

In-Band Management

The Catalyst 2820 and 1900 can be managed in-band through any SNMP-compatible workstation or through Telnet. They support standard SNMP MIB II objects as well as SNMP extensions designed to maximize the switches' manageability and configurability.

The complete set of objects are listed by function in the "Standard MIBs and MIB Extensions" section in this chapter. These MIB objects and other SNMP-based management techniques are described in a separate manual, the *Catalyst 2820 and Catalyst 1900 MIB Reference Manual*, available on the Cisco Connection Documentation, Enterprise Series, formerly called the Cisco UniverCD.

Using Telnet

You can use any Telnet TCP/IP package to invoke the management console. The Catalyst 2820 and 1900 support up to seven simultaneous Telnet sessions. See the "Out-of-Band Management" chapter for details on the use of the management console.

Before beginning, the Catalyst 2820 and 1900 must be configured for SNMP management. To do this, you must assign an IP address to the switch using the IP Configuration Menu, described in the "IP Configuration" section in the "Out-of-Band Management" chapter. You do not need to reset the switch the first time you assign an IP address. Changes to the IP address, however, must be followed by a reset for the change to take effect. You can also use the Bootstrap protocol (BOOTP) described in the "Configuring the Switch for SNMP Management with BOOTP" section in this chapter.

Configuring the Switch for SNMP Management with BOOTP

The switch must be configured with an IP address before it can make available any in-band management. You can assign an individual address to each Catalyst 2820 or 1900, or you can use the BOOTP protocol to maintain a centralized database of such addresses.

A host machine with a BOOTP server program is needed to use BOOTP. 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 are optional. The switch must be able to access the BOOTP server through one of its ports.

After a system reset, the switch looks into its non-volatile random access memory (NVRAM) for a configured IP address, and if that exists, looks for a default gateway address and IP subnet mask.

If an IP address has not been configured, the switch transmits a BOOTP broadcast request to all of its ports having a physical connection, requesting a mapping for its 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, which are all optional.

The reception of a valid BOOTP 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 that the next reset will not have to redeploy BOOTP.

As long as its IP address remains undiscovered, the switch will re-send BOOTP requests for 30 minutes.

For more information about using BOOTP, refer to the BOOTP server documentation.

Standard MIBs and MIB Extensions

The following pages list the actions you use to manage and configure a Catalyst 2820 and 1900 and the MIB objects associated with each action. A complete description of the objects, their defaults, and possible values is included in the *Catalyst 2820 and Catalyst 1900 MIB Reference Manual* available from Cisco Systems.

Parameter changes take effect immediately. However, changed parameters might not be written to permanent storage for up to 30 seconds. If you turn off the switch before the new parameters are written to permanent storage, the change does not take effect the next time the system is reset.

The following five MIBs are supported by the Catalyst 2820 and 1900 and are listed in Tables 6-1 through 6-5:

- Catalyst 2820 and 1900 enterprise-specific MIB
- Module MIB (Catalyst 2820 only)
- Bridge MIB: RFC 1493
- FDDI MIB: RFC 1512 (Catalyst 2820 only)
- RS-232 MIB: RFC 1317

Catalyst 2820 and 1900 Enterprise-Specific MIB

Table 6-1 **Catalyst 2820 and 1900 MIB Objects**

Action	Associated MIB Objects
View Self Test Results	sysInfoPOSTResult sysInfoPOSTPortFailedPostMap
View System Information	sysInfoFwdEngineRevision sysInfoBoardRevision sysInfoTotalNumberOfPorts sysInfoNumberOfSwitchPorts sysInfoNumberOfInstalledModules sysInfoNumberOfSwitchPorts sysInfoNumberOfSharedPorts sysInfoAddrCapacity sysInfoRestrictedStaticAddrCapacity
View/Configure RS-232 Port for an Attached Modem	netMgmtModemInitString netMgmtModemAutoAnswer netMgmtModemDialString netMgmtModemDialDelay

Action	Associated MIB Objects
View/Configure Logon Security	netMgmtConsolePasswordThresh netMgmtConsoleSilentTime netMgmtConsoleInactTime
View/Configure Switching Mode	sysConfigSwitchingMode sysConfigMulticastStoreAndForward
View/Configure Port Monitoring Mode	sysConfigMonitor sysConfigMonitorPort sysConfigHigherProtocolMonitor swPortMonitoring
View/Configure Virtual LAN Information	vlanMaxSupported vlanAllowMembershipOverlap
View/Configure Virtual LAN Membership	vlanIndex vlanName vlanMemberPorts vlanMemberIndex vlanMemberPortIndex vlanMemberPortOfVlan
View/Configure Address Security	swPortAddressingSecurity swPortAddressTableSize swPortSecuredAddressViolations sysConfigAddressViolationAlert sysConfigAddressViolationAction
View/Configure Performance Information	sysInfoBuffersUsed sysInfoMaxBuffers sysInfoUtilDisplay swPortTxQueueFullDiscards swPortRxNoBufferDiscards bandwidthUsageCurrent bandwidthUsageMaxPeakEntries bandwidthUsagePeakInterval bandwidthUsagePeakRestart bandwidthUsageCurrentPeakEntry bandwidthUsagePeakIndex bandwidthUsageStartTime bandwidthUsagePeak bandwidthUsagePeakTime

Standard MIBs and MIB Extensions

Action	Associated MIB Objects
View/Configure Broadcast Storm Control	SysInfoBroadcastStormLastTime SysInfoPortExceedBroadcastStorm SysConfigBroadcastStormAction SysConfigBroadcastStormAlert SysConfigBroadcastThreshold SysConfigBroadcastReEnableThreshold
View RPS State	SysInfoRedundantPowerState SysInfoInternalPowerState
View/Configure Port Characteristics	swPortIndex swPortName swPortMediaCapability swPortControllerRevision swPortMtu swPortSpeed swPortConnectorType swPortFullDuplex swPortBroadcastStormControlBlocked
View/Configure Port Address Status	swPortNumberOfLearnedAddresses swPortNumberOfStaticAddresses swPortEraseAddresses swPortFloodUnregisteredMulticasts swPortFloodUnknownUnicasts
View/Configure Port Status	swPortStatus swPortAdminStatus swPortLastStatus swPortStatusChanges swPortLinkbeatStatus swPortLinkbeatLosses swPortJabberStatus swPortJabbers

Action	Associated MIB Objects
View Port Receive Statistics	swPortRxStatIndex swPortRxTotalOctets swPortRxTotalOctetsWraps swPortRxTotalFrames swPortRxUnicastFrames swPortRxUnicastOctets swPortRxUnicastOctetsWraps swPortRxBroadcastFrames swPortRxBroadcastOctets swPortRxBroadcastOctetsWraps swPortRxMulticastFrames swPortRxMulticastOctets swPortRxMulticastOctetsWraps swPortRxForwardedFrames swPortRxFilteredFrames swPortRxNoBufferDiscards swPortRxFCSerrors swPortRxAlignmentErrors swPortRxFrameTooLongs swPortRxBroadcastFrames

Standard MIBs and MIB Extensions

Action	Associated MIB Objects
View Port Transmit Statistics	swPortTxStatIndex swPortTxTotalOctets swPortTxTotalOctetsWraps swPortTxTotalFrames swPortTxUnicastFrames swPortTxUnicastOctets swPortTxUnicastOctetsWraps swPortTxBroadcastFrames swPortTxBroadcastOctets swPortTxBroadcastOctetsWraps swPortTxMulticastFrames swPortTxMulticastOctets swPortTxMulticastOctetsWraps swPortTxDeferrals swPortTxSingleCollisions swPortTxMultipleCollisions swPortTxLateCollisions swPortTxExcessiveCollisions swPortTxExcessiveDeferrals swPortTxExcessiveCollisions16s swPortTxExcessiveCollisions4s swPortTxQueueFullDiscards swPortTxErrors
View/Configure Collision Histograms	swPortTxCollIndex swPortTxCollCount swPortTxCollFrequencies
View/Configure Spanning-Tree Protocol	sysConfigEnableSTP
View/Configure for In-Band Management	netMgmtIpAddress netMgmtDefaultGateway netMgmtIpSubnetMask vlanIpAddress vlanIpSubnetMask
View/Configure Set Clients	netMgmtSetClientIndex netMgmtSetClientAddr netMgmtSetClientStatus

Action	Associated MIB Objects
View/Configure Trap Clients and Traps	netMgmtTrapClientIndex netMgmtTrapClientAddr netMgmtTrapClientComm netMgmtTrapClientStatus netMgmtEnableLinkTraps netMgmtEnableAuthenTraps
View/Configure Firmware Upgrades	upgradeFlashSize upgradeFlashBankStatus upgradeTFTPServerAddress upgradeTFTPLoadFilename upgradeTFTPInitiate upgradeTFTPAccept
Reset System	sysConfigReset sysConfigDefaultReset
Clear Port Statistics	sysConfigClearPortStats swPortClearStatistics

Module MIB

This MIB applies to the Catalyst 2820 only.

Table 6-2 Module MIB Objects

Action	Associated MIB Objects
View/Configure High-Speed Modules	esModuleCapacity esModuleIndex esModuleStatus esModuleAdminStatus esModuleDescr esModuleID esModuleVersion esModuleObjectID esModulePortCapacity esModuleReset esModuleLastStatusChange esModuleCollisionPeriods esModulePortTable esModulePortIndex esModulePortDescr esModulePortAdminStatus esModulePortAutoPartitionState esModulePortOperStatus esModulePortLinkbeatStatus esModulePortConnectorType esModulePortReceivePeriods

Action	Associated MIB Objects
View FDDI POST Results	fmCfgPOSTResult fmCfgPOSTTest fmCfgPOSTLoopbackResult
Reset FDDI Module	fmCfgResetToFactoryDefaults fmCfgResetModule
View/Configure FDDI to Ethernet Frame Translation	fmCfgNovellFDDISNAPTranslation fmCfgUnmatchedSNAPDestination
View/Configure SMT Authorization	fmCfgAuthorizationChecking fmCfgAuthorizationString
View FDDI Module Firmware Status	fmCfgFirmwareVersion fmCfgBOOTCodeVersion fmCfgFlashStatus
View FDDI Translation to FDDI	fmXlateToFDDIIndex fmXlateToFDDINovellRaw8023ToSnapFrames fmXlateToFDDINovellEthIIToSnapFrames fmXlateToFDDINovellSnapToSnapFrames fmXlateToFDDIEthIIToBridgeTunnelFrames fmXlateToFDDIEthIIToSnapFrames fmXlateToFDDIOtherSnapToSnapFrames fmXlateToFDDI8022To8022Frames
View FDDI Frame Filtering Statistics	fmFilterIndex fmFilterFcsInvalidFrames fmFilterDataLengthFrames fmFilterErrorIndFrames fmFilterFddiFifoOverrunFrames fmFilterFddiInternalErrorFrame fmFilterNoEndDelimitFrames fmFilterNoBufferSpaceFrames fmFilterNoLlcHeaderFrames fmFilterSourceRouteFrames fmFilterNoSnapHeaderFrames fmFilterTooLargeFrames fmFilterNovellSnapFilteredFrames fmFilterCantFragmentFrames fmFilterBadIpHeaderFrames fmFilterRingDownDiscards fmFilterNovellOtherFilteredFrames
View FDDI Performance Information	fmFilterNoBufferSpaceFrames fmCfgUnmatchedSNAPDestination

Standard MIBs and MIB Extensions

Action	Associated MIB Objects
View FDDI Translation to Ethernet Statistics	fmXlateToEthIndex fmXlateToEthNovellSnapToRaw8023Frames fmXlateToEthNovellSnapToEthIIFrames fmXlateToEthNovellSnapToSnapFrames fmXlateToEthAppleTalkSnapToSnapFrames fmXlateToEthIpSnapForFragmentationFrames fmXlateToEthIpSnapFragmentedFrames fmXlateToEthBridgeTunnelToEthIIFrames fmXlateToEthOtherSnapToEthIIFrames fmXlateToEthOtherSnapToSnapFrames fmXlateToEth8022To8022Frames

Bridge MIB (RFC 1493)

Table 6-3 **Bridge MIB Objects**

Action	Associated MIB Objects
View Spanning-Tree Protocol Status	dot1dStpTimeSinceTopologyChange dot1dStpTopChanges dot1dStpDesignatedRoot dot1dStpMaxAge dot1dStpHelloTime dot1dStpHoldTime dot1dStpFowardDelay dot1dStpProtocolSpecification dot1dStpRootCost dot1dStpRootPort
View/Configure Spanning-Tree Protocol Parameters when this Bridge is Acting as Root	dot1dBridgeHelloTime dot1dBridgeMaxAge dot1dBridgeForwardDelay
View/Configure Spanning-Tree Protocol Parameters	dot1dStpPriority

Action	Associated MIB Objects
View/Configure Per Port Spanning-Tree Protocol Status	dot1dStpPortPriority dot1dStpPortState dot1dStpPortEnable dot1dStpPortPathCost dot1dStpPortDesignatedRoot dot1dStpPortDesignatedCost dot1dStpPortDesignatedBridge dot1dStpPortDesignatedPort dot1dStpPortForwardTransitions
View/Configure Address Aging Parameters	dot1dTpLearnedEntryDiscards dot1dTpAgingTime
View/Configure the Forwarding Database of the Bridge	dot1dTpFdbAddress dot1dTpFdbPort dot1dTpFdbStatus
View/Configure the Static Address Table	dot1dStaticAddress dot1dStaticReceivePort dot1dStaticAllowedToGoTo dot1dStaticStatus

FDDI MIB (RFC 1512)

This MIB applies to the Catalyst 2820 only.

Table 6-4 FDDI MIB Objects

Action	Associated MIB Objects
View SMT Information	fddimibSMTStationId fddimibSMTVersionId fddimibSMTMIBVersionId fddimibSMTMACCts fddimibSMTNonMasterCts fddimibSMTConnectionPolicy fddimibSMTBypassPresent fddimibSMTECMState fddimibSMTCFState fddimibSMTRemoteDisconnectFlag fddimibSMTStationStatus

Standard MIBs and MIB Extensions

Action	Associated MIB Objects
View MAC Traffic Statistics	fddimibMACFrameCts fddimibMACCopiedCts fddimibMACTransmitCts fddimibMACErrorCts fddimibMACLostCts fddimibMACTokenCts fddimibMACTvxExpiredCts fddimibMACNotCopiedCts fddimibMACLateCts fddimibMACRingOpCts fddimibMACNotCopiedRatio fddimibMACNotCopiedFlag
View PORT Information	fddimibPORTMyType fddimibPORTNeighborType fddimibPORTConnectionPolicies fddimibPORTCurrentPath fddimibPORTAvailablePaths fddimibPORTPMDClass fddimibPORTLCTFailCts fddimibPORTLemRejectCts fddimibPORTLemCts fddimibPORTPCMState
View/Configure SMT Information	fddimibSMTNotify
View MAC Information	fddimibMACFrameStatusFunctions fddimibMACAvailablePaths fddimibMACUpstreamNbr fddimibMACDownstreamNbr fddimibMACOldUpstreamNbr fddimibMACOldDownstreamNbr fddimibMACDownstreamPORTType fddimibMACTReq fddimibMACTNeg fddimibMACFrameErrorThreshold

RS-232 MIB (RFC 1317)

Table 6-5 RS-232 MIB ObjectsTrap Clients and Traps

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

A trap client is a management workstation configured to receive and process traps. The Catalyst 2820 or 1900 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 “Network Management (SNMP) Configuration” section in the “Out-of-Band Management” chapter for instructions on defining trap clients. See the “Standard MIBs and MIB Extensions” section in this chapter for the MIB objects to use.

Standard MIBs and MIB Extensions

The Catalyst 2820 or 1900 can generate the following traps:

<i>warmStart</i>	Generated when the switch is reset or after the completion of a firmware upgrade where the new firmware is immediately selected for execution. This could be performed in-band or out-of-band with the management console.
<i>coldStart</i>	Generated upon a power-on reset.
<i>linkDown</i>	Generated whenever a port changes to a suspended or disabled state due to spanning-tree blocking of a redundant path, secure address violation, loss of linkbeat, jabber error, or by management intervention. The trap frame carries the index value of the port.
<i>linkUp</i>	Generated when a port changes status from disabled or suspended to enabled.
<i>authenticationFailure</i>	Generated when the switch receives an SNMP message that is not accompanied by a valid community string.
<i>newRoot</i>	The switch generates this bridge-standard trap when it becomes the new root of the spanning tree.
<i>topologyChange</i>	From the bridge MIB, this trap is generated by the switch when any of its ports change from the learning to the forwarding state, from the forwarding state to the blocking state, or when a new root is elected.
<i>logonIntruder</i>	An enterprise-specific trap generated whenever the management console receives repeated logon failures due to invalid passwords. You can define the number of invalid passwords permitted before this trap is generated.
<i>switchDiagnostic</i>	The switch generates this enterprise-specific trap when it does not pass all of the POST tests. Some POST failures are fatal and could prevent the generation of this trap.

<i>AddressViolation</i>	The switch generates this trap when an address violation is detected on a secured port. It can be enabled or suppressed using the object <code>sysConfigAddressViolationAlert</code> .
<i>BroadcastStormControl</i>	This enterprise-specific trap is generated when the number of broadcast packets received from a port is higher than the broadcast threshold defined for the switch. This trap is generated no more than once every 30 seconds. This trap is disabled by default. You can enable it using the object <code>sysConfigBroadcastStormAlert</code>.
<i>rpsFailed</i>	This enterprise-specific trap is generated whenever the redundant power supply connected to the switch fails. It is generated no more than once a minute.

