Dialogic®

SNMP Agent Software for Dialogic® Host Media Processing Software

Administration Guide

March 2008

Publication Date: March 2008

Document Number: 05-2488-003

Contents

Contents

Figures

Tables

Revision History

This revision history summarizes the changes made in each published version of this document.

Document No.	Publication Date	Description of Revisions
05-2488-003	March 2008	Made global changes to reflect Dialogic brand and changed title to "SNMP Agent Software for Dialogic® HMP Software Administration Guide."
05-2488-002	August 2006	Stopping and Restarting the System: Added a note about Boardserver to Requirements.
05-2488-001	December 2005	Initial version of document. Much of the information contained in this document was previously published in the *SNMP Agent Software for Windows Administration Guide*, document number 05-1849-002 and the *SNMP Agent Software for Windows Operating Systems Administration Guide*, document number 05-1886-001.

About This Publication

The following topics provide information about this publication:

- Purpose
- Applicability
- Intended Audience
- How to Use This Publication
- Related Information

Purpose

This publication provides guidelines for using the SNMP agent software, which provides remote (or local) monitoring and limited control of the Dialogic® Host Media Processing (HMP) Software and the supported Dialogic® DNI and DSI boards over an IP network.

Applicability

This document version (05-2488-003) is published for Dialogic® Host Media Processing Software Release 3.0WIN.

Intended Audience

This publication is written for the following audience:

- System Integrators
- Independent Software Vendors (ISVs)
- Original Equipment Manufacturers (OEMs)
- Telephony Equipment Manufacturers (TEMs)
- Network Equipment Providers

How to Use This Publication

Refer to this publication for information about installing, configuring, and using the SNMP agent software.

This publication assumes that you are familiar with Simple Network Management Protocol (SNMP), a standard IP network mechanism for exchanging management information between an SNMP agent and a network management station.

The information in this guide is organized as follows:

- Chapter 1, "Administration Overview" provides an overview of SNMP, the preparation needed to use the SNMP agent, and the administration tasks that can be performed using the SNMP agent software.
- Chapter 2, "System Requirements" covers hardware and software requirements specific to SNMP.
- Chapters 3 through 9 describe how to perform various administrative tasks.
- Chapters 10 through 16 are reference chapters that provide details about the supported MIBs.
- The Glossary provides a definition of terms used in this guide.

Related Information

See the following for additional information:

- *http://www.dialogic.com/manuals/* (for Dialogic® product documentation)
- *http://www.dialogic.com/support/* (for Dialogic technical support)
- *http://www.dialogic.com/* (for Dialogic® product information)

Administration Overview 1

This chapter lists the administration tasks that can be performed using the SNMP agent software with the Dialogic® Host Media Processing (HMP) Software, and lists the Management Information Bases (MIBs) that can be used with this software.

1.1   Common Administration Tasks

This section describes administration tasks you can perform using SNMP with the Dialogic® HMP Software.

SNMP stands for Simple Network Management Protocol (SNMP), a standard IP network mechanism for exchanging management information between an SNMP agent and an SNMP manager. SNMP was designed to manage routers, switches and other headless network devices. SNMP provides an industry standard interface for fault and monitoring support.

The SNMP agent provides remote (or local) monitoring and limited control of boards or Dialogic HMP Software resources over an IP network. The SNMP agent resides on an IP stack and responds to SNMP "gets" and "sets" from an SNMP manager. The SNMP agent sends SNMP traps. The objects that an SNMP agent can manipulate are defined in MIBs. Refer to the Glossary and Figure 1 for more information about SNMP architecture and the components that comprise it.

Figure 1. General SNMP Architecture
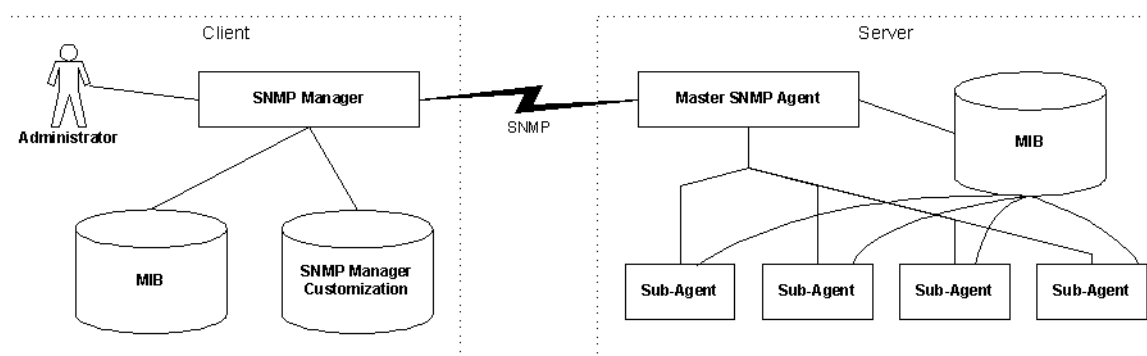
After you complete the preparations for using the SNMP agent software given in Chapter 2, "System Requirements", you can perform the following administrative tasks:

Collecting Information About Dialogic® Boards
The Dialogic® DM3 Extended Platform MIB is used to collect configuration information from a managed node regarding Dialogic® boards and their subassemblies and processors.

Monitoring DS-1 Lines
> A management station can monitor trunk lines that are managed by the DS-1 MIB module.

Monitoring ISDN Interfaces
> Using general SNMP monitoring methods, there are several ways to monitor the ISDN interfaces for fault detection.

Monitoring the Status of Dialogic® Boards
> The status of Dialogic® boards can be monitored using the Hardware Information MIB.

Resolving an Application Failure
> If a telephony application fails, the remote monitoring and control facilities provided by the SNMP agent can help you to resolve the problem. This chapter describes how to resolve an application failure.

Stopping and Restarting the System
> This chapter provides information on using the dlgHiIdentServiceStatus OID in the *dlghwinf.mib* MIB to stop and restart (reset) the system.

Using Traps to Monitor the System
> This chapter provides general information about using traps and a detailed description of each trap supported by this version of the SNMP agent software.

1.2   Administration Tools

This section defines MIBs and lists the MIBs supported for the Dialogic HMP Software.

A MIB (Management Information Base) is a specification containing definitions of management information so that networked systems can be remotely monitored, configured and controlled.

A MIB resides on a managed node. The MIB definition sets the limits on what can be managed. The MIB defines which variables or parameters will be accessed as well as how each value will be identified, encoded, and interpreted. A MIB contains *objects* (units of management information) divided into *scalars* and *tables*, which are identified by object identifiers (OIDs). These objects are exchanged between the managed node and the SNMP manager. Each MIB defines three types of OIDs: read-only OID, read-write OID, and traps.

MIBs can be either private (enterprise) MIBs or standard MIBs. SNMP agent software currently supports mostly private MIBs. The SNMP agent software supports the MIB modules listed at the end of this section.

For a definition of terms related to MIBs and SNMP, refer to the Glossary. For an illustration of SNMP architecture, refer to Figure 1, "General SNMP Architecture", on page 11.

This document provides a reference chapter describing each MIB that is relevant to Dialogic HMP Software.

Note: Throughout the reference chapters, "Dialogic HMP Software resources" is synonymous with "boards."

The following MIBs are used with this Dialogic HMP Software Release:

Dialogic® DM3 Extended Platform MIB Module Reference
> The proprietary Dm3ExtPlatform MIB module is an extension of the Board Identification Table (dlgHiIdentTable). This MIB contains detailed information about the configuration of hardware on Dialogic boards.

Proprietary DS-1 MIB Module Reference
> The proprietary DS-1 MIB module provides management stations with an interface to review DS-1 trunk lines, monitor their status, and report fault conditions using an SNMP trap. It also provides a 24-hour historical fault metrics log in the current, interval, and total tables.

Standard DS-1 MIB (RFC 2495) Reference
> The DS-1 MIB specified in RFC 2495 is a media-specific extension of the MIB-2 module.

Hardware Information MIB Module Reference
> The Hardware Information module provides a board inventory table and general parameters regarding the Dialogic HMP Software system services. This module permits the monitoring of board and Dialogic HMP Software resource status changes and provides status change notification using SNMP traps.

Proprietary ISDN MIB Module Reference
> The proprietary ISDN MIB module provides management stations with an interface to review ISDN B- and D-channels, monitor their status, and report fault conditions using SNMP traps.

Standard MIB-2 Module (RFC 1213) Reference
> The MIB-2 module is an industry standard MIB and a convention for monitoring interfaces of various protocols and hardware implementations.

R4 Resource MIB Module Reference
> The proprietary R4 Device Information MIB provides configuration and status information for devices using the R4 API on a managed node.

System Requirements 2

This section covers hardware and software requirements specific to SNMP and includes the following sections:

2.1 Requirements for Managed Nodes

To use the SNMP agent software on managed nodes, the following hardware and software is required:

- A version of the operating system supported by the Dialogic® Host Media Processing (HMP) Software release. Refer to the Dialogic® Host Media Processing (HMP) Software Installation Guide for instructions.
- Windows® SNMP Service. Refer to the Dialogic® HMP Software Installation Guide for instructions.
- A Dialogic HMP Software release. Refer to Assumptions and Prerequisites in the Software Installation Guide for the Dialogic HMP Software release and ensure that all prerequisites for installing the Dialogic HMP Software release have been met. When installing the Dialogic HMP Software, select SNMP from the installation menu. Refer to the Dialogic® HMP Software Installation Guide for complete instructions.
- The hardware requirements for the SNMP agent software are the same as for the Dialogic® HMP Software release. See the Release Guide.

2.2 Requirements for Management Stations

To use the SNMP agent software with management stations, the following software is required:

- Windows® SNMP Service. Refer to the Dialogic® HMP Software Installation Guide for instructions.

    Note: If you uninstall and reinstall the Windows® SNMP Service on the managed node, you will also have to uninstall and reinstall the SNMP agent software.

- A third-party manager such as HP OpenView.
- MIBs.

Collecting Information About Dialogic® Boards   3

The Dialogic® DM3 Extended Platform MIB is used to collect configuration information from a managed node regarding Dialogic® boards and their subassemblies and processors. The dlgDm3epOperStatus column and the dlgDm3epOperStatusChange trap allow a management station to monitor boards for processor health information, providing a gathering of finer-grained fault information from Dialogic boards than what the Board Identification Table provides through its operational status column.

For more information, refer to Chapter 10, "Dialogic® DM3 Extended Platform MIB Module Reference".

Monitoring DS-1 Lines 4

This chapter discusses how to monitor DS-1 lines and includes the following topics:

4.1 Using the Standard Versus the Proprietary DS-1 MIB

The standard DS-1 MIB is similar to the proprietary DS-1 MIB and can be used in similar ways. A few major differences exist between the standard DS-1 MIB in RFC2495 and the proprietary DS-1 MIB that create minor differences in their usages.

Most notably, the standard DS-1 MIB does not include an alarms table. All line status gathered from the standard DS-1 MIB must be obtained by using the dsx1LineStatus column object in the configuration table. A correspondence exists between the proprietary DS-1 MIB alarms table and the standard dsx1LineStatus object. Red alarms are indicated in the dsx1LineStatus object when the 6th least significant bit is set to 1. Yellow alarms are indicated in the dsx1LineStatus object when the 2nd least significant bit is set to 1. No alarms exist when neither the yellow nor the red bits are set to 1, although other bits in the dsx1LineStatus object may indicate conditions that do not fit into either the red or yellow alarm condition.

The standard MIB has more enumerated values for configuration table columns, which allows the standard MIB to indicate more types of line configurations. For instance, in the proprietary MIB, there are no dsx1LineType values for T-1 Extended Super Frame line type, but in the standard MIB there is a value for this configuration.

For more information about these MIBs, refer to Chapter 12, "Proprietary DS-1 MIB Module Reference" or Chapter 13, "Standard DS-1 MIB (RFC 2495) Reference".

4.2 Guidelines for Monitoring DS-1 Lines

There are two options available to a management station that allows it to monitor trunk lines managed by this MIB module. The most high-level option is to monitor the DS-1 Alarm table for changes in the Alarm Type column. Using this method, a management station can determine high-level shifts in line service status. For instance, if a management station observes that a trunk line's alarm type changes from no-alarm to red, the conclusion can be made that a severe fault has been detected for that trunk.

A more detailed way of monitoring trunk line service status is to poll the Line Status column in the DS-1 Trunk Configuration table. Each entry in this column is a bitmap that indicates very specific fault conditions, but does not make any interpretation on what changes in these faults mean. This gives the management station flexibility in making its own policy decisions on what constitutes severe and non-severe alarm conditions.

A management station may use the Line Status trap as a trigger to poll these two columns. This can lead to a more efficient and timely alert to the user when a trunk fault is observed. For example, suppose a management station is configured to poll the Line Status column in the configuration table every five minutes. If the management station does not take advantage of the Line Status trap, a line fault would only be detected on the expiration of every five-minute interval. If the management station is configured to poll when it receives the line status trap, it can take action right away instead of waiting up to five minutes for its polling interval to expire.

Monitoring ISDN Interfaces 5

This chapter describes how to monitor Integrated Services Digital Network (ISDN) interfaces. For additional information, refer to Chapter 14, "Proprietary ISDN MIB Module Reference".

Using general SNMP monitoring methods, there are several ways to monitor the ISDN interfaces for fault detection. The first way requires that the management station poll the managed node for the ISDN tables at regular intervals. When a change in status has been detected, the management station can take appropriate action to notify the user of a detected fault.

The second way is more efficient, but less reliable. This method requires the management station to act on received ISDN traps (see Section 14.5, "ISDN Traps", on page 50). Each time a B- or D-channel changes state, a trap is generated by the agent and sent to the management station. This trap contains the index and status of the channel that changed state. An important limitation of SNMP version 1 traps is that they are sent using an unreliable delivery method.

A third, more common approach that overcomes the unreliability of trap reception is to use trap-based polling. Trap-based polling requires the management station to poll the ISDN tables at regular intervals. This polling guarantees that a fault condition will be detected at each interval boundary. The reception of the ISDN traps optimizes the polling by forcing the end of an interval at the reception of a trap causing the fault to be detected immediately and the next polling interval to begin.

When providing fault detection capabilities on the management station, the most important table columns are the dlgIsdnSigLapdOperStatus and dlgIsdnBearerStatus columns. Because there are far more B-channels on a system than D-channels, it may only be practical to poll the dlgIsdnSigLapdOperStatus columns to detect faults. Inspecting the status of individual B-channels should only be performed when the B-channel is of particular interest, such as diagnosing a call connection.

Monitoring the Status of Dialogic® Boards   **6**

This chapter provides information about monitoring the status of Dialogic® boards using the Hardware Information MIB. For more information about the Hardware Information MIB, refer to Chapter 11, "Hardware Information MIB Module Reference".

The core of the Hardware MIB module is the Board Identification Table (dlgHiIdentTable), which contains a row for every board installed and configured on the managed node. Using this table, you can determine and verify which boards are configured on the node, and whether or not a board is working from a high-level point of view. Other MIB modules, such as the proprietary DS-1 MIB module and standard DS-1 MIB module, use the indices of the Board Identification Table to link subdevices, such as DS-1 trunk lines, to their host boards, such as an Dialogic® DNI board.

An example of the output from the Board Identification Table follows:

dlgHiIdent-Index	dlgHiIdent-Model	...	dlgHiIdent-AdminStatus	dlgHiIdent-OperStatus
1	Dialogic® DSI162HMP	…	started(2)	ok(2)
2	Dialogic® DNI601TEPHMP	…	stopped(3)	ok(2)
3	Dialogic® DNI300TEPHMP	…	started(2)	ok(2)
4	Dialogic® DNI300TEPHMP	…	stopped(2)	failed(4)

In this example configuration, the managed node contains four boards indexed from 1 to 4, sequentially. The first three boards are operating normally, the second of which is a Dialogic® DNI board in a stopped state. The fourth board is indicating that it has failed some operation and may need to be replaced.

The SNMP manager may poll this table periodically to determine if any board status changes have occurred and then notify the user accordingly, perhaps with a pop-up message or alert beep.

Suppose the user has stopped the second board and wishes to diagnose the board, check the results, and then restart the board after verifying the board is healthy. The following operations are performed to achieve this end:

1. An SNMP-get request is sent to the dlgHiIdentAdminStatus.2 object which returns *stopped(3)*, matching what is seen in the example table. Note that the ".2" suffix is added to specify which row in the dlgHiIdentAdminStatus column the request is targeting. In this case, we are interested in the second board, which has an index of '2'.

2. An SNMP-set request is sent to dlgHiIdentAdminStatus.2 object with the value *diagnose(5)*. The agent will invoke the `dm3post` tool, which begins running diagnostics on the board. (For more information on the `dm3post` tool, refer to the Diagnostics Guide for the release.)

3. The SNMP manager now polls dlgHiIdentAdminStatus.2 until it changes from *diagnose(5)* back to *stopped(3)*. When this occurs, the POST diagnostics have completed.

4. To view the results of the diagnostics, the manager issues a SNMP-get request on dlgHiIdentErrorMsg.2. The manager again uses ".2" to indicate the second row in the table. When the error message is returned, it will contain a message detailing the results of the POST. If the diagnostic fails, the operational status is set to failed. When the diagnostic completes, a trap is always generated. If it completed in failure, the operational status in the trap will be *failed*.

5. Finally, the manager starts the board by issuing an SNMP-set request to dlgHiIdentAdminStatus.2 with the value *start-pending(5)*. After starting, the dlgHiIdentAdminStatus.2 object will indicate *started(2)* or the dlgHiIdentOperStatus.2 object will return a *failed* status indicating the start attempt failed.

Resolving an Application Failure   7

This chapter describes how to resolve an application failure.

If a telephony application fails, the remote monitoring and control facilities provided by the SNMP agent can help you to resolve the problem.

Before you can perform the task described in this chapter, you must do the following:

- Install the Dialogic® Host Media Processing (HMP) Software. (Refer to the Dialogic® HMP Software Installation Guide.)

- Obtain, install, and activate a Dialogic HMP Software license (refer to the Dialogic® HMP Software Administration Guide).

- Start the Dialogic HMP Software: To use the SNMP agent software with Dialogic HMP Software, you need to perform a one-time startup of the Dialogic HMP Software services on the managed node. (After you install the Dialogic HMP Software and reboot, the Dialogic HMP Softare services will start automatically.) Once you have started the Dialogic HMP Software, the Dialogic HMP Software services can be stopped or started from the network management node.

  For information about stopping and starting the Dialogic HMP Software, refer to the Dialogic® HMP Software Administration Guide.

- Compile the MIBs (not always required): The MIBs are installed when you install the Dialogic HMP Software. However, some network management applications also require that you compile the MIBs. If compilation is required, you must compile the Hardware Information MIB (dlghwinf.mib) before compiling other MIBs:.

  Dialogic HMP Software supports the following MIBs:
    - Hardware Information MIB
    - DM3 Extended MIB
    - DS-1 MIB
    - ISDN MIB
    - R4 Device Information MIB

  These MIBs must be installed on the SNMP manager for full SNMP support of Dialogic HMP Software.

When an application fails, take the following diagnostic steps:

1. Verify that all the Dialogic HMP Software resources and supported Dialogic® boards (if used) are still running.

   The dlgHiIdentServiceStatus OID in the Hardware MIB Module (*dlghwinf.mib*) MIB indicates the current status of the Dialogic HMP Software resources and supported boards.

   If the HMP resources and supported boards are running, proceed to the next step. If the Dialogic HMP Software resources and supported boards are not running, restart them using the dlgHiIdentServiceStatus OID.

2. Verify that the Dialogic HMP Software resources and supported boards used by the application are still running.

   The dlgHiIdentOperStatus OID in the Hardware Information MIB Module (*dlghwinf.mib*) MIB indicates the current status of the HMP resources and supported boards. The possible values for this OID are *OK*, *Failed*, *Degraded*, and *Other.*

   If the Dialogic HMP Software resources and supported boards are not running, reset the system; for instructions, see Chapter 8, "Stopping and Restarting the System".

Stopping and Restarting the System   **8**

This chapter provides information about using the dlgHiIdentServiceStatus OID in the *dlghwinf.mib* MIB to stop and start (reset) the Dialogic® Host Media Processing (HMP) Software.

Note: For information about starting the Dialogic® HMP Software system for the first time, starting the Dialogic HMP Software system after initial startup, and stopping the system (without the use of SNMP), refer to the Dialogic® HMP Software Installation Guide and Administration Guide

8.1   Requirements

Before you can stop and restart the system using the SNMP agent software, you must do the following:

- Install the Dialogic® Host Media Processing (HMP) Software. (Refer to the Dialogic® HMP Software Installation Guide.)

- Obtain, install, and activate a Dialogic HMP Software license (refer to the Dialogic® HMP Software Administration Guide).

- Start the Dialogic HMP Software system: To use the SNMP agent software with Dialogic HMP Software, you need to perform a one-time startup of the Dialogic HMP Software system on the managed node. Once you have started the system, the system can be stopped or started from the network management node.

For information about starting and stopping the system, refer to the Dialogic® HMP Software Administration Guide. This Administration Guide explains how the Dialogic® Configuration Manager (DCM) is used to start and stop the system.

For additional information about DCM, consult the DCM online help by pressing F1 when the DCM Main window is active.

Note: The Boardserver service (*BoardServer.exe* service for the SNMP Agent Software functionality) is not a part of the DCM start-up sequence. It only can be started manually or can be set to start automatically when the Dialogic HMP Software system starts. In both cases, if Boardserver service was running prior to stopping the Dialogic HMP Software system, it has to be manually restarted.

8.2   Stopping and Restarting the System

Some situations require resetting the Dialogic HMP Software system. Resetting the system is done "outside" of the SNMP agent software. To reset the system, follow these steps:

1. Re-route telephone activity away from the malfunctioning system to another system, or take each port, time slot, channel, or station line out of service as they become available.

2. Stop all telephony applications.

3. Stop and restart all boards and Dialogic HMP Software resources using the dlgHiIdentServiceStatus OID in the *dlghwinf.mib* MIB.

4. Restart the telephony applications.

5. Re-route telephone activity back to the system and monitor the status to verify the functioning of the line or port.

Note: Shutting down the telephony application will disconnect any calls in progress. Be sure to wait for inactivity on any line before taking it off hook.

Using Traps to Monitor the System — 9

This chapter provides general information on using traps and a detailed description of each trap supported by this version of the SNMP agent software. This section contains the following topics:

9.1 Controlling the Occurrence of Traps

A trap is a notification that is sent by the SNMP agent when an event occurs on the managed node. When your network management application receives a trap, it may indicate that your telephony application or the Dialogic® Host Media Processing (HMP) Software platform on the managed node entered a condition that requires diagnostic treatment.

The network management station may not receive all the traps described in the next subsection (Responding to Events That Trigger Traps). The traps your network management station receives are affected by the Dialogic® HMP Software device driver's event mask. The event mask can be changed either via the SNMP agent software using the dlgDsx1SwEvtMskValue OID or by an application that accesses the device driver. In either case, the dlgDsx1SwEvtMskTrap informs you when the event mask has been modified.

9.2 Responding to Events That Trigger Traps

This subsection describes the traps supported by this version of the SNMP agent software. These descriptions indicate the event that triggers the trap and include brief suggestions for responding to these events.

It is possible to use the SNMP agent software to monitor boards and to determine if a board has failed. If a board has failed, you can diagnose the board to determine if the hardware is good. If it is, the board can then be restarted. If the diagnosis indicates that the board is bad, then the board must be replaced. If you are using an SNMP manager that can be extended through programming, you can program the manager to diagnose the board when a fault is detected, and either restart the board or notify a person through email or other communication methods.

If there is a hardware fault on your board, the steps described under dlgHiBoardStatusChanged (below) can help you diagnose the issue. This process will not detect a failure in software, but will allow you to restart your system if the software has caused the fault and the hardware is good. Also, if there is a Signal Processor fault, it is possible the power on self test (POST) will not detect this.

dlgHiBoardStatusChanged

MIB: Hardware Information MIB Module (*dlghwinf.mib*)

Condition: Change of a board state from *OK* to *failed* or from *failed* to *OK*

Remarks: This OID identifies the board to which it applies by the board's device name. A trap is also sent if the administrative status changes other than by a set. If the board's state changes from *OK* to *failed*, perform the following steps:

1. You (or an automated program) should stop the board that has failed. The board is stopped through the use of the dlgHiIdentAdminStatus. This can be found in the dlghwinf.mib. You would set this value to stop pending state (7). This will stop the board.

2. Once the board is stopped, you can run the diagnose function. This is done by setting the dlgHiIdentAdminStatus to diagnose (5). While the board is in the diagnose state, it will not accept any other commands. The diagnose state runs the full power on self test (POST). For more information about POST, refer to the Diagnostics Guide for the release.

3. Once the POST is complete, a trap will be sent to the SNMP manager. The dlgHiBoardStatus changed trap will be received. If there is an error during POST, it will be sent back in the trap.

4. If the POST did not return an error, then you can start the board. This is done by setting the dlgHiIdentAdminStatus to start-pending. Another trap will be sent up once the board has moved into the Started state.

5. If the POST did return an error, this means the board failed the POST and should be replaced. It should not be started.

Note: If this process is automated, certain safeguards should be put in place to make sure a board is not restarted too often. For example, if there is a software failure that causes the board to fail immediately after starting, it is possible that the process will continually restart the board. This will cause a large performance hit on the system. When automating the process, it is important to keep a counter on how often a board is restarted. This counter should be checked, and if a board is started too often within a specified amount of time, the restart for that board should be disabled. This will have to be implemented by the programmer as part of the process automation.

dlgHiTestTrap

MIB: Hardware Information MIB Module (*dlghwinf.mib*)

Condition: Setting of dlgHiIdentTestTrapEnable 0 to a value of 1.

Remarks: This trap can be sent by setting the dlgHiIdentTestTrapEnable OID to a value of 1 (using any MIB browser) to verify that the hardware agent is capable of communicating with the network management station.

dlgDsx1Alarm

MIB: Digital Service Level 1 (DS-1) Line Interface (*dlgds1.mib*)

Condition: Occurrence of new alarm for T-1 or E-1 interface (alarms include Red (101), Blue (102), Yellow (103), E-1 (104), and end of alarm (100)).

Remarks: In most cases, an alarm indicates a problem with either the network trunk or with the configuration of the board's front-end. For example, an alarm might indicate that the board

is configured to provide clocking, which would conflict with the clocking provided by the network trunk.

dlgIsdnDChanged

MIB: ISDN Configuration and Statistics (*dlgisdn.mib*)

Condition: Change in the operational status of a D-channel's link access protocol (LAPD).

Remarks: This trap may or may not indicate a problem depending on its value for a given event.

dlgIsdnBChanged

MIB: ISDN Configuration and Statistics (*dlgisdn.mib*)

Condition: Change in the operational status of a B-channel.

Remarks: This trap may or may not indicate a problem depending on its value for a given event.

Dialogic® DM3 Extended Platform MIB Module Reference   **10**

This chapter describes the proprietary Dialogic® DM3 Extended Platform MIB module.

The proprietary Dm3ExtPlatform MIB module is a hardware-specific extension of the Board Identification Table (dlgHiIdentTable). This MIB contains detailed information about the configuration of hardware on Dialogic® boards. This information is organized into three tables:

- dlgDm3ExtBrdLevelTable - Each row in the dlgDm3ExtBrdLevelTable table corresponds to a row in the Board Identification Table, so the indices of rows in the former table match indices of corresponding rows in the latter table.

- dlgDm3ExtSubAssemblyTable - The dlgDm3ExtSubAssemblyTable table contains entries that represent board subassemblies, and each row can be mapped back to its parent board in the dlgDm3ExtBrdLevelTable table.

- dlgDm3ExtProcTable - The dlgDm3ExtProcTable table contains rows that represent each processor on each subassembly of each board. Each entry in the dlgDm3ExtProcTable table can be mapped back to a parent subassembly in the dlgDm3ExtSubAssemblyTable table. Each processor maps to a board by way of the subassembly table.

The dlgDm3ExtBrdLevelTable table contains only configuration information that includes the following:

- shelf ID
- FCD configuration file name
- PCD configuration name
- PCD configuration version

The dlgDm3ExtSubAssemblyTable table contains only configuration information that includes the following:

- subassembly type
- serial number
- index of parent board in the dlgDm3ExtBrdLevelTable table

The dlgDm3ExtProcTable table contains configuration and status information for each processor, and columns exist that provide the following information:

- processor type
- run-time kernel version
- boot kernel version
- operation status

In addition to the its three tables, the dlgDm3ExtPlatform MIB module also defines a trap, dlgDm3epOperStatusChange, which is generated whenever the processor operation status value changes for a processor in the dlgDm3ExtProcTable table.

Hardware Information MIB Module Reference   **11**

This chapter describes the Hardware Information (HWINF) MIB Module and includes the following topics:

11.1   Description

The Hardware Information module provides a board inventory table and general parameters regarding the Dialogic® Host Media Processing (HMP) Software system services. This module permits the monitoring of board status changes and provides status change notification using SNMP traps. It also provides the capability to start or stop individual Dialogic® boards and to start or stop all boards in the system.

The Hardware MIB module contains the following groups:

- MIB Revision Group (dlgHiMibRev)
- OS Common Group (dlgHiOsCommon)
- Board Identification Group (dlgHiIdent)

11.2   Guidelines

You can use the Hardware Information MIB to monitor the status of Dialogic boards. Refer to Chapter 6, "Monitoring the Status of Dialogic® Boards".

11.3   MIB Revision Group (dlgHiMibRev)

This group contains general revision and condition information and is comprised of:

- major revision number (dlgHiMibRevMajor): Indicates the major revision of the HWINF MIB module.
- minor revision number (dlgHiMibRevMinor): Indicates the minor revision of the HWINF MIB module.

- dlgHiMibCondition: Indicates the MIB status for this module. It will indicate *ok* if the MIB module can function properly or *failed* otherwise. When the agent starts up, this object initially indicates *failed* until the agent completes self-initialization.

11.4 OS Common Group (dlgHiOsCommon)

This group contains the following three scalar objects:

- common polling frequency (dlgHiOsCommonPollFreq): This scalar object controls the global poll frequency. The current implementation of the SNMP agents does not support this variable, and setting its value to a new frequency has no effect on the run-time state of the agents.

- log enable (dlgHiOsLogEnable): This scalar object is not implemented. Network management stations (NMS) or other SNMP managers should handle logging any trap or status changes.

- test trap enable (dlgHiOsTestTrapEnable): Setting this scalar object to '1' causes the SNMP agent to send a test trap to all configured trap destinations. Reading this object always returns '0' as result.

11.5 Board Identification Group (dlgHiIdent)

The Board Identification Group contains the following:

- Board Identification Table (dlgHiIdentTable)
- Board Identification Table Size (dlgHiIdentNumberOfDevices)
- Service Status Object
- Service Change Date
- Global Trap Mask

The following sections describe each item.

11.5.1 Board Identification Table (dlgHiIdentTable)

The Board Identification Table contains a row entry for each board device installed on the managed node. It has read-only attribute columns that describe the board attributes (IRQ, firmware name, serial number, etc.) and the board operational status. It has mutable columns that describe the board administrative status and that allow the user to start, stop, or cause a board to perform self-diagnostics.

The following are the columns in the Board Identification Table:

board index (dlgHiIdentIndex): This column contains the indices for this table. All SNMP tables have one or more indices that uniquely identify the row in which they belong. Performing a **get** on this column should always return the same value as the row requested. For example,

```
snmp get dlgHiIdentIndex.2
```
returns 2

- *model name (dlgHiIdentModel)*: This column contains the string name of the board model for each board in the table.

- *family type (dlgHiIdentType)*: This column indicates the CT family type for each board.

- *functional description (dlgHiIdentFuncDesc)*: For each board, this column contains a short description of its purpose.

- *firmware name (dlgHiIdentFWName)*: This column contains the firmware file name for each board in the table.

- *firmware version (dlgHiIdentFWVers)*: This column contains the firmware version for each board in the table.

- *base memory address (dlgHiIdentMemBaseAddr)*: This column contains the memory address for each board's shared RAM space.

- *base I/O address (dlgHiIdentIOBaseAddr)*: This column contains the I/O address for each board that supports this style of interface.

- *interrupt request number (dlgHiIdentIRQ)*: This column contains each board's IRQ number.

- *board ID (dlgHiIdentBoardID)*: This column contains each board's board ID.

- *PCI slot number (dlgHiIdentPCISlotID)*: For each PCI board, this column contains the PCI slot number at which the board is installed. Non-PCI boards return –1 in this column.

- *PCI bus number (dlgHiIdentPCIBusID)*: For each PCI board, this column contains the PCI bus number at which the board is installed. Non-PCI boards return –1 in this column.

- *administrative status (dlgHiIdentAdminStatus)*: Administrative status uses two groups of values. The first group is used to indicate the present condition of the board. The possible values are *started*, *stopped*, and *diagnose*. The state of the board is *diagnose* while the diagnostic is running.

  Note: If a board is in the process of starting or stopping, it will always indicate the state from which it is coming from until the operation is complete.

The second group is made up of three values that are used to change the board state using set operations. These states are *start-pending*, *stop-pending*, and *diagnose*. When a board is in a stopped state, and its administrative status value is set to *start-pending*, the SNMP agent will attempt to start the board. When a board is in a started state, and its administrative status value is set to *stop-pending*, the SNMP agent will attempt to stop the board. If either operation fails, the board's *operational status* (see below) will indicate *failed* and the administrative status will stay at the old value. The *diagnose* state is used to cause a stopped board to run a power-on-self-test (POST). Once in the *diagnose* state, the board cannot be stopped or started until the POST has completed. When the diagnostics complete, the board is placed back into the stopped state, and the diagnostic results are stored in the Board Error Message column (see below).

All transitions in administrative status, except those that are the direct result of a set, cause a trap. So the transition from *stopped* to *diagnose* as the result of a set does not cause a trap. The transition from *diagnose* to *stopped* when the diagnostic finishes *does* cause a trap.

- *operational status (dlgHiIdentOperStatus)*: This column contains the operational status of each board. The operational status can indicate a *failed* or *ok* status. If this column indicates *ok*, then the board is working normally and has responded to all requests as expected. If this column indicates *failed*, then the board is not operating normally and something has caused it to enter a potentially dangerous state. Two conditions exist to cause *operational status* to indicate a *failed* status: the board has stopped responding to routine ping messages or the board

was instructed to start or stop using the administrative status column, and it has failed to do so. In general, a board that is indicating a *failed* status, should be restarted. If the problem persists, the board should be replaced.

- *device change date (dlgHiIdentDeviceChangeDate)*: This column indicates the time and date (in 7-octet format) of when the administrative status of the board last changed.

- *specific group OID (dlgHiIdentSpecific)*: Not used in a meaningful way in this release.

- *board error message (dlgHiIdentErrorMsg)*: This column is used to indicate the last error message for each board. Primarily, it is used to store the results in textual format of a `dm3post` operation (administrative status *diagnose* state). Refer to the Diagnostics Guide for details on `dm3post`.

11.5.2 Board Identification Table Size (dlgHiIdentNumberOfDevices)

This scalar object is type INTEGER and returns the number of boards installed and configured on the managed node. This number corresponds directly with the number of rows present in the Board Identification Table (dlgHiIdentTable). A value of zero indicates that no boards have been installed or configured.

11.5.3 Service Status Object

This scalar object is used to control the entire Dialogic® HMP Software run-time state (i.e., the software program is stopped or started). When it indicates *stopped*, the Dialogic HMP Software run time has not been started. When it indicates *started*, the Dialogic HMP Software run time is loaded and running.

An SNMP manager may set the value of this object to change the run time state of the Dialogic HMP Software. When the manager sets the value to *started*, the Dialogic HMP Software will start and initialize. All configured boards will be downloaded. When the manager sets the value to *stopped*, the Dialogic HMP Software will be stopped and unloaded.

11.5.4 Service Change Date

This scalar object indicates the last time in which the system service was started or stopped though the Service Status Object (dlgHiIdentServiceStatus). The result is in 7-octet format described in the MIB specification.

11.5.5 Global Trap Mask

This scalar object is not implemented and setting its value has no effect.

Proprietary DS-1 MIB Module **12**
Reference

This chapter describes the proprietary DS-1 MIB Module. This MIB contains the following topics:

For information about using this MIB to monitor DS-1 lines, refer to Chapter 4, "Monitoring DS-1 Lines".

12.1   Description

The proprietary DS-1 MIB module provides management stations with an interface to review DS-1 trunk lines, monitor their status, and report fault conditions using an SNMP trap. It also provides a 24-hour historical fault metrics log in the current, interval, and total tables.

Note: **The proprietary DS-1 MIB has been marked as deprecated.** Deprecated status indicates that a MIB is supported in the current release, but support for the MIB may be discontinued in future releases without notice. **If you are now using the proprietary DS-1 MIB, it is highly recommended that you migrate to using the standard DS-1 MIB specified in RFC 2495.** For information about the standard DS-1 MIB specified in RFC 2495, refer to section Chapter 13, "Standard DS-1 MIB (RFC 2495) Reference". Also refer to the RFC 2495 page on the Internet Engineering Task Force web site: *http://www.ietf.org/rfc/rfc2495.txt*

The DS-1 MIB module contains the following tables:

- DS-1 Trunk Configuration Table (dlgDsx1ConfigTable)
- DS-1 Alarm Table (dlgDsx1AlarmTable)
- Metrics Statistics Tables
    - Current Metrics Interval Table (dlgDsx1CurrentTable)
    - Historic Metrics Interval Table (dlgDsx1IntervalTable)
    - Total Metrics Interval Table

12.2   Guidelines

The following is an example of a typical DS-1 Trunk Configuration table:

dlgDsx1-LineIndex	dlgDsx1-LineType	...	dlgDsx1-LineStatus	dlgDsx1-SignalMode
1	dlgDsx1D4	…	1	dlgDsx1Isdn
2	dlgDsx1D4	…	1	dlgDsx1Isdn
3	dlgDsx1D4	…	96	dlgDsx1Isdn
4	dlgDsx1D4	…	96	dlgDsx1Isdn
5	dlgDsx1E1CRC	…	1	dlgDsx1BitOriented
6	dlgDsx1E1CRC	…	1	dlgDsx1BitOriented
…	…	…	…	…

The following is an example of a corresponding DS-1 Alarm Table:

dlgDsx1AlarmIndex	dlgDsx1AlarmType
1	No Alarm
2	No Alarm
3	Red Alarm
4	Red Alarm
5	No Alarm
6	No Alarm
…	…

These two tables contain 6 trunk lines: 4 configured as T-1 lines and 2 as E-1 lines. Two of the T-1 lines show a line status of 96, which is a bitmap that indicates near-end loss-of-frame and loss-of-signal faults. The indices for these two lines are 3 and 4. It is clear in the DS-1 Alarm table provided that the trunks represented by rows 3 and 4 are showing a red state, consistent with the fault indications in the configuration table. To further diagnose the problem, you can try analyzing the metrics counters in the current interval table to determine if the faults may be frame-related, bit-level, etc. The actual analyzing of each metric type to diagnose a difficult-to-diagnose line fault is beyond the scope of this document.

12.3   DS-1 Trunk Configuration Table (dlgDsx1ConfigTable)

The trunk configuration table is identified in the MIB as dlgDsx1ConfigTable. It contains one row entry for each DS-1 trunk line configured for all operational Dialogic® boards in the managed node. When a board is in a stopped state or if a board is unconfigured, its trunk lines will not appear in this table. A trunk line can be verified for correct configuration by requesting its row from this table. A trunk line can be monitored for fault information by polling columns from this table.

Line Index Column (dlgDsx1LineIndex)

This column contains the indices for the table. In general, each line is assigned a unique index with the first line starting from '1' and each successive line being assigned indices in ascending order. It is possible for indices to skip, or to not start at one, such as the case when boards are swapped in and out in CompactPCI-based platforms.

Board Index Column (dlgDsx1HiIdentIndex)

For each trunk line, this column contains the index of the board on which the trunk jack is located (near-side). This index corresponds to the indices in the dlgHiIdentTable (Board Identification Table).

Current Interval Elapsed Time Column (dlgDsx1TimeElapsed)

This column contains the time, in seconds, since the start of the current 15-minute metric interval. When this counter reaches 900, the metrics interval has ended, and it is archived in the Historic Interval table (refer to the section describing the Historic Metrics Interval Table (dlgDsx1IntervalTable)).

Valid Metric Intervals Column (dlgDsx1ValidIntervals)

For each trunk line, this column contains the number of elapsed 15-minute intervals since metrics tracking began. It contains a value between 0 and 96.

Line Type Column (dlgDsx1LineType)

This column contains a value that indicates the type of line the trunk is configured to be. The possible values are:

- D4: A T-1 bit rate introduced by AT&T
- E1-CRC: bit rate associated with E-1 lines

Line Coding Column (dlgDsx1LineCoding)

Note: Do not try to set a different LineCoding. Dsx1LineCoding is not able to set values.

This column contains a value for each line that indicates the type of coding in use. The possible values are:

- JBZS
- B8ZS
- HDLC
- TRANS

Loopback Configuration Column (dlgDsx1LoopbackConfig)

> *Note:* Do not try to set a different LoopbackConfig. Dsx1LoopbackConfig is not able to set values.

Entries in this column indicate the loopback configuration for each line. The possible values are:

- Normal loopback
- Payload loopback
- Line loopback
- Local loopback

Line Status Column

This column can be used to determine the link state of each line in detail. The value contained in each entry is a bitmap that represents the possible conditions that indicate line faults. The bit numbering assumes bit 1 is the least-significant bit (LSB). The bitmap positions have the following meaning:

Bit	Description
1	The line is not indicating any faults
2	The far end is indicating loss-of-frame
3	The near end is sending an alarm indication signal (AIS)
4	The near end is indicating loss-of-frame
5	The near end is indicating loss-of-signal
6	The near end is configured for loopback
7	Time slot 16 of an E-1 line is showing an alarm indication signal
8	Far end is sending an E-1 time slot 16 loss-of-multiframe
9	Near end is sending an E-1 time slot 16 loss-of-multiframe
10	Unclassified failure (other)

Line Signal Mode Column

This column contains the signal mode for each line. The possible values for signal mode are:

- None
- Robbed bit (T-1)
- Bit-Oriented (E-1)
- ISDN

12.4   DS-1 Alarm Table (dlgDsx1AlarmTable)

The DS-1 Alarm table contains an entry for each trunk on every configured and started Dialogic board on a managed node. The Alarm Type column in this table can be polled to determine high-level alarm flag information for DS-1 trunk lines.

Alarm Table Index Column (dlgDsx1AlarmIndex)

This column is the table index. It corresponds directly to each index that exists in the DS-1 Trunk Configuration Table (see Section 12.3, "DS-1 Trunk Configuration Table

(dlgDsx1ConfigTable)", on page 41). For example, if trunk line A is located at index 3 in the configuration table, then it is also represented in the alarm table as index 3.

Alarm Type Column (dlgDsx1AlarmType)

This column contains the current alarm flag for each trunk line. The possible flags values are red, yellow, blue, E-1, and no-alarm. Under normal circumstances, a configured and operational line will indicate the "no-alarm" type. When the alarm type changes to any of the other values, the management station should take the steps necessary to alert the network administrator of a possible trunk fault.

Note: The dlgDsx1TransmitClockSource OID reports a 0 value when a query is issued. The description states that the only values that should be reported are 1,2,3. The dlgDsx1TransmitClockSource OID is not able to use the settable values of 1,2,3.

12.5 Metrics Statistics Tables

During the analysis of a recurring fault, the user may wish to consult current and historic fault metrics. These metrics may provide some insight into the cause of a faulty trunk. The metrics statistics tables present this information to the user.

Each metric measures an instance of a particular kind of fault. The metrics tracked are:

- Errored seconds
- Severely errored seconds
- Severely errored framing seconds
- Unavailable seconds
- Controlled slip seconds
- Path code violations
- Line error seconds
- Bursty error seconds
- Degraded minutes
- Line code violations

  Note: For all Dialogic boards with a public switched telephone network (PSTN) interface, the initial value reported for line code violations (LCVs) is irrelevant, and you should disregard it. The line code violations did happen, but they're normal because of events that occur during initialization. If you sample the metric during the first 15 minutes repeatedly and the count increases, then there are new LCVs being generated. If the line code violation count doesn't increase, then all the LCVs were from initialization. When the line code violation value is updated 15 minutes later (and in subsequent updates), the initialization LCVs will no longer affect the value of this metric.

Each fault for each metric is counted for a fifteen-minute interval. The most current, incomplete interval is stored for each trunk line in the Current Metrics Interval table. After a fifteen-minute interval has expired, the metrics counters in the current table are archived in the Historic Metrics Interval table. A third table, called the Total Metrics Interval table, contains the summation of the metrics counters in all the archived intervals, for each line, in the Total Metrics interval table.

Current Metrics Interval Table (dlgDsx1CurrentTable)

This table contains one index column called dlgDsx1CurrentIndex. Indices in this column correspond one-to-one with the indexed entries of the DS-1 Trunk Configuration table (see).

Historic Metrics Interval Table (dlgDsx1IntervalTable)

The historic metrics interval table contains archived 15-minute intervals for up to the last 24 hours of service. There are 96 15-minute intervals in 24 hours, so this table may contain up to 96 entries for each trunk line.

This table has two index columns. The first index corresponds one-to-one with the indexed entries of the DS-1 Trunk Configuration table. The second index identifies the interval number. The interval number ranges from 1 to 96, with 1 as the most recent interval and 96 as the least recent interval.

Total Metrics Interval Table

The Total Metrics Interval table contains the sum of all interval metrics for each trunk up to the last 24 hours. It has one index column called dlgDsx1TotalIndex. Each index in this column corresponds one-to-one with the indexed entries of the DS-1 Trunk Configuration table.

12.6   Trunk Line Status Trap

This trap is sent whenever an entry in the Line Status column changes value. The trap contains the index into the configuration table of the line affected and the line status bitmap value.

Standard DS-1 MIB (RFC 2495) Reference   **13**

This chapter describes the standard DS-1 MIB (RFC 2495) and contains the following topics:

For information about using this MIB to monitor DS-1 lines, refer to Chapter 4, "Monitoring DS-1 Lines".

13.1   Description

The DS-1 MIB specified in RFC 2495 is a media-specific extension of the MIB-2 module (see Chapter 15, "Standard MIB-2 Module (RFC 1213) Reference"); in particular the Interfaces Table (ifTable). It contains a configuration table and three metrics statistics tables. The configuration table is called dsx1ConfigTable, and it contains information such as line coding and line status. The metrics statistics tables track fault counters for fifteen-minute intervals. The current table (dsx1CurrentTable) shows the metrics information for the current interval. The interval table (dsx1InterfaceTable) shows the metrics information for the ninety most recent intervals (24 hours). The total table shows the cumulative sum for all the intervals in the interval table, including the interval in the current table.

Like tables in other media-specific MIBs, the interface number of the DS-1 line indexes the DS-1 MIB tables. These indices correspond to the indices of the same interfaces in the Interfaces Table. This correspondence between interface indices allows management software to quickly find the complete set of general (RFC 1213 MIB-2) and specific (RFC 2495 DS-1) information available for each DS-1 interface.

Note: **The proprietary DS-1 MIB** (described in Chapter 12, "Proprietary DS-1 MIB Module Reference") **has been marked as deprecated.** Deprecated status indicates that a MIB is supported in the current release, but support for the MIB may be discontinued in future releases without notice. **If you are now using the proprietary DS-1 MIB, it is highly recommended that you migrate to using the standard DS-1 MIB specified in RFC 2495.** (Refer to the RFC 2495 page on the Internet Engineering Task Force web site: *http://www.ietf.org/rfc/rfc2495.txt*.)

13.2   Supported Objects and Limitations

The following table lists the IP Group objects that are supported by the SNMP agent software:

Table 1. DS-1 MIB IP Group Objects Supported by SNMP Agent Software

Object	Dialogic® boards
dsx1ConfigTable	
dsx1LineIndex	supported
dsx1IfIndex	supported[1]
dsx1TimeElapsed	supported
dsx1ValidIntervals	supported
dsx1LineType	supported, read-only
dsx1LineCoding	supported, read-only
dsx1SendCode	not supported
dsx1CircuitIdentifier	supported
dsx1LoopbackConfig	supported, read-only
dsx1LineStatus	supported
dsx1SignalMode	supported, read-only
dsx1TransmitClockSource	not supported
dsx1Fdl	not supported
dsx1InvalidIntervals	not supported
dsx1LineLength	supported
dsx1LineStatusChange	supported
dsx1LineStatusChangeTrapEnable	supported
dsx1LoopbackStatus	not supported
dsx1Ds1ChannelNumber	not supported
dsx1Channelization	not suppoted

Proprietary ISDN MIB Module **14**
Reference

This section describes the proprietary Dialogic® ISDN MIB module and includes the following topics:

For information about monitoring ISDN interfaces, refer to Chapter 5, "Monitoring ISDN Interfaces".

14.1   Description

The proprietary Dialogic® ISDN MIB module provides management stations with an interface to review ISDN B- and D-channels, monitor their status, and report fault conditions using SNMP traps.

The ISDN MIB module contains the following tables and traps:

- D-Channel Table (dlgIsdnSigTable)
- Bearer Channel Table (dlgIsdnBearerTable)
- ISDN Traps

14.2   Guidelines

The following tables show a typical managed node's ISDN tables:

D-Channel Table:

dlgIsdnSig-Index	dlgIsdnSig-Name	dlgIsdnSig-LapdOperStatus	dlgIsdnSig-HildentIndex
1	dtiB1	LINK_DOWN	1
2	dtiB2	LINK_UP	1
3	dtiB5	LINK_UP	3

dlgIsdnSig-Index	dlgIsdnSig-Name	dlgIsdnSig-LapdOperStatus	dlgIsdnSig-HildentIndex
4	dtiB6	LINK_UP	3

Bearer Channel Table:

dlgIsdn-BearerIndex	dlgIsdn-BearerName	dlgIsdn-BearerStatus	dlgIsdn-BearerHildentIndex
1	dtiB1T1	OUT_OF_SERVICE	1
2	dtiB1T2	OUT_OF_SERVICE	1
3	dtiB1T3	OUT_OF_SERVICE	1
4	dtiB1T4	OUT_OF_SERVICE	1
…	…	…	…
47	dtiB5T1	IN_SERVICE	3
48	dtiB5T2	IN_SERVICE	3
…	…	…	…

The first table shows four trunk lines configured with R4 virtual board device names dtiB1, dtiB2, dtiB5, and dtiB6. Each one has a D-channel configured; hence, there are four entries in the D-Channel table. The first D-channel is indicating a link-down status, which may indicate a potential fault on the trunk line. The potentially faulty trunk may be further diagnosed by referring to the DS-1 Alarm table and the DS-1 Configuration table for more detailed signal-level information. The first table also shows that the first two ISDN interfaces are configured on the board with index 1 in the Board Identification Table, and the second two interfaces are found at index 2 in the Board Identification Table.

The Bearer Channel table shown above provides greater depth of information regarding individual B-channels, each of which may be carrying voice data for a call conversation. From the table, it is obvious that the B-channels associated with the potentially faulty trunk line are out-of-service (indices 1-4 and beyond). The interfaces for the operational ISDN interfaces have been configured and they indicate this status in the entries 47, 48, and beyond.

14.3   D-Channel Table (dlgIsdnSigTable)

The D-Channel table contains an entry for each D-channel for all ISDN-configured Dialogic® boards. Primary Rate Interface (PRI) devices may have zero or one D-channel configured. If NFAS is not being used, then the D-Channel table contains one entry per trunk line, corresponding to each D-channel needed to provide control signals for each interface. If NFAS is configured, then the D-Channel table will contain fewer entries corresponding to the shared D-channel among multiple interfaces. The D-Channel table contains the following columns described in this section.

D-Channel Index (dlgIsdnSigIndex)

This column contains the table indices.

D-channel Name (dlgIsdnSigName)

This column contains the names of the D-channels using the Dialogic® R4 convention for naming devices. For PRI devices, the R4 names are dtiBx, where x is a positive integer.

ISDN Protocol (dlgIsdnSigProtocol)

The ISDN protocol used by each D-channel is stored in this column. For instance, 4ess, 5ess, and NTI are possible values for this column.

B-channel Count (dlgIsdnSigBchanCount)

This column contains the number of B-channels whose control signaling is performed by each D-channel.

Primary Channel Indicator (dlgIsdnSigPrimary)

When this boolean-typed column indicates true for an entry, then the corresponding D-channel is considered to be the primary ISDN D-channel for the managed node.

LAPD Operational Status (dlgIsdnSigLapdOperStatus)

Each D-channel may indicate a link-up or link-down status depending on the Layer-2 connection state of the LAPD layer. This column contains this state for each D-channel, and each entry contains one of the following three values:

- UNKNOWN: the managed node is unable to access this information
- LINK_DOWN: the D-channel layer-2 is inoperable
- LINK_UP: the D-channel layer-2 is operating normally

Board Index (dlgIsdnSigHiIdentIndex)

Each entry in this column contains an index into the Board Identification Table (dlgHiIdentTable) that indicates on which board its corresponding D-channel resides.

14.4   Bearer Channel Table (dlgIsdnBearerTable)

The Bearer Channel (B-channel) table contains one entry for each B-channel on every Dialogic-based ISDN board that is configured and started. This table allows the user to monitor the call state of each B-channel and to also trace a B-channel to its corresponding D-channel and its board or residence.

Bearer Channel Index (dlgIsdnBearerIndex)

This column contains the table indices.

Bearer Channel Name (dlgIsdnBearerName)

This column contains the name of each B-channel. This name is based on the Dialogic convention for naming logical R4 devices.

Bearer Channel Status (dlgIsdnBearerStatus)

This column indicates the operational status for each B-channel. The possible values for B-channel status are:

- IN_SERVICE: the B-channel is ready to send and receive a message
- OUT_OF_SERVICE: the B-channel is unable to send and receive a message
- MAINTENANCE: the B-channel is ready to receive an incoming test call

- UNKNOWN: the state of the B-channel is undefined

Note: Do not use a `set` on the dlgIsdnBearerStatus OID.

D-Channel Index

Each B-channel has an associated D-channel listed in the D-Channel table (section 1.1). The indices in this table refer to the indexed entries in the D-Channel table and can be used to trace each B-channel over to its associated D-channel.

Board Index

Each entry in this column contains an index into the Board Identification Table (dlgHiIdentTable) that indicates on which board its corresponding B-channel resides.

14.5   ISDN Traps

ISDN traps provide information on fault conditions.

D-Channel Status Change (dlgIsdnDChanged)

This trap is generated anytime the LAPD status of a D-channel changes value. The trap contains the following variables and associated current values:

- D-channel index (dlgIsdnSigIndex)
- D-channel name (dlgIsdnSigName)
- LAPD operational status (dlgIsdnSigLapdOperStatus)

Bearer Channel Status Change (dlgIsdnBChanged)

This trap is generated anytime the operational status of a B-channel changes value. The trap contains the following variables and associate current values:

- Bearer channel index (dlgIsdnBearerIndex)
- Bearer channel name (dlgIsdnBearerName)
- Bearer channel status (dlgIsdnBearerStatus)

Note: B Channel traps are not generated on Dialogic boards because this could cause too many traps to be sent.

Standard MIB-2 Module (RFC 1213) Reference   15

This chapter describes the standard MIB-2 module and includes the following topics:

15.1   Description

The MIB-2 module is an industry standard MIB and a convention for monitoring interfaces of various protocols and hardware implementations. The core object of MIB-2 is the **ifTable**, also known as the Interfaces Table. This table contains a row entry for each interface configured on the managed entity. These interfaces include Ethernet, DS-1, and other devices.

MIB-2 information is expanded in detail by media-specific MIBs. These MIBs are generally written to provide specific details for a particular type of interface. For example, RFC 2495 expands upon the information in MIB-2 regarding DS-1 interfaces. In most cases, media-specific MIBs also include tables whose indices exactly correspond to the **ifIndex** column of the Interfaces Table. This correspondence permits management applications to quickly cross-reference between MIB-2 and media-specific MIB tables.

Note: MIB-2 also includes detailed information for interfaces that support the Internet Protocol (IP). For details, refer to the RFC 1213 page on the Internet Engineering Task Force web site: *www.ietf.org/rfc/rfc1213.txt.*

15.2   SNMP Agent Software and MIB-2

The SNMP agent software supports MIB-2 management of DS-1 and Ethernet interfaces for the Dialogic® boards. The SNMP agent extension adds row entries to the Interfaces Table for each DS-1 or Ethernet device. These rows are added immediately following the host platform entries, which represent interfaces managed by the operating system.

15.3   Supported Objects and Limitations

Table 2 lists the MIB-2 objects that are supported by the SNMP agent software:

Table 2. MIB-2 Objects Supported by SNMP Agent Software

Object	Dialogic® boards
IfNumber	-
ifIndex	-
IfDescr	supported
IfType	supported
IfMtu	not supported
IfSpeed	supported
ifPhysAddress	supported
ifAdminStatus	not supported
ifOperStatus	supported
ifLastChange	always show time interface was started
all other ifTable[1]	-

1. Objects not mentioned are assumed to be unsupported by any family.

15.4   The Role of the MIB-2 Module

The Interfaces Table is used by management entities as a basis for other tables. The **ifIndex** is a key column, which provides the management entity with a way to find interfaces in other tables such as the dsx1ConfigTable and the ipAddrTable tables.

R4 Resource MIB Module Reference   16

This chapter describes the R4 Resource MIB and contains the following topics:

16.1   Description

The proprietary R4 Device Information MIB provides configuration and status information for devices using the R4 API on a managed node. It is arranged in a two-tiered device table hierarchy in addition to a separate table, which provides statistics information about active applications that use the R4 SRL API.

A top-level Device Table contains a row for each device using the R4 API on a managed node. For each device, the Device Table contains the following information:

- device name - the R4 name of the device
- device type- the type of R4 device (dxxx, dti, PRI isdn, or msi)
- board index- the index in the Board Identification Table which contains the R4 device
- open count- how many times this device has been opened (not supported forDialogic® DNI boards)
- transmit timeslot- the CT bus slot the device is configured to transmit on
- receive timeslot- the CT bus slot the device is configured to read information from

Four additional tables extend information provided in the Device Table for each specific device type (dxxx, dti, PRI ISDN, and MSI). These tables are called dlgR4VoiceTable, dlgR4DTITable, dlgR4ISDNTable, and dlgR4MSITable.

16.2   Table Descriptions

This section provides the following information:

- R4 Voice Device Table
- R4 DTI Device Table
- R4 ISDN Device Table
- R4 MSI Device Table
- SRL Application Table

16.2.1   R4 Voice Device Table

The R4 Voice Device Table contains only indices and rows from the Device Table that describe R4 voice channel resource devices. Each device is presented with the following information:

- voice channel status (not supported for Dialogic DNI boards)
- voice line status (not supported for Dialogic DNI boards)
- number of digits (not supported for Dialogic DNI boards)
- EEPROM features (not supported for Dialogic DNI boards)

16.2.2   R4 DTI Device Table

The R4 DTI Device Table contains only indices and rows from the Device Table that describe R4 digital trunk line timeslot devices. Each timeslot device is presented with the following information:

- protocol
- timeslot status (not supported for Dialogic DNI boards)
- receive signaling bits (not supported for Dialogic DNI boards)
- transmit signaling bits (not supported for Dialogic DNI boards)

Note: DS-1 timeslot devices configured for PRI ISDN are not included in the R4 DTI Device Table.

16.2.3   R4 ISDN Device Table

The R4 ISDN Device Table contains only indices and rows from the Device Table that describe R4 digital trunk line timeslot devices configured for a PRI ISDN protocol. These devices correspond to the B-channel devices on each PRI ISDN trunk line. Each B-channel device is presented with the following information:

- ISDN protocol
- B-channel status (not supported for Dialogic DNI boards)

16.2.4   R4 MSI Device Table

The R4 MSI Device Table contains only indices and rows from the Device Table that describe MSI station channel devices. Each channel device is presented with station line status information.

16.2.5   SRL Application Table

The SRL Application Table is an independent table. Each row in this table corresponds to an active application, which use the R4 API. The SRL Application Table contains the following information for each application:

- application name
- number of open handles

- number of closed handles
- SRL event queue size
- number of SRL events currently queued
- maximum number of SRL events ever on the queue
- total number of SRL events since the agent started monitoring each application
- number of SRL callback handlers registered by each application

Glossary

API: Application Programming Interface. A set of ready-to-use functions that provide the basis for a method of programming a user application.

Board: ABoard is a physical board installed in the system (typically the managed node). A board may be made up of one or more devices, but each one of those devices shall have the same Board ID.

Community: An entity that contains one agent and one or more managers, and is named by the string of octets.

Device: A device is whatever the MIB Module creators choose it to be. It can be a board, or it can be a channel. That is up to the MIB Module. The Dialogic Agent is not concerned with what a device is.

Enterprise: Area for delegation of subtrees to other organizations.

Managed Node: The system that is being remotely monitored and has SNMP agents installed. The managed node is the system that contains the boards or Dialogic® Host Media Processing (HMP) Software resources you wish to administrate remotely; the SNMP agent makes administrative functions available remotely over an IP network.

Management Node: See Management Station.

Management Station: (also called management node): The system that has the manager (management application) installed.

Manager: The management application which monitors and/or administers a remote system, such as HP OpenView Network Node Manager or MG-SOFT MIB Browser.

Master Agent: The primary interface between the network manager and the subagents. The master agent acts as a request scheduler and dispatcher for all subscribed subagents. The subagents send traps to the master agent, which are then forwarded to the manager.

MIB: Management Information Base. Specification containing definitions of management information so that networked systems can be remotely monitored, configured and controlled.

A MIB resides on a managed node. The MIB definition sets the limits on what can be managed. The MIB defines which variables or parameters will be accessed as well as how each value will be identified, encoded, and interpreted. A MIB contains *objects* (units of management information) divided into *scalars* and *tables*, which are identified by object identifiers (OIDs). These objects are exchanged between the managed node and the SNMP manager. Each MIB defines three types of OIDs: read-only OID, read-write OID, and traps.

MIBs can be either private (enterprise) MIBs or standard MIBs. SNMP agent software currently supports mostly private MIBs. SNMP agent software supports the following MIB modules for the Dialogic® HMP Software platform: Hardware Information MIB Module, DM3 Extended Platform MIB Module, R4 Resource MIB Module

Network Management Station (NMS): The system that has the SNMP manager installed. It is a dedicated workstation that gathers and stores network performance data. The NMS gets the data from network nodes

(computers) running network agent software that enables them to collect the data.The NMS is the system that exchanges administrative information and tasks with the SNMP agent on the managed node. The network makes this exchange possible and provides a user interface for viewing administrative information and performing management tasks.

NMS: Network Management Station.

OID: Object Identifier. SNMP uses an identification scheme found in ASN.1 to uniquely identify items used throughout SNMP. A identifier in this scheme is called an object identifier. See also MIB, trap, read-only OID, and read-write OID.

Read-only OID: This type defines the information that the network management station can read from the managed node. See also OID and MIB.

Read-write OID: This type defines the system configuration settings on the managed node that can be modified by the network management station.

SNMP: Simple Network Management Protocol. A simple protocol which uses either UDP, TCP/IP, or IPX (depending on the operating system) to transmit messages between a manager and an agent to perform network management.

SNMP Agent: This SNMP subagent supports the Management Information Base (MIB) module and provides manageability to various Dialogic® Host Media Processing (HMP) Software applications or components within a system. The subagents interact with the Master Agent using SNMP.

SNMP Manager: The SNMP manager is the management application that monitors and/or administers a remote system. The SNMP manager receives and displays traps, sends SNMP "gets" and "sets" to the SNMP agent, and provides a user interface. A single SNMP manager can support multiple SNMP agents. For a fully supported network management application, you must use a third-party product such as HP OpenView or any other SNMP-compliant network management application.

SNMP Master Agent: Acts as a relay/multiplexor in its communication with subagents, and also as an agent in servicing requests from SNMP managers.

Trap: A type of OID. This OID type defines the information that the managed node sends to the network management station under specified conditions. A trap is an unsolicited event that is sent asynchronously by the agent to a manager. However, the manager does have control over whether traps are sent or not. Related objects and their values (variable bindings) may be sent with a trap. Trap delivery is not guaranteed. Individual MIBs have objects which turn traps on and off. See also OID and MIB.

Index

A

Administrative Status (dlgHiIdentAdminStatus) 37
Alarm Table Index Column (dlgDsx1AlarmIndex) 42
Alarm Type Column (dlgDsx1AlarmType) 43

B

Base I/O Address (dlgHiIdentIOBaseAddr) 37
Base Memory Address (dlgHiIdentMemBaseAddr) 37
B-channel Count (dlgIsdnSigBchanCount) 49
Bearer Channel Index (dlgIsdnBearerIndex) 49
Bearer Channel Name (dlgIsdnBearerName) 49
Bearer Channel Status (dlgIsdnBearerStatus) 49
Bearer Channel Status Change (dlgIsdnBChanged) 50
Bearer Channel Table (dlgIsdnBearerTable) 49
Board Error Message (dlgHiIdentErrorMsg) 38
board failure 29
Board ID (dlgHiIdentBoardID) 37
Board Identification Group (dlgHiIdent) 36
Board Identification Table (dlgHiIdentTable) 23, 36, 50
Board Identification Table Size
        (dlgHiIdentNumberOfDevices) 38
Board Index (dlgHiIdentIndex) 36
Board Index (dlgIsdnSigHiIdentIndex) 49
Board Index Column (dlgDsx1HiIdentIndex) 41
Board Index, Bearer Channel Table 50
bursty error seconds 43

C

Common Polling Frequency (dlgHiOsCommonPollFreq) 36
controlled slip seconds 43
controlling the occurrence of traps 29
Current Interval Elapsed Time Column
        (dlgDsx1TimeElapsed) 41
Current Metrics Interval Table (dlgDsx1CurrentTable) 44

D

D-Channel Index 50
D-Channel Index (dlgIsdnSigIndex) 48
D-channel Name (dlgIsdnSigName) 49
D-Channel Status Change (dlgIsdnDChanged) 50

D-Channel Table (dlgIsdnSigTable) 47
degraded minutes 43
Device Change Date (dlgHiIdentDeviceChangeDate) 38
Digital Service Level 1 (DS-1) Line Interface 30
dlgDm3epOperStatusChange 34
dlgDm3ExtProcTable 34
dlgds1.mib 30
dlgDsx1Alarm 30
dlgDsx1AlarmIndex 42
dlgDsx1AlarmTable 42
dlgDsx1AlarmType 43
dlgDsx1ConfigTable 41
dlgDsx1CurrentTable 44
dlgDsx1HiIdentIndex 41
dlgDsx1IntervalTable 44
dlgDsx1LineIndex 41
dlgDsx1LineType 41
dlgDsx1LoopbackConfig 42
dlgDsx1TimeElapsed 41
dlgDsx1TransmitClockSource 43
dlgDsx1ValidIntervals 41
dlgHiBoardStatusChanged 30
dlgHiIdent 36
dlgHiIdentAdminStatus 37
dlgHiIdentBoardID 37
dlgHiIdentDeviceChangeDate 38
dlgHiIdentErrorMsg 38
dlgHiIdentFuncDesc 37
dlgHiIdentFWName 37
dlgHiIdentFWVers 37
dlgHiIdentIndex 36
dlgHiIdentIOBaseAddr 37
dlgHiIdentIRQ 37
dlgHiIdentMemBaseAddr 37
dlgHiIdentModel 37
dlgHiIdentNumberOfDevices 38
dlgHiIdentOperStatus 26, 37
dlgHiIdentPCIBusID 37
dlgHiIdentPCISlotID 37
dlgHiIdentServiceStatus 25, 38
dlgHiIdentSpecific 38
dlgHiIdentTable 23, 36, 50

SNMP Agent Software for Dialogic® HMP Software Administration Guide — March 2008