEndVTIntervalValidData	TruthValue

}

sonetFarEndVTIntervalNumber OBJECT-TYPE

SYNTAX Integer32 (1..96)

MAX-ACCESS not-accessible

STATUS current

Expires 4/19/1999

[Page 65]

DESCRIPTION

"A number between 1 and 96, which identifies the interval for which the set of statistics is available. The interval identified by 1 is the most recently completed 15 minute interval, and the interval identified by N is the interval immediately preceding the one identified by N-1."

::= { sonetFarEndVTIntervalEntry 1 }

sonetFarEndVTIntervalESS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far End Errored Seconds encountered by a SONET/SDH VT interface in a particular 15-minute interval in the past 24 hours."

::= { sonetFarEndVTIntervalEntry 2 }

sonetFarEndVTIntervalSESS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far End Severely Errored Seconds encountered by a SONET/SDH VT interface in a particular 15-minute interval in the past 24 hours."

::= { sonetFarEndVTIntervalEntry 3 }

sonetFarEndVTIntervalCVs OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Far End Coding Violations reported via the far end block error count encountered by a SONET/SDH VT interface in a

Expires 4/19/1999

[Page 66]

```
        particular 15-minute interval  
        in the past 24 hours."  
 ::= { sonetFarEndVTIntervalEntry 4 }
```

sonetFarEndVTIntervalUASS OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Far End Unavailable Seconds
encountered by a
SONET/SDH VT interface in a
particular 15-minute interval
in the past 24 hours."

```
::= { sonetFarEndVTIntervalEntry 5 }
```

sonetFarEndVTIntervalValidData OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates if the data for this
interval is valid."

```
::= { sonetFarEndVTIntervalEntry 6 }
```

Expires 4/19/1999

[Page 67]

```
-- conformance information
```

```
sonetConformance OBJECT IDENTIFIER ::= { sonetMIB 4 }
```

```
sonetGroups      OBJECT IDENTIFIER ::= { sonetConformance 1 }
```

```
sonetCompliances OBJECT IDENTIFIER ::= { sonetConformance 2 }
```

```
-- deprecated compliance statement
```

```
sonetCompliance MODULE-COMPLIANCE
```

```
    STATUS deprecated
```

```
    DESCRIPTION
```

```
        "The compliance statement for SONET/SDH interfaces."
```

```
MODULE -- this module
```

```
    MANDATORY-GROUPS { sonetMediumStuff, sonetSectionStuff }
```

```
    GROUP      sonetLineStuff
```

```
    DESCRIPTION
```

```
        "Implementation of this group is mandatory for all  
        SONET/SDH systems that terminate SONET/SDH Lines,  
        Paths or Virtual Tributaries."
```

```
    GROUP      sonetFarEndLineStuff
```

```
    DESCRIPTION
```

```
        "Implementation of this group is optional for all  
        SONET/SDH systems that terminate SONET/SDH Lines,  
        Paths or Virtual Tributaries, and that  
        provide for a far end block error (FEBE)  
        information at the SONET/SDH Line Layer."
```

```
    GROUP      sonetPathStuff
```

```
    DESCRIPTION
```

```
        "Implementation of this group is mandatory for all  
        SONET/SDH systems that terminate SONET/SDH  
        Paths or Virtual Tributaries."
```

```
    OBJECT      sonetPathCurrentWidth
```

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

```
    DESCRIPTION
```

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

```
    GROUP      sonetFarEndPathStuff
```

```
    DESCRIPTION
```

```
        "Implementation of this group is optional for all
```

Expires 4/19/1999

[Page 68]

SONET/SDH systems that terminate SONET/SDH
Paths or Virtual Tributaries, and that process
Far End information."

GROUP sonetVTStuff

DESCRIPTION

"Implementation of this group is mandatory for all
SONET/SDH systems that terminate SONET/SDH Virtual
Tributaries."

OBJECT sonetVTCurrentWidth

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

GROUP sonetFarEndVTStuff

DESCRIPTION

"Implementation of this group is optional for all
SONET/SDH systems that terminate the SONET/SDH
floating Virtual Tributaries, and that process
Far End information."

::= { sonetCompliances 1 }

-- current compliance statements

sonetCompliance2 MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for SONET/SDH interfaces."

MODULE -- this module

MANDATORY-GROUPS { sonetMediumStuff2, sonetSectionStuff2 }

OBJECT sonetMediumType

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT sonetMediumLineCoding

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

Expires 4/19/1999

[Page 69]

OBJECT sonetMediumLineType
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT sonetMediumCircuitIdentifier
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT sonetMediumLoopbackConfig
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT sonetSESthresholdSet
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required, and only one
 of the enumerated values need be supported."

GROUP sonetLineStuff2
DESCRIPTION
 "Implementation of this group is mandatory for all
 SONET/SDH systems that terminate SONET/SDH Lines,
 Paths or Virtual Tributaries."

GROUP sonetFarEndLineStuff2
DESCRIPTION
 "Implementation of this group is optional for all
 SONET/SDH systems that terminate SONET/SDH Lines,
 Paths or Virtual Tributaries, and that
 provide for a far end block error (FEBE)
 information at the SONET/SDH Line Layer."

GROUP sonetPathStuff2
DESCRIPTION
 "Implementation of this group is mandatory for all
 SONET/SDH systems that terminate SONET/SDH
 Paths or Virtual Tributaries."

OBJECT sonetPathCurrentWidth
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

Expires 4/19/1999

[Page 70]

GROUP sonetFarEndPathStuff2

DESCRIPTION

"Implementation of this group is optional for all
SONET/SDH systems that terminate SONET/SDH
Paths or Virtual Tributaries, and that process
Far End information."

GROUP sonetVTStuff2

DESCRIPTION

"Implementation of this group is mandatory for all
SONET/SDH systems that terminate SONET/SDH Virtual
Tributaries."

OBJECT sonetVTCurrentWidth

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

GROUP sonetFarEndVTStuff2

DESCRIPTION

"Implementation of this group is optional for all
SONET/SDH systems that terminate the SONET/SDH
floating Virtual Tributaries, and that process
Far End information."

::= { sonetCompliances 2 }

-- units of conformance

-- deprecated groups

sonetMediumStuff OBJECT-GROUP

OBJECTS { sonetMediumType,
 sonetMediumTimeElapsed,
 sonetMediumValidIntervals,
 sonetMediumLineCoding,
 sonetMediumLineType,
 sonetMediumCircuitIdentifier }

STATUS deprecated

DESCRIPTION

"A collection of objects providing configuration
information applicable to all SONET/SDH interfaces."

::= { sonetGroups 1 }

sonetSectionStuff OBJECT-GROUP

Expires 4/19/1999

[Page 71]

```
OBJECTS { sonetSectionCurrentStatus,
          sonetSectionCurrentESs,
          sonetSectionCurrentSESSs,
          sonetSectionCurrentSEFSs,
          sonetSectionCurrentCVs,
          sonetSectionIntervalESs,
          sonetSectionIntervalSESSs,
          sonetSectionIntervalSEFSs,
          sonetSectionIntervalCVs
        }

STATUS deprecated
DESCRIPTION
    "A collection of objects providing information
    specific to SONET/SDH Section interfaces."
::= { sonetGroups 2 }

sonetLineStuff OBJECT-GROUP
OBJECTS { sonetLineCurrentStatus,
          sonetLineCurrentESs,
          sonetLineCurrentSESSs,
          sonetLineCurrentCVs,
          sonetLineCurrentUASs,
          sonetLineIntervalESs,
          sonetLineIntervalSESSs,
          sonetLineIntervalCVs,
          sonetLineIntervalUASs }

STATUS deprecated
DESCRIPTION
    "A collection of objects providing information
    specific to SONET/SDH Line interfaces."
::= { sonetGroups 3 }

sonetFarEndLineStuff OBJECT-GROUP
OBJECTS { sonetFarEndLineCurrentESs,
          sonetFarEndLineCurrentSESSs,
          sonetFarEndLineCurrentCVs,
          sonetFarEndLineCurrentUASs,
          sonetFarEndLineIntervalESs,
          sonetFarEndLineIntervalSESSs,
          sonetFarEndLineIntervalCVs,
          sonetFarEndLineIntervalUASs }

STATUS deprecated
DESCRIPTION
    "A collection of objects providing information
    specific to SONET/SDH Line interfaces,
```

Expires 4/19/1999

[Page 72]

and maintaining Line Far End information."
 ::= { sonetGroups 4 }

sonetPathStuff OBJECT-GROUP

OBJECTS { sonetPathCurrentWidth,
 sonetPathCurrentStatus,
 sonetPathCurrentESS,
 sonetPathCurrentSESS,
 sonetPathCurrentCVs,
 sonetPathCurrentUASS,
 sonetPathIntervalESS,
 sonetPathIntervalSESS,
 sonetPathIntervalCVs,
 sonetPathIntervalUASS }

STATUS deprecated

DESCRIPTION

"A collection of objects providing information
 specific to SONET/SDH Path interfaces."

::= { sonetGroups 5 }

sonetFarEndPathStuff OBJECT-GROUP

OBJECTS { sonetFarEndPathCurrentESS,
 sonetFarEndPathCurrentSESS,
 sonetFarEndPathCurrentCVs,
 sonetFarEndPathCurrentUASS,
 sonetFarEndPathIntervalESS,
 sonetFarEndPathIntervalSESS,
 sonetFarEndPathIntervalCVs,
 sonetFarEndPathIntervalUASS }

STATUS deprecated

DESCRIPTION

"A collection of objects providing information
 specific to SONET/SDH Path interfaces,
 and maintaining Path Far End information."

::= { sonetGroups 6 }

sonetVTStuff OBJECT-GROUP

OBJECTS { sonetVTCurrentWidth,
 sonetVTCurrentStatus,
 sonetVTCurrentESS,
 sonetVTCurrentSESS,
 sonetVTCurrentCVs,
 sonetVTCurrentUASS,
 sonetVTIntervalESS,
 sonetVTIntervalSESS,

Expires 4/19/1999

[Page 73]

```
        sonetVTIntervalCVs,
        sonetVTIntervalUASS }
STATUS   deprecated
DESCRIPTION
        "A collection of objects providing information
        specific to SONET/SDH VT interfaces."
 ::= { sonetGroups 7 }

sonetFarEndVTStuff      OBJECT-GROUP
OBJECTS { sonetFarEndVTCurrentESs,
          sonetFarEndVTCurrentSESSs,
          sonetFarEndVTCurrentCVs,
          sonetFarEndVTCurrentUASSs,
          sonetFarEndVTIntervalESs,
          sonetFarEndVTIntervalSESSs,
          sonetFarEndVTIntervalCVs,
          sonetFarEndVTIntervalUASS }
STATUS   deprecated
DESCRIPTION
        "A collection of objects providing information
        specific to SONET/SDH VT interfaces,
        and maintaining VT Far End information."
 ::= { sonetGroups 8 }

-- current groups

sonetMediumStuff2      OBJECT-GROUP
OBJECTS { sonetMediumType,
          sonetMediumTimeElapsed,
          sonetMediumValidIntervals,
          sonetMediumLineCoding,
          sonetMediumLineType,
          sonetMediumCircuitIdentifier,
          sonetMediumInvalidIntervals,
          sonetMediumLoopbackConfig,
          sonetSESthresholdSet }
STATUS   current
DESCRIPTION
        "A collection of objects providing configuration
        information applicable to all SONET/SDH interfaces."
 ::= { sonetGroups 9 }

sonetSectionStuff2     OBJECT-GROUP
OBJECTS { sonetSectionCurrentStatus,
```

Expires 4/19/1999

[Page 74]

```
        sonetSectionCurrentESs,
        sonetSectionCurrentSESSs,
        sonetSectionCurrentSEFSs,
        sonetSectionCurrentCVs,
        sonetSectionIntervalESs,
        sonetSectionIntervalSESSs,
        sonetSectionIntervalSEFSs,
        sonetSectionIntervalCVs,
        sonetSectionIntervalValidData }
STATUS    current
DESCRIPTION
    "A collection of objects providing information
    specific to SONET/SDH Section interfaces."
::= { sonetGroups 10 }

sonetLineStuff2    OBJECT-GROUP
    OBJECTS { sonetLineCurrentStatus,
        sonetLineCurrentESs,
        sonetLineCurrentSESSs,
        sonetLineCurrentCVs,
        sonetLineCurrentUASSs,
        sonetLineIntervalESs,
        sonetLineIntervalSESSs,
        sonetLineIntervalCVs,
        sonetLineIntervalUASSs,
        sonetLineIntervalValidData }
STATUS    current
DESCRIPTION
    "A collection of objects providing information
    specific to SONET/SDH Line interfaces."
::= { sonetGroups 11 }

sonetPathStuff2    OBJECT-GROUP
    OBJECTS { sonetPathCurrentWidth,
        sonetPathCurrentStatus,
        sonetPathCurrentESs,
        sonetPathCurrentSESSs,
        sonetPathCurrentCVs,
        sonetPathCurrentUASSs,
        sonetPathIntervalESs,
        sonetPathIntervalSESSs,
        sonetPathIntervalCVs,
        sonetPathIntervalUASSs,
        sonetPathIntervalValidData }
STATUS    current
```

Expires 4/19/1999

[Page 75]

DESCRIPTION

"A collection of objects providing information
specific to SONET/SDH Path interfaces."

::= { sonetGroups 12 }

sonetVTStuff2 OBJECT-GROUP

OBJECTS { sonetVTCurrentWidth,
sonetVTCurrentStatus,
sonetVTCurrentESSs,
sonetVTCurrentSESSs,
sonetVTCurrentCVs,
sonetVTCurrentUASSs,
sonetVTIntervalESSs,
sonetVTIntervalSESSs,
sonetVTIntervalCVs,
sonetVTIntervalUASSs,
sonetVTIntervalValidData }

STATUS current

DESCRIPTION

"A collection of objects providing information
specific to SONET/SDH VT interfaces."

::= { sonetGroups 13 }

sonetFarEndLineStuff2 OBJECT-GROUP

OBJECTS { sonetFarEndLineCurrentESSs,
sonetFarEndLineCurrentSESSs,
sonetFarEndLineCurrentCVs,
sonetFarEndLineCurrentUASSs,
sonetFarEndLineIntervalESSs,
sonetFarEndLineIntervalSESSs,
sonetFarEndLineIntervalCVs,
sonetFarEndLineIntervalUASSs,
sonetFarEndLineIntervalValidData }

STATUS current

DESCRIPTION

"A collection of objects providing information
specific to SONET/SDH Line interfaces,
and maintaining Line Far End information."

::= { sonetGroups 14 }

sonetFarEndPathStuff2 OBJECT-GROUP

OBJECTS { sonetFarEndPathCurrentESSs,
sonetFarEndPathCurrentSESSs,
sonetFarEndPathCurrentCVs,
sonetFarEndPathCurrentUASSs,

Expires 4/19/1999

[Page 76]


```
        sonetFarEndPathIntervalESs,  
        sonetFarEndPathIntervalSESSs,  
        sonetFarEndPathIntervalCVs,  
        sonetFarEndPathIntervalUASs,  
        sonetFarEndPathIntervalValidData }  
STATUS   current  
DESCRIPTION  
    "A collection of objects providing information  
    specific to SONET/SDH Path interfaces,  
    and maintaining Path Far End information."  
 ::= { sonetGroups 15 }  
  
sonetFarEndVTStuff2    OBJECT-GROUP  
    OBJECTS { sonetFarEndVTCurrentESs,  
               sonetFarEndVTCurrentSESSs,  
               sonetFarEndVTCurrentCVs,  
               sonetFarEndVTCurrentUASs,  
               sonetFarEndVTIntervalESs,  
               sonetFarEndVTIntervalSESSs,  
               sonetFarEndVTIntervalCVs,  
               sonetFarEndVTIntervalUASs,  
               sonetFarEndVTIntervalValidData }  
STATUS   current  
DESCRIPTION  
    "A collection of objects providing information  
    specific to SONET/SDH VT interfaces,  
    and maintaining VT Far End information."  
 ::= { sonetGroups 16 }  
  
END
```

Expires 4/19/1999

[Page 77]

6. Acknowledgments

This specification is a product of the AToM MIB Working Group. The author would like to acknowledge Mike Heard for his many valuable contributions to this memo.

7. Security Considerations

There are a number of 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.

The managed objects in this MIB contain sensitive information since, collectively, they allow influencing of interfaces in SONET/SDH equipment or networks and provide information of their configuration.

It is thus important to control even GET access to these objects and possibly to even encrypt the values of these object when sending them over the network via SNMP. Not all versions of SNMP provide features for such a secure environment.

SNMPv1 by itself is not a secure environment. 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.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model [RFC 2274](#) [12] and the View-based Access Control Model [RFC 2275](#) [15] is recommended.

It is then a customer/user responsibility to ensure that the SNMP entity giving access to an instance of this MIB, 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.

Expires 4/19/1999

[Page 78]

8. References

- [1] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", [RFC 2271](#), Cabletron Systems, Inc., BMC Software, Inc., IBM T. J. Watson Research, January 1998
- [2] Rose, M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", [RFC 1155](#), Performance Systems International, Hughes LAN Systems, May 1990
- [3] Rose, M., and K. McCloghrie, "Concise MIB Definitions", [RFC 1212](#), Performance Systems International, Hughes LAN Systems, March 1991
- [4] M. Rose, "A Convention for Defining Traps for use with the SNMP", [RFC 1215](#), Performance Systems International, March 1991
- [5] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1902](#), SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.
- [6] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Textual Conventions for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1903](#), SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.
- [7] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Conformance Statements for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1904](#), SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.
- [8] Case, J., Fedor, M., Schoffstall, M., and J. Davin, "Simple Network Management Protocol", [RFC 1157](#), SNMP Research, Performance Systems International, Performance Systems International, MIT Laboratory for Computer

Science, May 1990.

- [9] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Introduction to Community-based SNMPv2", [RFC 1901](#), SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.
- [10] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1906](#), SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.
- [11] Case, J., Harrington D., Presuhn R., and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", [RFC 2272](#), SNMP Research, Inc., Cabletron Systems, Inc., BMC Software, Inc., IBM T. J. Watson Research, January 1998.
- [12] Blumenthal, U., and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", [RFC 2274](#), IBM T. J. Watson Research, January 1998.
- [13] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1905](#), SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.
- [14] Levi, D., Meyer, P., and B. Stewart, "SNMPv3 Applications", [RFC 2273](#), SNMP Research, Inc., Secure Computing Corporation, Cisco Systems, January 1998.
- [15] Wijnen, B., Presuhn, R., and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", [RFC 2275](#), IBM T. J. Watson Research, BMC Software, Inc., Cisco Systems, Inc., January 1998.
- [16] McCloghrie, K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets - MIB-

II", [RFC 1213](#), Hughes LAN Systems, Performance Systems International, March 1991.

- [17] Information processing systems - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1), International Organization for Standardization. International Standard 8824, (December, 1987).
- [18] Information processing systems - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Notation One (ASN.1), International Organization for Standardization. International Standard 8825, (December, 1987).
- [19] American National Standard for Telecommunications - Digital Hierarchy - Optical Interface Rates and Formats Specification, ANSI T1.105-1988.
- [20] American National Standard for Telecommunications - Digital Hierarchy - Optical Interface Rates and Formats Specification, ANSI T1.105-1991.
- [21] American National Standard for Telecommunications - Digital Hierarchy - Optical Interface Specification (Single-Mode), ANSI T1.106-1988.
- [22] Draft American National Standard for Telecommunications - Digital Hierarchy - Layer 1 In-Service Digital Transmission Performance Monitoring, T1M1.3/93-005R2, July 1993.
- [23] McCloghrie, K. and F. Kastenholtz, "The Interfaces Group MIB", [RFC2233](#), Cisco Systems, FTP Software, November 1997.
- [24] Fowler, D., "Definitions of Managed Objects for the DS3/E3 Interface Type", RFC xxxx, Newbridge Networks, ??? 1996.
- [25] Fowler, D., "Definitions of Managed Objects for the DS1, E1, DS2 and E2 Interface Types", RFC xxxx, Newbridge Networks, ????? 1996.

Expires 4/19/1999

[Page 81]

- [26] CCITT Recommendation G.707, "Synchronous Digital Hierarchy Bit Rates", June 1992.
- [27] CCITT Recommendation G.708, "Network Node Interface for the Synchronous Digital Hierarchy", June 1992.
- [28] CCITT Recommendation G.709, "Synchronous Multiplexing Structure", June 1992.
- [29] CCITT Recommendation G.783, "Characteristics of Synchronous Digital Hierarchy (SDH) Multiplexing Equipment Functional Blocks", November 1992.
- [30] Brown, T., and K. Tesink, "Definitions of Managed Objects for the SONET/SDH Interface Type", [RFC1595](#), Bellcore, March 1994.
- [31] American National Standard for Telecommunications - Digital Hierarchy - Layer 1 In-Service Digital Transmission Performance Monitoring, ANSI T1.231-1993, September 1993.
- [32] Bellcore TR-NWT-000253, Issue 1, "Synchronous Optical Network (SONET) Transport Systems: Common Generic Criteria", December 1991.
- [33] ITU Recommendation G.826, "Error Performance Parameters and Objectives for International Constant Bit Rate Digital Paths at or above Primary Rate", September 1995 (COM 13-R57E).
- [34] Bellcore GR-253-CORE, Issue 2, "Synchronous Optical Network (SONET) Transport Systems Common Generic Criteria", December 1995.
- [35] American National Standard for Telecommunications - Digital Hierarchy - Layer 1 In-Service Digital Transmission Performance Monitoring, ANSI T1.231-1997, September 1997.
- [36] Tesink, Kaj, " Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals ", RFCxxxx, Bellcore, ????? 1998.

Expires 4/19/1999

[Page 82]

9. Author's Address

Kaj Tesink
Bellcore
331 Newman Springs Road
P.O. Box 7020
Red Bank, NJ 07701-7020

Phone: (732) 758-5254

EMail: kaj@bellcore.com

10. Intellectual Property

The IETF takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in [BCP-11](#). Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementors or users of this specification can be obtained from the IETF Secretariat.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights which may cover technology that may be required to practice this standard. Please address the information to the IETF Executive Director.

Expires 4/19/1999

[Page 84]

11. Full Copyright Statement

Copyright (C) The Internet Society (1998). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Expires 4/19/1999

[Page 85]

Appendix A: The delay-line approach to statistics collection.

According to ANSI T1.231 unavailable time begins at the onset of 10 contiguous severely errored seconds -- that is, unavailable time starts with the first of the 10 contiguous SESSs -- and while an interface is deemed unavailable all counters for that interface are frozen except for the UAS count. Since changes in the signal state lag the data to which they apply by 10 seconds, an implementation which wishes to avoid making retroactive adjustments to the counts must pass the the one-second statistics through a 10-second delay line prior to updating any counters. That can be done by performing the following steps at the end of each one second interval.

- i) Read near/far end line and path CV counts and alarm status flags from the hardware.
- ii) Accumulate the CV counts for the preceding second and compare them to the ES and SES threshold for the layer in question. Update the signal state and shift the one-second CV counts and ES/SES flags into the 10-element delay line. Note that far-end one-second statistics are to be flagged as "absent" during any second in which there is an incoming defect at the layer in question or at any lower layer.
- iii) Update the current interval statistics using the signal state from the previous update cycle and the one-second CV counts and ES/SES flags shifted out of the 10-element delay line.

This procedure guarantees that the statistical counters will be correctly updated at all times, although they lag real time by 10 seconds. It is illustrated in the figure below. At the end of each 15 minutes interval the current interval counts are transferred to the most recent interval entry and each interval is shifted up by one position, with the oldest being discarded if necessary in order to make room. The current interval counts then start over from zero. Note, however, that the signal state calculation does not start anew at each interval boundary; rather, signal state information is retained across interval boundaries.

Expires 4/19/1999

[Page 86]

READ COUNTERS & STATUS INFO FROM HARDWARE															
LOS	00F/ LOF	SECT CV	LINE AIS	LINE CV	LINE RDI	LINE FEBE	PATH AIS	PATH LOP	PATH CV	PATH RDI	PATH CV				
V	V	V	V	V	V	V	V	V	V	V	V				
ACCUM ONE-SEC STATS, CHK ERR THRESHOLDS, & UPDT SIGNAL STATE															
NEAR END/FAR END							NEAR END/FAR END								
SECT	SECT	SECT	LINE	LINE	LINE	LINE	PATH	PATH	PATH	PATH					
CV	ES	SES	CV	ES	SES	AVA/UNA	CV	ES	SES	AVA/UNA					
V	V	V	V	V	V		V	V	V						
ONE-SEC DELAY (1 OF 10)			ONE-SEC DELAY (1 OF 10)				ONE-SEC DELAY (1 OF 10)								
CV	ES	SES	CV	ES	SES		CV	ES	SES						
/	/	/	/	/	/	/	/	/	/	/					
V	V	V	V	V	V		V	V	V						
ONE-SEC DELAY (10 OF 10)			ONE-SEC DELAY (10 OF 10)				ONE-SEC DELAY (10 OF 10)								
CV	ES	SES	CV	ES	SES		CV	ES	SES						
V	V	V	V	V	V	V	V	V	V	V					
UPDATE STATISTICS COUNTERS															
NEAR END/FAR END							NEAR END/FAR END								
SECTION			LINE				PATH								
CV	ES	EFS	SES	CV	ES	EFS	SES	AS	UAS	CV	ES	EFS	SES	AS	UAS

Expires 4/19/1999

[Page 87]

Note that if such a procedure is adopted there is no current interval data for the first ten seconds after a system comes up. noSuchInstance must be returned if a management station attempts to access the current interval counters during this time.

It is an implementation-specific matter whether an agent assumes that the initial state of the interface is available or unavailable.

Appendix B - [RFC1595](#) SES interpretation

This appendix contains the values for x for the Section, Line, Path, and VT Layers as used in [\[22\]](#)[\[30\]](#)[\[32\]](#).

Value for x for SONET/SDH Section SES Definition

Rate	x	Minimum Bit Error Rate
=====		
OC-1	9	1.5×10^{-7}
OC-3	16	1×10^{-7}
OC-9	47	1×10^{-7}
OC-12	63	1×10^{-7}
OC-18	94	1×10^{-7}
OC-24	125	1×10^{-7}
OC-36	187	1×10^{-7}
OC-48	249	1×10^{-7}

Value for x for SONET/SDH Line SES Definition

Rate	x	Minimum Bit Error Rate
=====		
OC-1	12	2×10^{-7}
OC-3	32	2×10^{-7}
OC-9	47	2×10^{-7}
OC-12	124	2×10^{-7}
OC-18	186	2×10^{-7}
OC-24	248	2×10^{-7}
OC-36	370	2×10^{-7}
OC-48	494	2×10^{-7}

Value for x for SONET/SDH STS-Path SES Definition

Rate	x	Minimum Bit Error Rate
=====		
STS-1	9	1.5×10^{-7}
STS-3	16	1×10^{-7}

Expires 4/19/1999

[Page 89]

Value for x for SONET/SDH VT-Path SES Definition

Rate	x	Minimum Bit Error Rate
=====		
VT1.5	4	2×10^{-6}
VT2	6	2×10^{-6}
VT3	8	2×10^{-6}
VT6	14	2×10^{-6}

Table of Contents

1	Status of this Memo	1
2	Abstract	2
3	The SNMP Network Management Framework	3
4	Overview	5
4.1	Use of the ifTable	5
4.2	Use of ifTable for SONET/SDH Medium/Section/Line Layer	6
4.3	Use of ifTable for SONET/SDH Paths	7
4.4	Use of ifTable for SONET/SDH VTs/VCs	8
4.5	SONET/SDH Terminology	9
5	Object Definitions	19
6.1	The SONET/SDH Medium Group	23
6.2	The SONET/SDH Section Group	28
6.2.1	The SONET/SDH Section Current Group	28
6.2.2	The SONET/SDH Section Interval Group	31
6.3	The SONET/SDH Line Group	34
6.3.1	The SONET/SDH Line Current Group	34
6.3.2	The SONET/SDH Line Interval Group	37
6.4	The SONET/SDH Far End Line Group	40
6.4.1	The SONET/SDH Far End Line Current Group	40
6.4.2	The SONET/SDH Far End Line Interval Group	43
6.5	The SONET/SDH Path Group	46
6.5.1	The SONET/SDH Path Current Group	46
6.5.2	The SONET/SDH Path Interval Group	49
6.6	The SONET/SDH Far End Path Group	52
6.6.1	The SONET/SDH Far End Path Current Group	52
6.6.2	The SONET/SDH Far End Path Interval Group	54
6.7	The SONET/SDH Virtual Tributary Group	57
6.7.1	The SONET/SDH VT Current Group	57
6.7.2	The SONET/SDH VT Interval Group	60
6.8	The SONET/SDH Far End VT Group	63
6.8.1	The SONET/SDH Far End VT Current Group	63
6.8.2	The SONET/SDH Far End VT Interval Group	65
6.9	Conformance Information	68
6.10	Compliance Statements	68
6	Acknowledgments	78
7	Security Considerations	78
8	References	79
9	Author's Address	83
10	Intellectual Property	84
11	Full Copyright Statement	85

Expires 4/19/1999

[Page 91]