CHAPTER 5

In-Band Management

This chapter provides information on the following procedures:

- Configuring the FastHub for SNMP management using Bootstrap Protocol/Dynamic Host Control Protocol (BOOTP/DHCP).
- Using Telnet or SNMP to access the FastHub through a workstation.
- MIBs and MIB extensions: Lists the actions you use to manage and configure a FastHub and the Management Information Base (MIB) objects associated with each action.
- Trap clients and traps: Lists and describes the traps generated by the FastHub.

Using SNMP, the FastHub communicates with the third-party network-management application through its in-band management interface (the SNMP agent). The management information used to configure and monitor a FastHub are represented as objects in a database called a MIB. The FastHub can be managed in-band through any SNMP-compatible workstation or through Telnet. The FastHub supports standard MIB-II objects, RFC 1516 repeater MIB objects, as well as custom extensions found in the enterprise-specific MIB. The extensions provide access to unique FastHub features and other management functions.

FastHub and SNMP Management Platforms

In general, you use SNMP network-management applications to locate the FastHub icon and access the table of FastHub objects. You can then view the characteristics and counters describing the FastHub and set object values as defined in the FastHub-supported MIBs.

CiscoWorks applications, one method of SNMP network management, are integrated on several SNMP-based network management platforms, including SunNet Manager, HP Open View, and IBM NetView. Contact Cisco Systems or your authorized reseller for detailed information on CiscoWorks.

The complete set of FastHub MIB objects are listed by function (user action) in the "Standard MIBs and MIB Extensions" section in this chapter. These MIB objects and other SNMP-based management techniques are described in detail in a separate manual, the *Catalyst FastHub 100+ Series MIB Reference Manual*, available only on the Cisco Connection Documentation, CiscoPro Solutions CD, previously called the Cisco UniverCD. To order the Cisco Connection Documentation, CiscoPro Solutions CD in North America, contact your local reseller; international customers, contact your local Cisco sales office. The CD is available both as a single CD and as an annual subscription. You can also access CiscoPro product documentation on the World Wide Web URL http://www.cisco.com.

Before Beginning...

Before beginning any in-band management, the FastHub must be configured for SNMP management. To do this, assign an IP address to the FastHub by using the IP Configuration menu described in the "IP Configuration Menu" section in the "Out-of-Band Management" chapter. You can also use BOOTP/DHCP, described in the "Configuring the FastHub for SNMP Management with BOOTP/DHCP" section in this chapter, to assign an IP address.

Using Telnet

You can use any Telnet TCP/IP package to access the management console. The FastHub supports up to seven simultaneous Telnet sessions. The Telnet package must support VT-100 terminal emulation. See the "Out-of-Band Management" chapter for details on using the management console.

Configuring the FastHub for SNMP Management with BOOTP/DHCP

The FastHub must be configured with an IP address before in-band management can be used. You can assign an individual address to each FastHub, or you can use the BOOTP/DHCP protocol to maintain a centralized database of these addresses.

You need a host machine with a BOOTP/DHCP server program to use BOOTP/DHCP. A database containing a list of physical MAC addresses and corresponding IP addresses must be set up on this host. Other information, such as the corresponding subnet masks, default gateway addresses, and host names, can also be stored in the database, but this information is optional. The FastHub must be able to access the BOOTP/DHCP server through one of its ports.

After a system reset, the FastHub searches its nonvolatile random-access memory (NVRAM) for a configured IP address, and if it exists, then searches for a default gateway address and an IP subnet mask.

If an IP address has not been configured, the FastHub transmits a BOOTP/DHCP request to all physically connected ports, requesting a mapping for the port's physical MAC address. A valid response includes the IP address, which is mandatory, along with the subnet mask, the default gateway, and the host name, all of which are optional.

The reception of a valid BOOTP/DHCP response immediately activates the rest of the system's protocol suite, without requiring a system reset. The information is also saved in the NVRAM, so the next reset does not have to use BOOTP/DHCP.

For more information about using BOOTP/DHCP, see the BOOTP/DHCP server documentation.

Standard MIBs and MIB Extensions

This section lists the actions you use to configure and manage a FastHub and the MIB objects associated with each action. A complete description of the objects, their defaults, and possible values is included in the *Catalyst FastHub 100+ Series MIB Reference Manual,* available on CD only.

The following are the seven supported MIBs:

- RS-232 MIB

  The RS-232 MIB is used to configure the NMM console port.

Note EIA/TIA-232 was known as recommended standard RS-232 before its acceptance by the Electronics Industries Association (EIA) and Telecommunications Industry Association (TIA). However, because RS-232 appears in the names of supported MIB objects, this manual uses RS-232.

- Enterprise-Specific MIB

  The FastHub implements extensions to the standard MIB-II in the form of the Enterprise-Specific MIB. These extensions are used to manage unique characteristics of the FastHub architecture.

- Repeater MIB

  This is the standard repeater MIB for managing IEEE 802.3 repeaters. The FastHub supports this MIB as it is defined in RFC 1516, *Definitions of Managed Objects for IEEE 802.3 Repeater Devices*.

- Remote Monitoring MIB

  The FastHub implements the first four object groups of the standard Remote Monitoring (RMON) MIB.

- Cisco Discovery Protocol (CDP) MIB

  The CDP MIB is a media- and protocol-independent device-discovery protocol that runs on all Cisco-manufactured equipment, including routers, access servers, bridges, and switches. Using CDP, a device can advertise its existence to other devices and receive information about other devices on the same LAN or on the remote side of a WAN. CDP runs on all media that support Subnetwork Access Protocol (SNAP), including LANs, Frame Relay, and Asynchronous Transfer Mode (ATM) media.

- MIB II (not documented here, see RFC 1213)
- Ethernet Transmission MIB (not documented here, see RFC 1643)

RS-232 MIB

Action	Associated MIB Objects
View/Configure RS-232 Port Characteristics	rs232Number rs232PortIndex rs232PortType rs232PortInSigNumber rs232PortOutSigNumber rs232PortInSpeed rs232PortOutSpeed
View RS-232 Port Input/Output Signals	rs232InSigPortIndex rs232InSigName rs232InSigState rs232InSigChanges rs232OutSigPortIndex rs232OutSigName rs232OutSigState rs232OutSigChanges
View/Configure RS-232 Async Port Characteristics	rs232AsyncPortIndex rs232AsyncPortBits rs232AsyncPortStopBits rs232AsyncPortParity rs232AsyncPortAutobaud
View RS-232 Async Port Statistics	rs232AsyncPortParityErrs rs232AsyncPortFramingErrs rs232AsyncPortOverrunErrs

Enterprise-Specific MIB

Action	Associated MIB Objects
View/Configure Hub Stack	mrStackUnit Capacity mrStackNumberofUnitsPresent mrStackSelectPrimarySupervisorUnit mrStackUnitSupervisorIsPrimary
Clear Stack Statistics	mrStackClearStatistics

Action	Associated MIB Objects
View/Configure POST	mrStackPOSTSelect mrStackUnitPOSTResult
Reset Hub Stack	mrStackReset mrStackDefaultReset
View/Configure Supervisor Log	mrSupervisorClearLogTable mrSupervisorLogIndex mrSupervisorLogTime mrSupervisorLogInfo
View/Configure FastHub (Unit)	mrStackUnitIndex mrStackUnitPresent mrStackUnitFirstGroupIndex mrStackUnitLastGroupIndex mrStackUnitSupervisorPresent mrStackUnitSupervisorMajorVersion mrStackUnitSupervisorMinorVersion mrStackUnitSupervisorBootstrapMajorVersion mrStackUnitSupervisorBootstrapMinorVersion mrStackUnitPortVisualIndicatorSelect mrStackUnitBasePortVisualIndicatorGreenMap mrStackUnitBasePortVisualIndicatorAmberMap mrStackUnitActivityVisualIndicator mrStackUnitCollisionVisualIndicator
View/Configure 100BaseTX/16 Port Expansion Module	mrStackUnitExpansionModulePresent mrStackUnitExpansionPortVisualIndicatorGreenMap mrStackUnitExpansionPortVisualIndicatorAmberMap
View Unit Redundant Power Supply (RPS) Status	mrStackUnitRPSStatus mrStackUnitRPSVisualIndicator
View/Configure Network Management Module (NMM)	mrNetMgmtIpAddress mrNetMgmtIpSubnetMask mrNetMgmtDefaultGateway mrNetMgmtEnableAuthenTraps mrNetMgmtEnableRIP
View/Configure Domain Name Servers	mrNetMgmtDomainServer1IpAddress mrNetMgmtDomainServer2IpAddress mrNetMgmtDefaultSearchDomain

Action	Associated MIB Objects
Configure the Management Console	mrNetMgmtConsoleInactTime mrNetMgmtConsolePasswordThreshold mrNetMgmtConsoleSilentTime
View/Configure Set Clients	mrNetMgmtSetClientIndex mrNetMgmtSetClientName mrNetMgmtSetClientStatus
View/Configure Trap Clients and Traps	mrNetMgmtTrapClientIndex mrNetMgmtTrapClientName mrNetMgmtTrapClientComm mrNetMgmtTrapClientStatus logonIntruder hubStackDiagnostic rpsFailed ipAddressChange
Configure a Modem (Console Port)	mrNetMgmtModemInitString mrNetMgmtModemDialString mrNetMgmtModemDialDelay mrNetMgmtModemAutoAnswer
Upgrade FastHub Firmware	mrUpgradeFlashSize mrUpgradeLastUpgradeTime mrUpgradeLastUpgradeSource mrUpgradeLastUpgradeStatus mrUpgradeTFTPServerAddress mrUpgradeTFTPLoadFilename mrUpgradeTFTPInitiate mrUpgradeTFTPAccept

Repeater MIB

Action	Associated MIB Objects
View FastHub Operational Status	rptrGroupCapacity rptrOperStatus rptrHealthText rptrTotalPartitionedPorts rptrMonitorTransmitCollisions

Action	Associated MIB Objects
Reset/Test FastHub	rptrReset rptrNonDisruptTest
View/Configure FastHub Ports	rptrPortGroupIndex rptrPortIndex rptrPortAdminStatus rptrPortAutoPartitionState rptrPortOperStatus rptrPortConnectorType rptrPortLinkbeatStatus rptrPortName
View/Configure FastHub Groups	rptrGroupIndex rptrGroupDescr rptrGroupObjectID rptrGroupOperStatus rptrGroupLastOperStatusChange rptrGroupPortCapacity
View FastHub Group Statistics	rptrMonitorGroupIndex rptrMonitorGroupTotalFrames rptrMonitorGroupTotalOctets rptrMonitorGroupTotalErrors
View FastHub Port Statistics	rptrMonitorPortGroupIndex rptrMonitorPortIndex rptrMonitorPortReadableFrames rptrMonitorPortReadableOctets rptrMonitorPortFCSErrors rptrMonitorPortAlignmentErrors rptrMonitorPortFrameTooLongs rptrMonitorPortShortEvents rptrMonitorPortRunts rptrMonitorPortCollisions rptrMonitorPortLateEvents rptrMonitorPortVeryLongEvents rptrMonitorPortDataRateMismatches rptrMonitorPortAutoPartitions rptrMonitorPortTotalErrors rptrMonitorPortIsolates rptrMonitorPortSymbolErrors

Action	Associated MIB Objects
View Address Tracking Information	rptrAddrTrackGroupIndex rptrAddrTrackPortIndex rptrAddrTrackLastSourceAddress rptrAddrTrackSourceAddrChanges rptrAddrTrackNewLastSrcAddress

Remote Monitoring MIB

Action	Associated MIB Objects
View/Configure Ethernet Statistics Group	etherStatsIndex etherStatsDataSource etherStatsDropEvents etherStatsOctets etherStatsPkts etherStatsBroadcastPkts etherStatsMulticastPkts etherStatsCRCAlignErrors etherStatsUndersizePkts etherStatsOversizePkts etherStatsFragments etherStatsJabbers etherStatsCollisions etherStatsPkts64Octets etherStatsPkts65to127Octets etherStatsPkts128to255Octets etherStatsPkts256to511Octets etherStatsPkts512to1023Octets etherStatsPkts1024to1518Octets etherStatsOwner etherStatsStatus

Action	Associated MIB Objects
View/Configure History Control Group	historyControlIndex historyControlDataSource historyControlBucketsRequested historyControlBucketsGranted historyControlInterval historyControlOwner historyControlStatus
View History Group Statistics	etherHistoryIndex etherHistorySampleIndex etherHistoryIntervalStart etherHistoryDropEvents etherHistoryOctets etherHistoryPkts etherHistoryBroadcastPkts etherHistoryMulticastPkts etherHistoryCRCAlignErrors etherHistoryUndersizePkts etherHistoryOversizePkts etherHistoryFragments etherHistoryJabbers etherHistoryCollisions etherHistoryUtilization
View/Configure Alarm Group	alarmIndex alarmInterval alarmVariable alarmSampleType alarmValue alarmStartupAlarm alarmRisingThreshold alarmFallingThreshold alarmRisingEventIndex alarmFallingEventIndex alarmOwner alarmStatus

Action	Associated MIB Objects
View/Configure Event Group	eventIndex eventDescription eventType eventCommunity eventLastTimeSent eventOwner eventStatus logEventIndex logIndex logTime logDescription
View Remote Monitoring Traps	risingAlarm fallingAlarm

Cisco Discovery Protocol MIB

Action	Associated MIB Objects
View/Configure CDP Interfaces	cdpInterfaceIfIndex cdpInterfaceEnable cdpInterfaceMessageInterval cdpInterfaceGroup cdpInterfacePort
View CDP Cache	cdpCacheIfIndex cdpCacheDeviceIndex cdpCacheAddressType cdpCacheAddress cdpCacheVersion cdpCacheDeviceId cdpCacheDevicePort cdpCachePlatform cdpCacheCapabilities

Trap Clients and Traps

A trap client is a management workstation configured to receive and process traps. The FastHub supports up to four trap clients with separate community strings. At least one trap client must be defined before any traps are generated. See the section “SNMP Management Menu” in the “Out-of-Band Management” chapter for instructions on defining trap clients.

The FastHub generates the traps described in the following sections.

Enterprise-Specific Traps

logonIntruder

A user is repeatedly trying to log on to the management console using an invalid password. You can define the number of invalid passwords permitted before this trap is generated. The FastHub can shut down the management console following the generation of this trap.

hubStackDiagnostic

The FastHub issues this trap when its power-on self-test (POST) does not pass all tests. However, note that some failures are catastrophic, preventing the generation of this trap.

rpsFailed

An RPS is connected to the FastHub but a failure exists in the power system.

ipAddressChange

This trap is issued when the NMM is unable to complete its DHCPDISCOVER/DHCPREQUEST process, when it fails to extend the lease for the current address, or when it accepts an address change from the user.

Repeater Traps

rptrHealth

This trap conveys information related to the operational status of the FastHub. This trap is sent either when the value of rptrOperStatus changes or when a nondisruptive test completes.

rptrGroupChange

This trap is sent when a change occurs in the group structure of the FastHub. This occurs only when a group is logically or physically removed from or added to a repeater.

rptrResetEvent

This trap conveys information related to the operational status of the FastHub. This trap is sent on completion of a reset action (such as an SNMP Set on the rptrReset object).

Remote Network Monitoring Traps

risingAlarm

This SNMP trap is generated when an alarm entry crosses its rising threshold and generates an event that is configured for sending SNMP traps.

fallingAlarm

This SNMP trap is generated when an alarm entry crosses its falling threshold and generates an event that is configured for sending SNMP traps.

MIB II Traps

warmStart

Generated when the repeater is reset or after the completion of a firmware upgrade.

coldStart

Generated upon a power-up reset.

linkDown

This trap is currently not generated by the FastHub.

linkUp

This trap is currently not generated by the FastHub.

authenticationFailure

Generated when the FastHub receives an SNMP message that is not accompanied by a valid community string.