IF-MIB Link Operational Status for Subinterfaces

This feature module describes the enhancement of the Interfaces Group MIB for subinterfaces and RFC 2233 compliance for Cisco's implementation of the IF-MIB in Cisco IOS Software Release 12.1(2)T and 12.0(21)S3. This document includes the following sections:

- Feature Overview, page 1
- Supported Platforms, page 3
- Supported Standards, MIBs, and RFCs, page 4
- Prerequisites, page 4
- Configuration Tasks, page 4
- Configuration Examples, page 5
- Command Reference, page 6
- Glossary, page 8

Please see the Glossary for definitions of any unfamiliar terms or acronyms.

Feature Overview

This feature module documents enhancements made to the Interfaces Group MIB module (IF-MIB) in Cisco IOS Release 12.1(2)T and 12.0(21)S3. These MIB enhancements bring the IF-MIB into compliance with RFC 2233 and provide SNMP support for subinterfaces. Additionally, you can now configure SNMP to use either the existing Cisco implementation of linkUp / linkDown traps or the new implementation consistent with Internet Engineering Task Force (IETF) standards. This configuration is achieved through the use of a new Cisco IOS CLI command.

Until this enhancement was introduced, linkUp and linkDown traps in Cisco IOS have been defined in the Cisco Interface Capability MIB module (CISCO-IF-CAPABILITY.my) as follows:

```
VARIATION       linkUp -- TRAP-TYPE
--              OBJECTS { ifIndex, ifDescr, ifType, locIfReason }
DESCRIPTION     "A linkUp trap signifies that the sending
                protocol entity recognizes that one of the
                communication links represented in the agent's
                configuration has come up."

VARIATION       linkDown -- TRAP-TYPE
--              OBJECTS { ifIndex, ifDescr, ifType, locIfReason }
DESCRIPTION     "A linkDown trap signifies that the sending
                protocol entity recognizes a failure in one of
                the communication links represented in the
                agent's configuration."
```

However, RFC 2233 defines linkUp and linkDown traps in the Interfaces Group MIB module (IF-MIB.my) as follows:

```
linkDown NOTIFICATION-TYPE
OBJECTS { ifIndex, ifAdminStatus, ifOperStatus }
::= { snmpTraps 3 }

linkUp NOTIFICATION-TYPE
OBJECTS { ifIndex, ifAdminStatus, ifOperStatus }
::= { snmpTraps 4 }
```

Starting with Cisco IOS Release 12.1(2)T/12.0(21)S3, you can configure your router to begin using the new RFC 2233 IETF standards-based implementation by using the **snmp-server trap link ietf** command. This command enables notification support for subinterfaces. This command is disabled by default to allow you to continue using the earlier Cisco implementation of linkUp/linkDown traps if you so choose.

However, please note that when using the earlier Cisco object definitions, an arbitrary value is used for the *locIfReason* object in linkUp/linkDown traps for subinterfaces, which may give you unintended results. This is because the *locIfReason* object is not defined for subinterfaces in the current Cisco implementation, which uses OLD-CISCO-INTERFACES-MIB.my.

If you do not enable this functionality, the link trap varbind list will consist of {ifIndex, ifDescr, ifType, locIfReason}. After you enable this functionality with the **snmp-server trap link ietf** command, the varbind list will consist of {inIndex, ifAdminStatus,ifOperStatus, if Descr, ifType}. The *locIfReason* object will also be conditionally included in this list depending on whether meaningful information can be retrieved for that object. A configured sub-interface will generate retrievable information. On non-HWIDB interfaces, there will be no defined value for *locIfReason*, so it will be omitted from the trap message.

Other updates to the IF-MIB module have also been made to comply with RFC2233. These changes include the addition of the *ifCounterDiscontinuityTime* object, and the addition of basic support for *ifTableLastChange* (updated OIR drivers are planned in a future release for full *ifTableLastChange* support).

Benefits

Compliance with RFC2233

The enhancement to the IF-MIB allows Cisco IOS to support RFC 2233. Prior to this release, Cisco IOS supported only RFC 1573.

linkUp/linkDown Trap Generation for Subinterfaces

The enhancement to the IF-MIB allows linkUp and linkDown SNMP traps for subinterfaces to be generated correctly, while permitting unaffected customers to continue using the earlier Cisco implementation.

Restrictions

There are no known memory or performance impacts for this feature.

Related Features and Technologies

- CiscoWorks2000
- Network Management
- SNMP (Simple Network Management Protocol)

Related Documents

- The "Configuring SNMP Support" chapter of the *Cisco IOS Configuration Fundamentals Configuration Guide,* Release 12.1.
- The "SNMP Commands" chapter of the *Cisco IOS Configuration Fundamentals Command Reference,* Release 12.1

Supported Platforms

This feature is supported on the following platforms:

- Cisco 800 Series (Cisco 801, 801 CAPI, 802, 803, 804, 805, 827, and 827-4V)
- Cisco 1000 Series (Cisco 1003, 1004, and 1005)
- Cisco 1400 Series (Cisco 1401, 1417, and 1417-T)
- Cisco 1600 and 1600 R Series (1601-1604, 1601R-1604R)
- Cisco 1700 Series (Cisco 1720 Access Router, 1720 VPN Access Router, 1750)
- Cisco 2500 Series (Cisco 2509-2512 Access Servers)
- Cisco 3600 Series (Cisco 3620, 3640, and 3660 (3661,3662))
- Cisco 4000 Series
- Cisco AS5200 UAS
- Cisco AS5300 UAS, Cisco AS5300/Voice Gateway
- Cisco AS5400
- Cisco AS5800/Access Path;
- Cisco 6400
- Cisco 7000 Family (Cisco 7100 Series, Cisco 7200 Series, and Cisco 7500/7000RSP Series)
- Cisco Catalyst 8500 Series (Cisco 8510, 8540)

- Cisco LS1010

- Cisco UBR7200

- Cisco 12000 GSR Series (Cisco 12008, 12012, and 12016)

Supported Standards, MIBs, and RFCs

Standards

None

MIBs

The updates to the Interface Group MIB and the Ethernet-like Interface MIB are reflected in the following files:

- IF-MIB.my

- CISCO-IF-CAPABILITY.my

- ETHERLIKE-MIB.my

- CISCO-ETHERLIKE-CAPABILITY.my

The Ethernet-like MIB modules were introduced in Cisco IOS Release 12.0(9)SC (the cable-specific release for Cisco uBR7200 series routers).

For lists of supported MIBs by platform and to download MIB modules, see the Cisco MIB web site on CCO at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

RFCs

- RFC2233 (INTERGRMIB): "The Interfaces Group MIB using SMIv2,"
  K. McCloghrie, F. Kastenholz

RFCs are available from a variety of Internet sources, including http://www.ietf.org.

Prerequisites

To utilize the MIBs described in this feature module you must configure SNMP on your system. The configuration task below assumes you will be using Cisco IOS or a network management system (NMS) such as CiscoWorks to monitor the performance of your network. For information on these topics, see the documents listed in the Related Documents section, or the documentation which came with your network management application.

Configuration Tasks

See the following section for configuration tasks for the Interface MIB Enhancement feature. Configuration of this feature is optional on your system, and is disabled by default.

Enabling IETF-Compliant Link Traps for SNMP

To enable the use of the new object list for SNMP linkUp/linkDown traps, use the following commands, starting in privileged EXEC mode:

	Command	Purpose
Step 1	Router# **configure terminal**	Enters global configuration mode.
Step 2	Router(config)# **snmp-server trap link ietf**	Enables SNMP traps which are compliant with RFC2233.
Step 3	Router(config)# **end**	Ends the current configuration session and returns you to privileged EXEC mode.

Verifying IETF Compliant Link Traps for SNMP

Use the **more system:running-config** command in privileged EXEC mode to verify that the command is in your running configuration file.

Troubleshooting Tips

To monitor SNMP trap activity in real-time for the purposes of troubleshooting, use the SNMP debug commands, including the **debug snmp packet** command. For documentation of SNMP debug commands, see the Release 12.1 *Cisco IOS Debug Command Reference,* available on Cisco.com at http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121sup/index.htm, or on the Cisco Documentation CD-ROM.

Configuration Examples

The following example shows the SNMP related output before the IETF compliant implementation is enabled, a configuration session it which it is enabled, and the changed output after the configuration:

```
Router# more system:running config
. . .
!
snmp-server engineID local 00000009000000A1616C2056
snmp-server community public RO
snmp-server community private RW
!
. . .
Router# conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# snmp-server trap link ietf
Router(config)# end
Router# more system:running config
. . .
!
snmp-server engineID local 00000009000000A1616C2056
snmp-server community public RO
snmp-server community private RW
snmp-server trap link ietf
!
. . .
```

Command Reference

This section documents the new command that enables the Interfaces Group MIB Enhancements feature. All other existing SNMP-related commands are documented in the *Cisco IOS Configuration Fundamentals Command Reference*.

snmp-server trap link

To enable linkUp/linkDown SNMP traps which are compliant with RFC2233, use the **snmp-server trap link** command in global configuration mode. To disable IETF compliant functionality and revert to the older Cisco implementation of linkUp/linkDown traps, use the **no** form of this command.

snmp-server trap link ietf

no snmp-server trap link ietf

Syntax Description	ietf	This required keyword indicates to the command parser that you would like to link functionality of SNMP traps to the Internet Engineering Task Force (IETF) standard (as opposed to the previous Cisco implementation).

Defaults   This command is disabled by default.

Command Modes   Global configuration mode

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.0(21)S3	Support for this command was integrated in Cisco IOS Release 12.0S.

Usage Guidelines   The **snmp-server trap link ietf** command is used to configure your router to use the RFC2233 IETF standards-based implementation of linkUp/linkDown traps. This command is disabled by default to allow you to continue using the earlier Cisco implementation of linkUp/linkDown traps if you so choose.

However, please note that when using the earlier Cisco object definitions, linkUp/linkDown traps are not generated correctly for sub-interfaces.

Examples   In the following example linkUp and linkDown traps are configured to be compliant with RFC 2233:

```
Router(config)# snmp-server trap link ietf
```

Related Commands

Command	Description
debug snmp packets	Displays information about every SNMP packet sent or received by the router for the purposes of troubleshooting.

Glossary

CLI—The Cisco IOS Command-Line Interface. The CLI is the primary user interface for entering Cisco IOS commands on Cisco devices (such as routers).

DOCSIS—Data-Over-Cable Service Interface Specification. DOCSIS defines interface requirements for Cable Modems (CM) and Cable Modem Termination Systems (CMTS) involved in high-speed data distribution over cable television networks. CM certification and CMTS qualification is determined by Cable Television Laboratories, Inc. (CableLabs). Full CM and CMTS certification is in development for the Cisco uBR900 Series and the Cisco uBR7200 Series. See also OSSI.

ETHERLIKE-MIB—The "Ethernet-like Interface Types MIB", as defined in RFC2665.

IETF—Internet Engineering Task Force. The IETF is the body (supervised by the Internet Architecture Board) that defines Internet operating standards such as SNMP MIBs, and publishes RFCs for use by the Internet community. The IETF's web site address is http://www.ietf.org.

IF-MIB—The Interfaces Group MIB. The current specification for the IF-MIB is found in RFC2233.

MIB—Management Information Base. The MIBs referred to in this document are MIB modules. These modules contain definitions of management information for use by SNMP network management systems.

OID—Object Identifier. The values for OIDs are defined in specific MIB modules.

OSSI—Operations Support System Interface. OSSI is a specific DOCSIS specification. For example, "DOCSIS OSSI 1.0" defines the Network Management requirements for support a DOCSIS 1.0 environment.

RFC—Requests For Comments. RFCs are a series of documents used as the primary means for communicating information about the Internet. Some RFCs are designated by the Internet Architecture Board (IAB) as Internet standards. Most RFCs document protocol specifications such as Telnet and FTP, but some are humorous or historical. RFCs are available online from numerous sources, but a primary source is http://www.rfc-editor.org/.