

# SNMP Management

This part of the Management Section briefly describes the SNMP (Simple Network Management Protocol) support provided by the Verilink SCM and NCM controller modules. It contains an explanation of the SNMP support that permits access to SCM- and NCM-controlled nodes by the SNMP manager of your choice. You should be familiar with SNMP and the SNMP manager you are using.

The SCC module supports SNMP for legacy products only. The Quad/IMUX module supports SNMP as a standalone module. See these application modules for further information.

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## Overview

SNMP is a network management protocol that is widely accepted for controlling network equipment. SNMP has been implemented on Verilink equipment to provide customers the flexibility to use the Craft interface or an SNMP network management system. The SNMP implementation provided by Verilink has been tested using HP OpenView™ and Verilink's SNMP management system embedded in the Verilink Node Manager.

The SCM and NCM supports the following MIB tables:

- DS1 MIB Interface
- Verilink Enterprise MIB

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## Getting Started

This document is a reference, not a tutorial. The preliminary steps to using SNMP with your network SNMP management system are:

1. Compile the MIBs if they have not already been prepared.
2. Perform a request for [system] MIB to confirm the connection to the node.
3. Access the [ncm.generic] table using the path:  
iso.org.dod.internet.private.enterprises.verilink.as2000.ncm\_generic
4. Go to the table **NCM.NODECURRTABLE** and select "Active" via the **NCM Active Node Status** to activate node control.
5. Go to [ncm\_generic] table **NCMSHELFINFOTABLE** and set the ncmShelfHardware to indicate the shelf type.

You are now ready to manage the system. To change the active node being managed by your management system, return to step 3.

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## SNMP Interface Specifications

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### Verilink vendor number

SNMP helps you to manage your equipment by providing a simple indexing method. Each piece of information to be managed is given an index identifier. To participate in the SNMP management, individual “enterprises” must obtain an enterprise number if the vendor intends to provide product specific information in a vendor-specified MIB.

Verilink’s vendor number is 1.3.6.1.4.1.321

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### Interface Numbering Scheme

An interface numbering scheme allows the SNMP management system to identify, solicit, and view information about a specific module in a node. To do this, the management system associates a unique number with each module. This number is called the **SNMP ifIndex**.

### Calculating the SNMP ifIndex

According to the DS1 MIB documentation, the network interface should be an odd number. The equipment interface should be an even number.

The **SNMP ifIndex** number for either is calculated using this formula:

$$(\text{shelf number} \times 10000) + (\text{slot number} \times 100) + (\text{port number})$$

The values needed for calculating the **SNMP ifIndex** number are found in [Table 1](#) below.

Table 1 SNMP ifIndex Variables

Module Type	Name	Ranges		Port Number
		Shelf Number	Slot Number	
Multi-line shelf	MLS 2000 MLS 2200 MLS 3000	1-4	1-13	<a href="#">See Table 2</a>
Dual-line shelf	DLS 2000	1-4	1-2	<a href="#">See Table 2</a>
Quint-line shelf	QLS 2500 QLS 3500	1-4	1-4	<a href="#">See Table 2</a>

For example, you would calculate each interface's number for a module (plug) in Shelf 2, Slot 2, as follows:

$$\begin{aligned} \text{Net} & \text{--- } (2 \times 10000) + (2 \times 100) + 1 = 20201 \\ \text{Equipment} & \text{--- } (2 \times 10000) + (2 \times 100) + 2 = 20202 \end{aligned}$$

Table 2 Port Number Range

Module Type	Net	Data
<u>NCM Node</u>		
NCM	0	0
DIDCSU	1-2	1-2
DCSU	1-4	--
DPRI	1-2	1-2
QPRI	1-4	--
HDM 2180	1	1
HDM 2182	1	1-2
M13	1	1-28(T1)
TAC2010	1	1(Eqp)
TAC 2130-S /TAC2131-T	1	1(Eqp)
DIU2130	1	1-2
DIU 2140	--	1-5
DIU/DDS	--	1-2
DIU/DBU	--	1-2
IMUX 2160	--	1
<u>SCM Node</u>		
SCM	0	0
M1-3	1	1-28 (T1s)
QUAD T1	4	--
QUAD DATA	--	4
IMUX	--	1

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## Modules Controlled

If multiple MIB tables are associated with a module, find information in the MIBs by searching the module-specific information (ex. ncm-isdn) and if the information is not in the module-specific MIB, then check the generic file (ncm-generic).

In Table 3 below, column 1 specifies the modules controlled and column 2 specifies the associated MIB tables that contain the objects that can be used to control the module. For example, objects controlling the ISDN-specific characteristics of the DPRI may be found in table [ncm-isdn].

**Table 3 Modules Supported by MIBs**

<b>Module Type</b>	<b>Object-Type</b>
<u>NCM Node</u>	
NCM 2000	[system]; [ncmAlarm]; [ncm-generic]
DIDCSU 2912	[ncm-generic]
Dual CSU 2911	[ncm-generic]
DPRI 2922	[ncm-isdn]; [ncm-generic]; [ncm-japi] (Japan); [ncm-npri] (North America)
QPRI	[ncm-isdn]; [ncm-generic]; [ncm-japi] (Japanese); [ncm-npri] (North American)
QUAD 2164	[ncm-quad]; [ncm-generic]
HDM 2180	[ncm-ds3]
HDM 2182	[ncm-ds3]
TAC 2010	[ncm-csu]; [ncm-generic]
TAC 2130-S /TAC2131-T	[ncm-idcsu]; [ncm-csu]; [ncm-generic]
DIU 2130	[ncm-dsu]; [ncm-generic]
DIU 2140	not supported yet
DIU/DDS	[ncm-dds]; [ncm-dsu]; [ncm-generic]
DIU/DBU	[ncm-dbu]; [ncm-dsu]; [ncm-generic]
IMUX	[ncm-imux]; [ncm-generic]
<u>SCM Node</u>	
SCM	[system]; [ncmAlarm]; [ncm-generic]
QUAD T1	[ncm-quad]; [ncm-generic]
M1-3	[ncm-m13]; [ncm-generic]
IMUX	[ncm-imux]; [ncm-generic]
QUAD DATA	[ncm-generic]

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## MIB Tables

This section lists MIB tables for the following:

- MIB-II Interface
- DS1 MIB Interface
- Verilink Enterprise MIB

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**DS1 MIB Interface**

Tables 4 through 10 list the various MIB-II interface parameters. The accompanying comments explain the parameters, describe specific conditions, or specify which parameters are not supported.

**DS1 Near End Group**
**Table 4 DS1 Near End Group 1**

<b>Object-Type</b>	<b>Parameters</b>
dsx1LineIndex	A number calculated with the formula in <a href="#">Calculating the SNMP ifIndex</a> , on page 2.
dsx1IfIndex	A unique number.
dsx1TimeElapsed	The number of seconds that have elapsed since the beginning of the current error-measurement period.
dsx1ValidIntervals	The number of previous intervals for which valid data was collected. The value is 96 unless the interface was brought on-line within the last 24 hours, in which case the value will be the number of complete 15 minute intervals the interface has been online.
dsx1LineType	Access is read-only and applies to network side. other(1) for any line type not defined in this object. dsx1ESF(2) for ESF framing. dsx1D4(3) for D4 framing. dsx1E1(4) for G.704 framing (Table 4a). dsx1E1_CRC(5) for G.704 framing (Table 4b). dsx1E1_MF(6) for G.704 framing with TS16 multiframing enabled (Table 4a). dsx1E1_MF(7) for G.704 framing with TS16 multiframing enabled (Table 4b).
dsx1LineCoding	Access is read-only and applies to network side. dsx1B8ZS(2) for B8ZS line coding. dsx1HDB3(3) for HDB3 line coding. dsx1AMI(5) for AMI line coding. other(6) for any line coding not defined in this object.
dsx1SendCode	Access is read-write: <ul style="list-style-type: none"> <li>dsx1SendNoCode(1) if no test pattern is sent.</li> <li>dsx1SendQRS(5) if near end is sending QRSS test pattern.</li> <li>dsx1Send3in24Pattern(7) if near end is sending 3/24 test pattern.</li> </ul> For "read": <ul style="list-style-type: none"> <li>dsx1SendOtherTestPattern(8) if sending a test pattern other than those defined in this object.</li> </ul> For "write": <ul style="list-style-type: none"> <li>dsx1SendOtherTestPattern(8) sends a 1-in-8 test pattern.</li> </ul>
dsx1CircuitIdentifier	Access is read-write. Circuit name.

Object-Type	Parameters
dsx1LoopbackConfig	<p>Access is read-write:</p> <ul style="list-style-type: none"> <li>dsx1NoLoop(1) if no loopback is in progress.</li> <li>dsx1PayloadLoop (2) if near-end Payload Loopback (PLB) is enabled.</li> <li>dsx1LineLoop(3) if near-end Line Loopback (LLB) is enabled.</li> </ul> <p>For "read":</p> <ul style="list-style-type: none"> <li>dsx1OtherLoop(4) for loopbacks that are not defined in this object.</li> </ul> <p>For "read":</p> <ul style="list-style-type: none"> <li>dsx1OtherLoop(4) if RLB is enabled.</li> </ul>
dsx1LineStatus	<p>dsx1NoAlarm(1) if no alarm present.  dsx1RcvFarEndLOF(2) if far-end LOF (Yellow Alarm).  dsx1RcvAIS(8) if far-end AIS.  dsx1LossOfFrame(32) if near-end LOF (Red Alarm).  dsx1LossOfSignal(64) if near-end LOS.  dsx1LoopbackState(128) if near end is looped.  dsx1OtherFailure(4096) if near-end BER exceeded.  dsx1RcvFarEndLOF and dsx1RcvAIS are supported for AS2000 equipment.</p>
dsx1SignalMode	<p>Access is read only.  none(1) - indicates that no bits are reserved for signaling on this channel.</p>
dsx1TransmitClock Source	<p>Access is read-only.  loopTiming(1) if NET timing is selected.  localTiming(2) if internal (INT) timing is selected.  throughTiming(3) if THROUGH timing is selected.</p>
dsx1Fd1	<p>Access is read-only.  dsx1Ansi-T1-403(2) is always on.  dsx1Att-54016(4) is always on.</p>

**NOTE:** To determine the clock source for Verilink products, see the Verilink enterprise MIBs.

Table 5 DS1 Near End Group 2

Object-Type	Parameters
dsx1CurrentIndex	A number calculated with the formula in <a href="#">Calculating the SNMP ifIndex</a> , on page 2.
dsx1CurrentSESS	The number of Severely Errored Seconds in the current 15-minute interval.
dsx1CurrentSEFSs	The number of Severely Errored Framing Seconds in the current 15-minute interval.
dsx1CurrentESS	The number of Errored Seconds in the current 15-minute interval.
dsx1CurrentUASs	The number of Unavailable Seconds in the current 15-minute interval.
dsx1CurrentCSSs	0 (Not supported).
dsx1CurrentPCVs	0 (Not supported).

<b>Object-Type</b>	<b>Parameters</b>
dsx1CurrentLEs	The number of ES-L in the current 15-minute interval.
dsx1CurrentBESs	The number of Bursty Errored Seconds in the current 15-minute interval.
dsx1CurrentDM	0 (Not supported).
dsx1CurrentLCVs	0 (Not supported).

Table 6 Near End Group 3

Object-Type	Parameters
dsx1IntervalIndex	A number calculated with the formula in <a href="#">Calculating the SNMP ifIndex</a> , on page 2.
dsx1IntervalNumber	A number between 1 and 96, where 1 is the most recently completed 15-minute interval and 96 is the least recently completed 15-minute interval. If the interval is not valid, nothing will be returned.
dsx1IntervalESSs	The number of Errored Seconds in one of the previous 96 15-minute intervals.
dsx1IntervalSESSs	The number of Severely Errored Seconds in one of the previous 96 15-minute intervals.
dsx1IntervalSEFSs	The number of Severely Errored Framing Seconds in one of the previous 96 15-minute intervals.
dsx1IntervalUASSs	The number of Unavailable Seconds in one of the previous 96 15-minute intervals.
dsx1IntervalCSSs	0 (Not supported).
dsx1IntervalPCVs	0 (Not supported).
dsx1IntervalLESSs	The number of ES-L in one of the previous 96 15-minute intervals.
dsx1IntervalBESSs	The number of Bursty Errored Seconds in one of the previous 96 15-minute intervals.
dsx1IntervalDM	0 (Not supported).
dsx1IntervalLCVs	0 (Not supported).

Table 7 Near End Group 4

Object-Type	Parameters
dsx1TotalIndex	A number calculated with the formula in <a href="#">Calculating the SNMP ifIndex</a> , on page 2.
dsx1TotalESSs	The number of Errored Seconds in the previous 24-hour interval.
dsx1TotalSESSs	The number of Severely Errored Seconds in the previous 24-hour interval.
dsx1TotalSEFSs	The number of Severely Errored Framing Seconds in the previous 24-hour interval.
dsx1TotalUASSs	The number of Unavailable Seconds in the previous 24-hour interval.
dsx1TotalCSSs	0 (Not supported).
dsx1TotalPCVs	0 (Not supported).
dsx1TotalLESSs	The number of ES-L in the previous 24-hour interval.
dsx1TotalBESSs	The number of Bursty Errored Seconds in the previous 24-hour interval.
dsx1TotalDM	0 (Not supported).
dsx1TotalLCVs	0 (Not supported).

**DS1 Far End Group** The DS1 Far End group only applies to the SCC controller module.

**Table 8 Far End Group1**

<b>Object-Type</b>	<b>Parameters</b>
dsx1FarEndCurrentIndex	A number calculated with the formula in <a href="#">Calculating the SNMP ifIndex</a> , on page 2.
dsx1FarEndTimeElapsed	The number of seconds that have elapsed since the beginning of the far end current error-measurement period.
dsx1FarEndValidIntervals	The number of previous far end intervals for which valid data was collected. The value is 96 unless the interface was brought online within the last 24 hours, in which case the value will be the number of complete 15-minute far-end intervals since the interface has been on-line.
dsx1FarEndCurrentESs	The number of Far End Errored Seconds in the current 15-minute interval.
dsx1FarEndCurrentSESs	The number of Far End Severely Errored Seconds in the current 15-minute interval.
dsx1FarEndCurrentSEFSS	The number of Far End Severely Errored Framing Seconds in the current 15-minute interval.
dsx1FarEndCurrentUASS	The number of Far End Unavailable Seconds in the current 15-minute interval.
dsx1FarEndCurrentCSSs	0 (Not supported).
dsx1FarEndCurrentLESs	The number of Far End ES-L in the current 15-minute interval.
dsx1FarEndCurrentPCVs	0 (Not supported).
dsx1FarEndCurrentBESs	The number of Far End Bursty Errored Seconds in the current 15-minute interval.
dsx1FarEndCurrentDM	0 (Not supported).

**Table 9 Far End Group 2**

<b>Object-Type</b>	<b>Parameters</b>
dsx1FarEndIntervalIndex	A number calculated with the formula in <a href="#">Calculating the SNMP ifIndex</a> , on page 2.
dsx1FarEndIntervalNumber	A number between 1 and 96, where 1 is the most recently completed 15-minute interval and 96 is the least recently completed 15-minute interval. If the interval is not valid, nothing will be returned.
dsx1FarEndIntervalESs	The number of Far End Errored Seconds in one of the previous 96 15-minute intervals.
dsx1FarEndIntervalSESs	The number of Far End Severely Errored Seconds in one of the previous 96 15-minute intervals.
dsx1FarEndIntervalSEFSS	The number of Far End Severely Errored Framing Seconds in one of the previous 96 15-minute intervals.

Object-Type	Parameters
dsx1FarEndIntervalUASs	The number of Far End Unavailable Seconds in one of the previous 96 15-minute intervals.
dsx1FarEndIntervalCSSs	0 (Not supported).
dsx1FarEndIntervalLESSs	The number of Far End ES-L in one of the previous 96 15-minute intervals.
dsx1FarEndIntervalPCVs	0 (Not supported).
dsx1FarEndIntervalBESSs	The number of Far End Bursty Errored Seconds in one of the previous 96 15-minute intervals.
dsx1FarEndIntervalDM	0 (Not supported).

Table 10 Far End Group3

Object-Type	Parameters
dsx1FarEndTotalIndex	A number calculated with the formula in <a href="#">Calculating the SNMP ifIndex</a> , on page 2.
dsx1FarEndTotalIESSs	The number of Far End Errored Seconds in the previous 24-hour interval.
dsx1FarEndTotalSESSs	The number of Far End Severely Errored Seconds in the previous 24-hour interval.
dsx1FarEndTotalSEFSs	The number of Far End Severely Errored Framing Seconds in the previous 24-hour interval. For equipment previous to FFF, this is always 0 (Not supported).
dsx1FarEndTotalUASs	The number of Far End Unavailable Seconds in the previous 24-hour interval.
dsx1FarEndTotalCSSs	0 (Not supported).
dsx1FarEndTotalLESSs	The number of Far End ES-L in the previous 24-hour interval. For equipment previous to FFF, this is always 0 (Not supported).
dsx1FarEndTotalPCVs	0 (Not supported).
dsx1FarEndTotalBESSs	The number of Far End Bursty Errored Seconds in the previous 24-hour interval.
dsx1FarEndTotalIDM	0 (Not supported).

DS1 Fractional Group parameters are not supported in this release.

## Verilink Enterprise MIB

Verilink supports various enterprise-specific MIBs. Specific information on the Verilink private MIBs is included in the CD-ROM Management Section (see [Appendix](#)) and on the 3-1/2" floppy that comes with the SCM and NCM module.

The following table identifies the modules with their corresponding MIB documents:

**Table 11 Verilink Enterprise MIBs**

Module Type	Document
<u>NCM Node</u>	
NCM	general.mib; ncm_veri.mib
DIDCSU	general.mib; ncm_veri.mib
DCSU	general.mib; ncm_veri.mib
DPRI	ncm_isdn.mib; general.mib; ncm_veri.mib
QPRI	ncm_isdn.mib; general.mib; ncm_veri.mib
QUAD	ncm_quad.mib; general.mib; ncm_veri.mib
DS3	ncm_ds3.mib
DDS3	ncm_ds3.mib
TAC 2010/TAC 2130	ncm_csu.mib; general.mib; ncm_veri.mib
DIU 2130	ncm_dsu.mib; general.mib; ncm_veri.mib
DIU/DDS	ncm_dsu.mib; general.mib; ncm_veri.mib
DIU/DBU	ncm_dsu.mib; general.mib; ncm_veri.mib
IMUX	ncm_imux.mib
TAC 2130-S/TAC 2130-T	ncm_csu.mib; ncm_idcsu.mib
DIU 2140	not supported
<u>SCM Node</u>	
SCM	general.mib; ncm_veri.mib
QUAD T1	ncm_quad.mib; general.mib; ncm_veri.mib
M1-3	ncm_m13.mib; general.mib; ncm_veri.mib
IMUX	ncm_imux.mib
QUAD DATA	

Start with the module-specific MIB document—if you do not find the information you need to control the module in the MIB-specific document (for example, ncm-isdn), check the ncm\_general.mib document. The MIB document provides information relating to the objects:

- Access {read-only, read/write, not-accessible}

- Status {mandatory, not mandatory}
- Syntax {specifies values allowed by the object}
- Description {provides explanation}

Summary: For information on managing any specific module, use the table above to access the specific file and determine the information you need.

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## Warnings

The warnings are grouped according to the modules affected. Read this section before using the modules. The only AS3000 module listed is the SCM.

### SCM and NCM

1. Before building circuits or performing any other configuration, go to the **Node Administration Menu** to set the shelf type.

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***NOTE:** If the shelf type is not set before building the circuits or configuring modules, problems may occur with the circuit or configuration databases.*

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2. The read and write community strings should be set correctly to access the node via SNMP.

When configuring the community strings, restrict each string setting to 30 characters or less. The current Craft interface does not protect against inadvertent insertion of strings larger than 30. Such a string insertion may cause unpredictable results.

3. Circuit build is not supported via SNMP for TABS modules.

### IDCSU

For the IDCSU loopback configuration:

1. There is a DTE and a Net port.
2. In the display that comes up for ncmidcsuDiagnosticEntry, only SNMP line 1 is valid for objects ncmidcsuLoopback and ncmdteloops. These objects are not valid in line 2.
3. To configure DTE loopbacks, use ncmdteloops, entry 1.
4. The following object options are displayed under ncmidcsuLoopback but are not valid (the MIB will not be modified):
  - repeater-Loop-Back
  - csu-Equip-Loop-Back
  - deactivate-ELB-and-RLB

- DIU**
1. The “run BER test” option works only for the DIU 2130 module and not for the DIU/DBU or DIU/DDS modules.
  2. For the DIU 2130, Test-511 and Test-2047 options are displayed as available via SNMP. These options are not yet functional. This will be adjusted in a future release.
  3. The “BEC” test option available at the craft interface is not yet supported via the SNMP.
- DIU/DDS**
1. For the DIU/DDS, the option to select nonlatching-dds-loop for the ncmddslatchingloopbacktype is not supported. If this option is selected, the message “no response from device” displays and the request is ignored by the module.
  2. The DDS Non-latching up and the DDS Non-latching down are not applicable to the DBU’s 56k DDS loopback operation. The message “Bad Value” displays if these options are chosen as the operation options using HP OpenView™.
  3. The DDS Latching loopback and DDS Latching loopback Device Name are not supported under the ncm\_dds table. The status conditions are available under the ncm\_dsu table.
- ISDN**
1. ISDN call profiles may be modified but not created using SNMP.
  2. Select ncmPRICPSetCallProf to send the desired changes to the ISDN module.
  3. While changing ISDN configuration information in the SNMP matrix, the data is not sent to the module for storage until the ncmPRICPSetCallProf is selected in the line of the matrix that has been modified.
- TAC**
1. The options ncmcsuAlarmSetDelay and ncmcsuAlarmClearDelay are not supported for the TAC module.
  2. Entering Repeater Loop Timeout via SNMP has the following behavior:  
 Entering a timeout less than or equal to 60 seconds produces a timeout of the specified number of seconds. For example, entering a timeout of 45 seconds produces a timeout of 45 seconds.  
  
 As the number of seconds entered exceeds 60 seconds, the amount of seconds exceeding 60 adds a corresponding amount of *minutes* to the delay. Entering 61 causes a 2-minute timeout and entering 62 causes a 3-minute timeout. Entering 63 causes a 4-minute timeout, and so on.

