



MIB Quick Reference for the Cisco ONS 15500 Series

This document describes Management Information Base (MIB) objects and explains how to access Cisco public MIBs for the following systems:

- Cisco ONS 15501
- Cisco ONS 15530
- Cisco ONS 15540 ESP
- Cisco ONS 15540 ESPx

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MIB Definition

Network management takes place between two major types of systems: those in control, called *managing systems*, and those observed and controlled, called *managed systems*. The most common managing system is called a network management system (NMS). Managed systems can include hosts, servers, or network devices such as routers or intelligent repeaters.

To promote interoperability, cooperating systems must adhere to a common framework and a common language, called a *protocol*. In the Internet network management framework, that protocol is the Simple Network Management Protocol (SNMP). (See the “[SNMP Description](#)” section on page 4.)

In a managed device, specialized low-impact software modules, called *agents*, access information about the device and make it available to the NMS. Managed devices maintain values for a number of variables and report those, as required, to the NMS. For example, an agent might report such data as the number



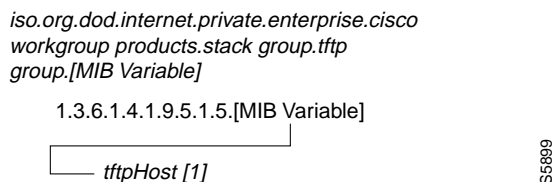
of bytes and packets received and transmitted by the device, or the number of broadcast messages sent and received. In the Internet network management framework, each variable is referred to as a *managed object*, which is anything that an agent can access and report back to the NMS.

All managed objects are contained in the MIB, which is a database of the managed objects. The managed objects, or variables, can be set or read to provide information on network devices and interfaces. An NMS can control a managed device by sending a message to an agent of that managed device requiring the device to change the value of one or more of its variables.

Object Identifier

Each MIB variable is assigned an object identifier. The *object identifier* is the sequence of numeric labels on the nodes along a path from the root to the object. For example, in [Figure 1](#) the MIB variable *tftpHost* is indicated by the number 1. The object identifier for *tftpHost* is *iso.org.dod.internet.private.enterprise.cisco.workgroup.products.stack.group.tftp.group.tftpHost.variable* or *1.3.6.1.4.1.9.5.1.5.1*. The last value (in this case 1) is the number of the MIB variable *tftpHost*.

Figure 1 Example of an Object Identifier for a MIB Variable



Tables

When network management protocols use names of MIB variables in messages, each name has an appended suffix. This suffix is called an *instance identifier*. For simple variables, the instance identifier 0 refers to the instance of the variable with that name. A MIB also can contain tables of related variables.

Typically, an instance identifier might be a unique interface number or a 0. An instance identifier can also be an IP address. For example, to find the network mask for the route with a destination address of *131.104.211.243*, use the variable *locRtMask* (locate route mask) with an instance identifier of *131.104.211.243*. The format is *locRtMask.131.104.211.243*.

Cisco MIB Files

The Cisco MIB for Cisco IOS is provided with all Cisco software releases and with CiscoWorks management software.

The Cisco MIB is a set of variables that are private extensions to the Internet standard MIB II. The MIB II standard is documented in Request for Comment (RFC) 1213, *Management Information Base for Network Management of TCP/IP-based Internets: MIB-II*.

Cisco agents support many other Internet-standard MIBs. These standard MIBs are defined in RFC publications. To find specific MIB information, you must examine the Cisco proprietary MIB structure and the standard RFC MIBs supported by Cisco.

If your NMS is unable to get requested information from a managed device such as a Cisco router, the MIB that allows that specific data collection might be missing. Typically, if an NMS cannot retrieve a particular MIB variable, either the NMS does not recognize the MIB variable, or the agent does not support the MIB variable. If the NMS does not recognize a specified MIB variable, you might need to load the MIB into the NMS, usually with a MIB compiler. For example, you might need to load the Cisco Workgroup MIB or the supported RFC MIB into the NMS to execute a specified data collection. If the agent does not support a specified MIB variable, you must find out what version of Cisco IOS or system software you are running. Different software releases support different MIBs.

Cisco MIB File Directories

Cisco's public MIB files are organized into two directories: SNMPv1 MIBs are in the v1 directory and SNMPv2 MIBs are in the v2 directory. Determine which MIBs the system supports and get a description of the files by retrieving the following:

- supportlists.txt file—Describes which MIBs the Cisco ONS 15500 Series system supports
- v1/README—Describes the SNMPv1 MIBs in the subdirectory
- v2/README—Describes the SNMPv2 MIBs in the subdirectory

Loading Order of MIBs

Many MIBs use definitions that are defined in other MIBs. These definitions are listed in the IMPORTS section near the top of the MIB.

If MIB B imports a definition from MIB A, some MIB compilers require you to load MIB A prior to loading MIB B. If you get the MIB loading order wrong, the MIB compiler might complain about what was imported claiming it is *undefined* or not listed in IMPORTS. If this happens, look at the loading order of the MIB definitions from the IMPORTS of the MIB. Make sure that you have loaded all the preceding MIBs first.

Here is a list of MIBs from which many other MIBs import definitions. The MIBs are listed in the order in which you should load them:

- SNMPv2-SMI.my
- SNMPv2-TC.my
- SNMPv2-MIB.my
- RFC1213-MIB.my
- IF-MIB.my
- CISCO-SMI.my
- CISCO-PRODUCTS-MIB.my
- CISCO-TC.my

If you load the MIBs in this order, you can eliminate 95 percent of your load-order definition problems.



Note

You can load most other MIBs (those not listed here) in any order.

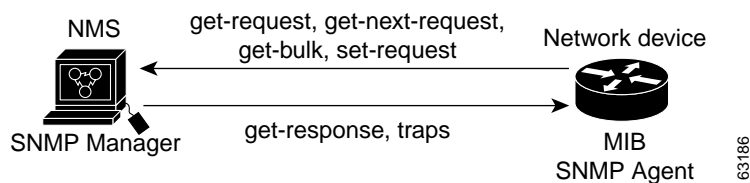
SNMP Description

You can access the Cisco MIB variables through SNMP, an application-layer protocol designed to facilitate the exchange of management information between network devices. The SNMP system consists of three parts: SNMP manager, SNMP agent, and MIB.

The SNMP manager can be part of a network management system (NMS), and the SNMP agent can reside on a networking device such as a Cisco ONS 15500 Series system. You can compile the Cisco MIB with your network management software. If SNMP is configured on a Cisco ONS 15500 Series system, the SNMP agent responds to MIB-related queries being sent by the NMS.

As shown in [Figure 2](#), the SNMP agent gathers data from the MIB. Then the agent can send traps, or notifications of certain events, to the manager.

Figure 2 *SNMP Network*



The SNMP manager uses information in the MIB to perform the operations described in [Table 1](#).

Table 1 *SNMP Manager Operations*

Operation	Description
get-request	Retrieves a value from a specific variable.
get-next-request	Retrieves the value following the named variable. It is often used to retrieve variables from within the table. ¹
get-bulk²	Retrieves large blocks of data, such as multiple rows in a table, which would otherwise require the transmission of many small blocks of data.
set-request	Stores a value in a specific variable.
get-response	Replies to the get commands sent by an NMS.
traps	Sends an unsolicited message by an SNMP agent to an SNMP manager indicating that some event has occurred.

1. An SNMP manager does not need to know the exact variable name with this operation. A sequential search is performed to find the needed variable from within the MIB.

2. The **get-bulk** command only works with SNMP version 2.

Accessing and Downloading Cisco MIB Files

You can find the current list of supported “Cisco Optical Transport Products” MIBs on Cisco.com at: <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.



Note

The Cisco ONS 15540 ESP and Cisco ONS 15540 ESPx do not support RMON MIBs.

You can access the Cisco MIB files in either of the following ways:

- Use the File Transfer Protocol (FTP) to access the ftp.cisco.com server.
- Use the HTTP protocol to connect to CCO at this URL:
<http://www.cisco.com>

Using FTP to Access and Download the MIB Files

To access the Cisco public MIB files using FTP, follow these steps:

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- Step 1** Use FTP to access the ftp.cisco.com server from your Web browser. Enter the following command:
<ftp://ftp.cisco.com>
- Step 2** Navigate to <ftp://ftp.cisco.com/pub/mibs/supportlists/>.
- Step 3** Select the appropriate system.
- Step 4** Select and save the MIBs you need to download.
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Using HTTP to Access and Download the MIB Files from CCO

To access MIB files using your Web browser, follow these steps:

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- Step 1** Enter the following URL: <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>
You see the Cisco MIB files supported by products.
- Step 2** Select the appropriate system.
- Step 3** Select and save the MIBs you need to download.
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This document is to be used in conjunction with the document set that supports the Cisco ONS 15500 Series.

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