



Configuring Basic Interface Parameters

This chapter describes how to configure bidirectional forwarding detection.

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Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "New and Changed Information" chapter or the Feature History table in this chapter.

Feature History for Configuring Basic Interface Parameters

This table includes only the updates for those releases that have resulted in additions or changes to the feature.

Table 1: Feature History for Configuring Basic Interface Parameters

Feature Name	Release	Feature Information
Ethernet Link OAM	8.2(3)	The errdisable recovery cause command is enhanced with link-oam-dying-gasp and link-oam-discovery-timeout keywords.
Debounce link up time	7.3(0)D1(1)	Added support for debounce link up time. Updated the link debounce {link-up time} milliseconds command.
Error disabled	6.2(2)	Added the show errdisable {detect recovery} command.
Display errors during policy programming.	6.2(2)	Added the show interface status error policy command which displays the interfaces and VLANs that produce an error during policy programming.
Clear SNMP counters from the interface	6.2(2)	Updated the clear counters interface command to include the snmp keyword that provides an option to clear SNMP values from the interface.
Interface descriptions	6.2(2)	Updated the description command for the increased maximum of 254 case-sensitive, alphanumeric characters.
Enhanced show output for interfaces	6.1(1)	Updated the show interface eth command output.
Port profiles	4.2(1)	Allows you to apply several configurations to a range of interfaces at once.
Basic interface settings	4.0(1)	These features were introduced.

Information About Basic Interface Parameters

The following sections provide information about basic interface parameters:

Interface Description

For the Ethernet and management interfaces, you can configure the description parameter to provide a recognizable name for the interface. Using a unique name for each interface allows you to quickly identify the interface when you are looking at a listing of multiple interfaces.

For information about configuring this parameter for other interfaces, see the “[Configuring the Interface Description](#)” section.

Beacon

The beacon mode allows you to identify a physical port by flashing its link state LED with a green light. By default, this mode is disabled. To identify the physical port for an interface, you can activate the beacon parameter for the interface.

For information about configuring the beacon parameter, see the “[Configuring the Beacon Mode](#)” section.

MDIX

The medium dependent interface crossover (MDIX) parameter enables or disables the detection of a crossover connection between devices. This parameter applies only to copper interfaces. By default, this parameter is enabled.

For information about configuring the MDIX parameter, see the “[Configuring the MDIX Parameter](#)” section.

Debounce Timer

The debounce timer delays notification of a link change, which can decrease traffic loss due to network reconfiguration. You can configure the debounce timer separately for each Ethernet port and specify the delay time in milliseconds. The default value for debounce timer link down is 100 milliseconds and the default value for debounce timer link up is 0 milliseconds.

From Cisco NX-OS Release 7.3(0)D1(1), you can configure separate debounce timer values for debounce timer link down and link up. The debounce timer for link up helps in better convergence after a system reloads and avoids traffic blackholing.

**Caution**

Enabling the debounce timer causes the link-down detections to be delayed, which results in a loss of traffic during the debounce period. This situation might affect the convergence and reconvergence of some Layer 2 and Layer 3 protocols.

For information about configuring the debounce-timer parameters, see the “[Configuring the Debounce Timer](#)” section.

Error Disabled

A port is in the error-disabled (err-disabled) state when the port is enabled administratively (using the **no shutdown** command) but disabled at runtime by any process. For example, if UDLD detects a unidirectional link, the port is shut down at runtime. However, because the port is administratively enabled, the port status displays as err-disable. Once a port goes into the err-disable state, you must manually reenabling it or you can configure a timeout value that provides an automatic recovery. By default, the automatic recovery is not configured, and by default, the err-disable detection is enabled for all causes.

When an interface is in the err-disabled state, use the **errdisable detect cause** command to find information about the error.

You can configure the automatic error-disabled recovery timeout for a particular error-disabled cause and configure the recovery period. The **errdisable recovery cause** command provides an automatic recovery after 300 seconds.

The **errdisable recovery cause** command provides an automatic recovery after 300 seconds.

From Cisco NX-OS Release 8.2(3) the **link-oam-dying-gasp** and the **link-oam-discovery-timeout** options under the **errdisable recovery cause** command enables to recover the Ethernet link OAM.

You can use the **errdisable recovery interval** command to change the recovery period within a range of 30 to 65535 seconds. You can also configure the recovery timeout for a particular err-disable cause.

If you do not enable the error-disabled recovery for the cause, the interface stays in the error-disabled state until you enter the **shutdown** and **no shutdown** commands. If the recovery is enabled for a cause, the interface is brought out of the error-disabled state and allowed to retry operation once all the causes have timed out. Use the **show interface status err-disabled** command to display the reason behind the error.

From Cisco NX-OS Release 6.2(2), you can use the **show errdisable recovery** and **show errdisable detect** commands to display the errdisable recovery and detection runtime information.

Interface Status Error Policy

Cisco NX-OS policy servers such as Access Control List (ACL) Manager and Quality of Service (QoS) Manager, maintain a policy database. A policy, such as a Layer 2 port mode change from access to trunk, which can be ingress, egress or bi-directional, is defined through the command line interface.

Policies are pushed when you configure a policy on an interface, if an interface VLAN membership changes or when the line card boots up, all the configured policies get pushed simultaneously. To ensure that the policies that are pushed are consistent with hardware policies, the **show interface status error policy** command is used to ensure that policies that are pushed are consistent with the hardware policies and that they display the interfaces and VLANs that have errors during the policy programming, enter the **show interface status error policy** command.

To clear the errors and to allow the policy programming to proceed with the running configuration, enter the **no shutdown** command. If the policy programming succeeds, the port is allowed to come up. If the policy programming fails, the configuration is inconsistent with the hardware policies and the port is placed in an error-disabled policy state. The error-disabled policy state remains and the information is stored to prevent the same port from being brought up in the future. This process helps to avoid unnecessary disruption to the system.

Rate Mode

On a 32-port, 10-Gigabit Ethernet module, each set of four ports can handle 10 Gb/s of bandwidth. You can use the rate-mode parameter to dedicate that bandwidth to the first port in the set of four ports or share the bandwidth across all four ports.

The table below identifies the ports that are grouped together to share each 10 Gb/s of bandwidth and which port in the group can be dedicated to use the entire bandwidth.

Table 2: Dedicated and Shared Ports

Ports Groups that Can Share Bandwidth	Ports that Can be Dedicated to Each 10-Gigabit Ethernet of Bandwidth
1, 3, 5, 7	1
2, 4, 6, 8	2
9, 11, 13, 15	9
10, 12, 14, 16	10

Ports Groups that Can Share Bandwidth	Ports that Can be Dedicated to Each 10-Gigabit Ethernet of Bandwidth
17, 19, 21, 23	17
18, 20, 22, 24	18
25, 27, 29, 31	25
26, 28, 30, 32	26



Note All ports in each port group must be part of the same virtual device context (VDC). For more information on VDCs, see the [Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide](#).

Speed Mode and Duplex Mode

The speed mode and duplex mode are interrelated for each Ethernet and management interface. By default, each of these interfaces autonegotiates its speed and duplex mode with the other interface, but you can change these settings. If you change the settings, be sure to use the same speed and duplex mode setting on both interfaces, or use autonegotiation for at least one of the interfaces.

For information about setting the speed and duplex speed for other interfaces, see the “[Configuring the Interface Speed and Duplex Mode](#)” section.

Flow Control

When the receive buffer for an Ethernet port that runs 1 Gb/s or faster fills, flow control enables that port to send an IEEE 802.3x pause frame to the transmitting port to request it to stop transmitting data for a specified amount of time. Transmitting ports, running at any speed, can receive the pause frames to stop their transmission of data.

To allow flow control to work between two ports, you must set the corresponding receive and send flow control parameters for both ports as enabled or desired. When you set the parameter to enabled, the send or receive flow-control function is activated regardless of the setting of the other port. When you set the parameter to desired, the send or receive flow-control function is activated if you set the corresponding flow-control state of the other port to enabled or desired. If you set one of the flow control states to disabled, flow control is disabled for that transmission direction. To see how the different port flow-control states affect the link flow-control state, see the table below.

Table 3: Port Flow Control Influences on Link Flow Control

Port Flow Control States		Link Flow Control State
Port Receiving Data (Sends Pause Frames)	Port Transmitting Data (Receives Pause Frames)	
Enabled	Enabled	Enabled
Enabled	Desired	Enabled

Port Flow Control States		Link Flow Control State
Port Receiving Data (Sends Pause Frames)	Port Transmitting Data (Receives Pause Frames)	
Enabled	Disabled	Disabled
Desired	Enabled	Enabled
Desired	Desired	Enabled
Desired	Disabled	Disabled
Disabled	Enabled	Disabled
Disabled	Desired	Disabled
Disabled	Disabled	Disabled

Port MTU Size

The maximum transmission unit (MTU) size specifies the maximum frame size that an Ethernet port can process. For transmissions to occur between two ports, you must configure the same MTU size for both ports. A port drops any frames that exceed its MTU size.

By default, each port has an MTU of 1500 bytes, which is the IEEE 802.3 standard for Ethernet frames. Larger MTU sizes are possible for more efficient processing of data with less overhead. The larger frames, called jumbo frames, can be up to 9216 bytes in size, which is also the default system jumbo MTU size.

On a Layer 3 interface, you can configure an MTU size between 576 and 9216 bytes. You can configure up to 64 MTU settings for each I/O module.



Note The global LAN port MTU size applies to the traffic through a Layer 3 Ethernet LAN port that is configured with a nondefault MTU size.

For a Layer 2 port, you can configure an MTU size that is either the system default (1500 bytes) or the system jumbo MTU size (initially 9216 bytes).



Note If you change the system jumbo MTU size, Layer 2 ports automatically use the system default MTU size (1500 bytes) unless you specify the new system jumbo MTU size for some or all of those ports.

For information about setting the MTU size, see the “[Configuring Interface MTU Size](#)” section.

Bandwidth

Ethernet ports have a fixed bandwidth of 1,000,000 Kb at the physical level. Layer 3 protocols use a bandwidth value that you can set for calculating their internal metrics. The value that you set is used for informational purposes only by the Layer 3 protocols—it does not change the fixed bandwidth at the physical level. For

example, the Interior Gateway Routing Protocol (IGRP) uses the minimum path bandwidth to determine a routing metric, but the bandwidth at the physical level remains at 1,000,000 Kb.

For information about configuring the bandwidth parameter for other interfaces, see the “[Configuring Bandwidth for Ethernet Interfaces](#)” section.

Throughput Delay

Specifying a value for the throughput-delay parameter provides a value used by Layer 3 protocols; it does not change the actual throughput delay of an interface. The Layer 3 protocols can use this value to make operating decisions. For example, the Enhanced Interior Gateway Routing Protocol (EIGRP) can use the delay setting to set a preference for one Ethernet link over another, if other parameters such as link speed are equal. The delay value that you set is in the tens of microseconds.

For information about configuring the throughput-delay parameter for other interfaces, see the “[Configuring Throughput Delay](#)” section.

Administrative Status

The administrative-status parameter determines whether an interface is up or down. When an interface is administratively down, it is disabled and unable to transmit data. When an interface is administratively up, it is enabled and able to transmit data.

For information about configuring the administrative-status parameter for other interfaces, see the “[Shutting Down and Activating an Interface](#)” section.

Unidirectional Link Detection Parameter

UDLD Overview

The Cisco-proprietary Unidirectional Link Detection (UDLD) protocol allows devices that are connected through fiber-optic or copper (for example, Category 5 cabling) Ethernet cables to monitor the physical configuration of the cables and detect when a unidirectional link exists. When a device detects a unidirectional link, UDLD shuts down the affected LAN port and alerts the user. Unidirectional links can cause a variety of problems, including spanning tree topology loops.

UDLD is a Layer 2 protocol that works with the Layer 1 protocols to determine the physical status of a link. At Layer 1, autonegotiation takes care of physical signaling and fault detection. UDLD performs tasks that autonegotiation cannot perform, such as detecting the identities of neighbors and shutting down misconnected LAN ports. When you enable both autonegotiation and UDLD, Layer 1 and Layer 2 detections work together to prevent physical and logical unidirectional connections and the malfunctioning of other protocols.

A unidirectional link occurs whenever traffic transmitted by the local device over a link is received by the neighbor but traffic transmitted from the neighbor is not received by the local device. If one of the fiber strands in a pair is disconnected, as long as autonegotiation is active, the link does not stay up. In this case, the logical link is undetermined, and UDLD does not take any action. If both fibers are working normally at Layer 1, UDLD at Layer 2 determines whether those fibers are connected correctly and whether traffic is flowing bidirectionally between the correct neighbors. This check cannot be performed by autonegotiation, because autonegotiation operates at Layer 1.

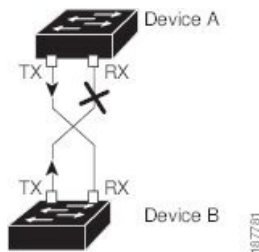
The Cisco Nexus 7000 Series device periodically transmits UDLD frames to neighbor devices on LAN ports with UDLD enabled. If the frames are echoed back within a specific time frame and they lack a specific acknowledgment (echo), the link is flagged as unidirectional and the LAN port is shut down. Devices on both ends of the link must support UDLD in order for the protocol to successfully identify and disable unidirectional links. You can configure the transmission interval for the UDLD frames, either globally or for the specified interfaces.



Note By default, UDLD is locally disabled on copper LAN ports to avoid sending unnecessary control traffic on this type of media.

The figure below shows an example of a unidirectional link condition. Device B successfully receives traffic from device A on the port. However, device A does not receive traffic from device B on the same port. UDLD detects the problem and disables the port.

Figure 1: Unidirectional Link



Default UDLD Configuration

Table 4: UDLD Default Configuration

Feature	Default Value
UDLD global enable state	Globally disabled
UDLD per-port enable state for fiber-optic media	Enabled on all Ethernet fiber-optic LAN ports
UDLD per-port enable state for twisted-pair (copper) media	Disabled on all Ethernet 10/100 and 1000BASE-TX LAN ports
UDLD aggressive mode	Disabled
UDLD message interval	15 seconds

For information about configuring the UDLD for the device and its port, see the “[Configuring UDLD Mode](#)” section.

UDLD Aggressive and Nonaggressive Modes

UDLD aggressive mode is disabled by default. You can configure UDLD aggressive mode only on point-to-point links between network devices that support UDLD aggressive mode. If UDLD aggressive mode is enabled, when a port on a bidirectional link that has a UDLD neighbor relationship established stops

receiving UDLD frame, UDLD tries to reestablish the connection with the neighbor. After eight failed retries, the port is disabled.

To prevent spanning tree loops, nonaggressive UDLD with the default interval of 15 seconds is fast enough to shut down a unidirectional link before a blocking port transitions to the forwarding state (with default spanning tree parameters).

When you enable the UDLD aggressive mode, the following occurs:

- One side of a link has a port stuck (both transmission and receive)
- One side of a link remains up while the other side of the link is down

In these cases, the UDLD aggressive mode disables one of the ports on the link, which prevents traffic from being discarded.



Note You enable the UDLD aggressive mode globally to enable that mode on all the fiber ports. You must enable the UDLD aggressive mode on copper ports on specified interfaces.



Tip When a line card upgrade is being performed during an in-service software upgrade (ISSU) and some of the ports on the line card are members of a Layer 2 port channel and are configured with UDLD aggressive mode, if you shut down one of the remote ports, UDLD puts the corresponding port on the local device into an error-disabled state. This behavior is correct.

To restore service after the ISSU has completed, enter the **shutdown** command followed by the **no shutdown** command on the local port.

Carrier Delay



Note You can configure the carrier delay timer only on VLAN network interfaces. The timer cannot be configured on physical Ethernet interfaces, port channels, and loopback interfaces.

If a link goes down and comes back up before the carrier delay timer expires, the down state is effectively filtered, and the rest of the software on the device is not aware that a link-down event occurred. A large carrier delay timer results in fewer link-up/link-down events being detected. When you set the carrier delay time to 0, the device detects each link-up/link-down event that occurs.

In most environments, a lower carrier delay time is better than a higher one. The exact value that you choose depends on the nature of the link outages and how long you expect these linkages to last in your network. If your data links are subject to short outages (especially if those outages last less time than it takes for your IP routing to converge), you should set a long carrier delay value to prevent these short outages from causing unnecessary problems in your routing tables. However, if your outages tend to be longer, you might want to set a shorter carrier delay time so that the outages are detected sooner, and the IP route convergence begins and ends sooner.

The default carrier-delay time is 100 milliseconds.

Port Channel Parameters

A port channel is an aggregation of physical interfaces that comprise a logical interface. You can bundle up to eight individual interfaces into a port channel to provide increased bandwidth and redundancy. Port channeling also load balances traffic across these physical interfaces. The port channel stays operational if at least one physical interface within the port channel is operational.

You can create a Layer 2 port channel by bundling compatible Layer 2 interfaces, or you can create Layer 3 port channels by bundling compatible Layer 3 interfaces. You cannot combine Layer 2 and Layer 3 interfaces in the same port channel.

Any configuration changes that you apply to the port channel are applied to each interface member of that port channel.

Port Profiles

From Cisco NX-OS Release 4.2(1) for the Cisco Nexus 7000 Series devices, you can create a port profile that contains many interface commands and apply that port profile to a range of interfaces. Each port profile can be applied only to a specific type of interface; the choices are as follows:

- Ethernet
- VLAN network interface
- Loopback
- Port channel
- Tunnel

When you choose Ethernet or port channel as the interface type, the port profile is in the default mode which is Layer 3. Enter the **switchport** command to change the port profile to Layer 2 mode.

You inherit the port profile when you attach the port profile to an interface or range of interfaces. When you attach, or inherit, a port profile to an interface or range of interfaces, the system applies all the commands in that port profile to the interfaces. Additionally, you can have one port profile inherit the settings from another port profile. Inheriting another port profile allows the initial port profile to assume all of the commands of the second, inherited, port profile that do not conflict with the initial port profile. Four levels of inheritance are supported. The same port profile can be inherited by any number of port profiles.

The system applies the commands inherited by the interface or range of interfaces according to the following guidelines:

- Commands that you enter under the interface mode take precedence over the port profile's commands if there is a conflict. However, the port profile retains that command in the port profile.
- The port profile's commands take precedence over the default commands on the interface, unless the port-profile command is explicitly overridden by the default command.
- When a range of interfaces inherits a second port profile, the commands of the initial port profile override the commands of the second port profile if there is a conflict.
- After you inherit a port profile onto an interface or range of interfaces, you can override individual configuration values by entering the new value at the interface configuration level. If you remove the

individual configuration values at the interface configuration level, the interface uses the values in the port profile again.

- There are no default configurations associated with a port profile.

A subset of commands are available under the port-profile configuration mode, depending on which interface type you specify.



Note You cannot use port profiles with Session Manager. See the *Cisco Nexus 7000 Series NX-OS System Management Configuration Guide* http://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus7000/sw/system-management/config/cisco_nexus7000_system-management_config_guide_8x.html for information about Session Manager.

To apply the port-profile configurations to the interfaces, you must enable the specific port profile. You can configure and inherit a port profile onto a range of interfaces prior to enabling the port profile. You would then enable that port profile for the configurations to take effect on the specified interfaces.

If you inherit one or more port profiles onto an original port profile, only the last inherited port profile must be enabled; the system assumes that the underlying port profiles are enabled.

When you remove a port profile from a range of interfaces, the system undoes the configuration from the interfaces first and then removes the port-profile link itself. Also, when you remove a port profile, the system checks the interface configuration and either skips the port-profile commands that have been overridden by directly entered interface commands or returns the command to the default value.

If you want to delete a port profile that has been inherited by other port profiles, you must remove the inheritance before you can delete the port profile.

You can also choose a subset of interfaces from which to remove a port profile from among that group of interfaces that you originally applied the profile. For example, if you configured a port profile and configured ten interfaces to inherit that port profile, you can remove the port profile from just some of the specified ten interfaces. The port profile continues to operate on the remaining interfaces to which it is applied.

If you delete a specific configuration for a specified range of interfaces using the interface configuration mode, that configuration is also deleted from the port profile for that range of interfaces only. For example, if you have a channel group inside a port profile and you are in the interface configuration mode and you delete that port channel, the specified port channel is also deleted from the port profile as well.

Just as in the device, you can enter a configuration for an object in port profiles without that object being applied to interfaces yet. For example, you can configure a virtual routing and forward (VRF) instance without it being applied to the system. If you then delete that VRF and related configurations from the port profile, the system is unaffected.

After you inherit a port profile on an interface or range of interfaces and you delete a specific configuration value, that port-profile configuration is not operative on the specified interfaces.

If you attempt to apply a port profile to the wrong type of interface, the system returns an error.

When you attempt to enable, inherit, or modify a port profile, the system creates a checkpoint. If the port-profile configuration fails, the system rolls back to the prior configuration and returns an error. A port profile is never only partially applied.

Time Domain Reflectometry Cable Diagnostics

From Cisco NX-OS Release 5.0(2) for the Cisco Nexus 7000 Series devices and the introduction of the latest generation of line cards, you can perform cable diagnostics without the use of expensive third-party equipment. With the cable diagnostic capabilities embedded directly in the line cards, you no longer need to unplug cables and connect cable testers to diagnose a link fault. Each port on the line card can independently detect cabling issues and report them to the switch software using Time Domain Reflectometry (TDR).

You can use TDR to analyze a conductor by transmitting a pulsed waveform signal into it and then examine the polarity, amplitude, and round-trip time of the reflected waveform.

By estimating the speed of propagation of the signal in the cable and by measuring the time it takes for its reflection to travel back to the source, it is possible to measure the distance to the reflecting point. Also, by comparing the polarity and amplitude of the original pulse with its reflection, it is possible to distinguish between different types of faults, such as open or shorted pairs.

Being able to remotely diagnose a cable failure, you can now identify the root cause of a problem more quickly and more effectively, providing your users with a prompt response to connectivity issues.

Default Settings for Basic Interfaces Parameters

Table 5: Default Basic Interface Parameter Settings

Parameter	Default
Description	Blank
Beacon	Disabled
Debounce timer link down	Enabled. 100 milliseconds
Debounce timer link up	Disabled
Bandwidth	Data rate of interface
Throughput delay	100 microseconds
Administrative status	Shutdown
MTU	1500 bytes
UDLD global	Globally disabled
UDLD per-port enable state for fiber-optic media	Enabled on all Ethernet fiber-optic LAN ports
UDLD per-port enable state for copper media	Disabled on all Ethernet 10/100 and 1000BASE-TX LAN ports
UDLD message interval	Disabled
UDLD aggressive mode	Disabled

Parameter	Default
Carrier delay	100 milliseconds
Error disable	Disabled
Error disable recovery	Disabled
Error disable recovery interval	300 seconds
Link debounce	Enabled
Port profile	Disabled

Guidelines and Limitations for Basic Interfaces Parameters

Basic interface parameters have the following configuration guidelines and limitations:

- Fiber-optic Ethernet ports must use Cisco-supported transceivers. To verify that the ports are using Cisco-supported transceivers, use the **show interface transceivers** command. Interfaces with Cisco-supported transceivers are listed as functional interfaces.
- A port can be either a Layer 2 or a Layer 3 interface; it cannot be both simultaneously.
By default, each port is a Layer 3 interface.
You can change a Layer 3 interface into a Layer 2 interface by using the **switchport** command. You can change a Layer 2 interface into a Layer 3 interface by using the **no switchport** command.
- When configuring flow control for a local port, consider the following:
 - To receive pause frames when you do not know how the remote port send parameter is configured, set the local port receive parameter to desired.
 - To receive pause frames when you know that the remote port send parameter is enabled or desired, set the local port receive parameter to enabled.
 - To ignore received pause frames, set the local port receive parameter to disabled.
 - To send pause frames when you do not know how the remote port receive parameter is configured, set the local port send parameter to desired.
 - To send pause frames when you know that the remote port receive parameter is enabled or desired, set the local port send parameter to enabled.
 - To prevent the sending of pause frames, set the local port send parameter to disabled.
- You usually configure Ethernet port speed and duplex mode parameters to auto to allow the system to negotiate the speed and duplex mode between ports. If you decide to configure the port speed and duplex modes manually for these ports, consider the following:
 - Before you configure the speed and duplex mode for an Ethernet or management interface, see [Speed Mode and Duplex Mode, on page 5](#) for the combinations of speeds and duplex modes that can be configured at the same time.
 - If you set the Ethernet port speed to auto, the device automatically sets the duplex mode to auto.

- If you enter the **no speed** command, the device automatically sets both the speed and duplex parameters to auto (the **no speed** command produces the same results as the **speed auto** command).
- If you configure an Ethernet port speed to a value other than auto (for example, 10, 100, or 1000 Mb/s), you must configure the connecting port to match. Do not configure the connecting port to negotiate the speed.



Note The device cannot automatically negotiate the Ethernet port speed and duplex mode if the connecting port is configured to a value other than auto.

- Debounce timer link up is supported only on F3-Series Line cards.



Caution Changing the Ethernet port speed and duplex mode configuration might shut down and reenble the interface.

Configuring Basic Interface Parameters

When you configure an interface, you must specify the interface before you can configure its parameters.

Specifying the Interfaces to Configure

Before you can configure the parameters for one or more interfaces of the same type, you must specify the type and the identities of the interfaces.

The table below shows the interface types and identities that you should use for specifying the Ethernet and management interfaces.

Table 6: Information Needed to Identify an Interface for Configurations

Interface Type	Identity
Ethernet	I/O module slot numbers and port numbers on the module
Management	0 (for port 0)

The interface range configuration mode allows you to configure multiple interfaces with the same configuration parameters. After you enter the interface range configuration mode, all command parameters you enter are attributed to all interfaces within that range until you exit out of the interface range configuration mode.

You enter a range of interfaces using dashes (-) and commas (.). Dashes separate contiguous interfaces and commas separate noncontiguous interfaces. When you enter noncontiguous interfaces, you must enter the media type for each interface.

This example shows how to configure a contiguous interface range:

```
switch(config)# interface ethernet 2/29-30
switch(config-if-range)#
```

This example shows how to configure a noncontiguous interface range:

```
switch(config)# interface ethernet 2/29, ethernet 2/33, ethernet 2/35
switch(config-if-range)#
```

You can specify subinterfaces in a range only when the subinterfaces are on the same port, for example, 2/29.1-2. But you cannot specify the subinterfaces in a range of ports, for example, you cannot enter 2/29.2-2/30.2. You can specify two of the subinterfaces discretely, for example, you can enter 2/29.2, 2/30.2.



Note When you are in the interface configuration mode, the commands that you enter configure the interface that you specified for this mode.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters global configuration mode.
Step 2	switch(config)# interface <i>interface</i>	Specifies the interface that you are configuring. You can specify the interface type and identity. For an Ethernet port, use “ethernet slot/port.” For the management interface, use “mgmt0.” Note You do not need to add a space between the interface type and identity (port or slot/port number) For example, for the Ethernet slot 4, port 5 interface, you can specify either “ethernet 4/5” or “ethernet4/5.” The management interface is either “mgmt0” or “mgmt 0.”

Configuring the Interface Description

You can provide textual interface descriptions for the Ethernet and management interfaces. Descriptions can be a maximum of 254 case-sensitive, alphanumeric characters.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface <i>interface</i>	Specifies the interface that you are configuring. You can specify the interface type and identity. For an Ethernet port, use “ethernet slot/port.” For the management interface, use “mgmt0.”
Step 3	switch(config-if)# description <i>text</i>	Specifies the description for the interface. The description is a maximum of 254 characters.

	Command or Action	Purpose
Step 4	switch(config-if)# exit	Exits the interface mode.
Step 5	(Optional) switch(config)# show interface interface	Displays the interface status, which includes the description parameter.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to set the interface description to Ethernet port 24 on module 3:

```
switch# configure terminal
switch(config)# interface ethernet 3/24
switch(config-if)# description server1
switch(config-if)#
```

From Cisco NX-OS Release 6.1, the output of the **show interface eth** command is enhanced as shown in the following example:

```
switch# show interface eth 2/1
Ethernet2/1 is down (SFP not inserted)
admin state is down, Dedicated Interface
Hardware: 1000 Ethernet, address: 0026.9814.0ec1 (bia f866.f23e.0de8)
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, medium is broadcast
auto-duplex, auto-speed
Beacon is turned off
Auto-Negotiation is turned on
Input flow-control is off, output flow-control is off
Auto-mdix is turned off
Switchport monitor is off
EtherType is 0x8100
EEE (efficient-ethernet) : n/a
Last link flapped never
Last clearing of "show interface" counters never
0 interface resets
30 seconds input rate 0 bits/sec, 0 packets/sec
30 seconds output rate 0 bits/sec, 0 packets/sec
```

Configuring the Beacon Mode

You can enable the beacon mode for an Ethernet port to flash its LED to confirm its physical location.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.

	Command or Action	Purpose
Step 2	switch(config)# interface ethernet <i>slot/port</i>	Specifies an interface to configure, and enters interface configuration mode.
Step 3	switch(config-if)# { beacon no beacon }	Enables the beacon mode or disables the beacon mode. The default mode is disabled.
Step 4	(Optional) switch(config)# show interface ethernet <i>slot/port</i>	Displays the interface status, which includes the beacon mode state.
Step 5	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to enable the beacon mode for the Ethernet port 3/1:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# beacon
```

This example shows how to disable the beacon mode for the Ethernet port 3/1:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# no beacon
```

Changing the Bandwidth Rate Mode

You can specify whether each 10 Gb of bandwidth on a 32-port 10-Gigabit Ethernet module is dedicated to one port or shared by four ports in the same port group.

Dedicating Bandwidth to One Port

When you dedicate the bandwidth to one port, you must first administratively shut down the four ports in the group, change the rate mode to dedicated, and then bring the dedicated port administratively up.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface ethernet <i>slot/port</i> , ethernet <i>slot/port</i> , ethernet <i>slot/port</i> , ethernet <i>slot/port</i>	Specifies an Ethernet interface to configure, and enters interface configuration mode.
Step 3	switch(config-if)# shutdown	Administratively shuts down the ports.
Step 4	switch(config)# interface ethernet <i>slot/port</i>	Specifies the first Ethernet interface in a group of interfaces.

	Command or Action	Purpose
Step 5	switch(config-if)# rate-mode dedicated	Dedicates the full bandwidth of 10 Gb to one port. When you dedicate the bandwidth, all subsequent commands for the port are for dedicated mode.
Step 6	switch(config-if)# no shutdown	Brings the port administratively up.
Step 7	(Optional) switch(config-if)# show interface ethernet slot/port capabilities	Displays the interface information including the current rate mode.
Step 8	switch(config-if)# exit	Exits the interface mode.
Step 9	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to configure the dedicated mode for Ethernet port 4/17 in the group that includes ports 4/17, 4/19, 4/21, and 4/23:

```
switch# configure terminal
switch(config)# interface ethernet 4/17, ethernet 4/19, ethernet 4/21, ethernet 4/23
switch(config-if)# shutdown
switch(config-if)# interface ethernet 4/17
switch(config-if)# rate-mode dedicated
switch(config-if)# no shutdown
```

Sharing the Bandwidth Among a Port Group

You can share 10 Gb of bandwidth among a group of ports (four ports) on a 32-port, 10-Gigabit Ethernet module. To share the bandwidth, you must bring the dedicated port administratively down, specify the ports that are to share the bandwidth, change the rate mode to shared, and then bring the ports administratively up.

Before you begin

All ports in the same group must belong to the same VDC.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface ethernet slot/port	Specifies the first Ethernet interface in a group of interfaces.
Step 3	switch(config-if)# shutdown	Administratively shuts down the ports.

	Command or Action	Purpose
Step 4	switch(config)# interface ethernet <i>slot/port</i> , ethernet <i>slot/port</i> , ethernet <i>slot/port</i> , ethernet <i>slot/port</i>	Specifies four Ethernet interfaces to configure (they must be part of the same port group), and enters interface configuration mode.
Step 5	switch(config-if)# rate-mode shared	Sets the shared rate mode for the specified ports.
Step 6	switch(config-if)# no shutdown	Brings the ports administratively up.
Step 7	(Optional) switch(config-if)# show interface ethernet <i>slot/port</i>	Displays the interface information including the current rate mode.
Step 8	switch(config-if)# exit	Exits the interface mode.
Step 9	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to configure the shared mode for Ethernet port 4/17 in the group that includes ports 4/17, 4/19, 4/21, and 4/23:

```
switch# configure terminal
switch(config)# interface ethernet 4/17
switch(config-if)# shutdown
switch(config)# interface ethernet 4/17, ethernet 4/19, ethernet 4/21, ethernet 4/23
switch(config-if)# rate-mode shared
switch(config-if)# no shutdown
```

Configuring the Error-Disabled State

You can view the reason an interface moves to the error-disabled state and configure automatic recovery.

Enabling Error-Disable Detection

You can enable error-disable detection in an application. As a result, when a cause is detected on an interface, the interface is placed in an error-disabled state, which is an operational state that is similar to the link-down state.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# errdisable detect cause { acl-exception all link-flap loopback }	Specifies a condition under which to place the interface in an error-disabled state. The default is enabled.

	Command or Action	Purpose
Step 3	switch(config)# shutdown	Brings the interface down administratively. To manually recover the interface from the error-disabled state, enter this command first.
Step 4	switch(config)# no shutdown	Brings the interface up administratively and enables the interface to recover manually from the error-disabled state.
Step 5	(Optional) switch(config)# show interface status err-disabled	Displays information about error-disabled interfaces.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to enable the error-disabled detection in all cases:

```
switch(config)# errdisable detect cause all
```

Enabling Error-Disabled Recovery

You can specify the application to bring the interface out of the error-disabled state and retry coming up. It retries after 300 seconds, unless you configure the recovery timer (see the **errdisable recovery interval** command).

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# errdisable recovery cause {all bpduguard failed-port-state link-flap loopback miscabling psecure-violation security-violation storm-control uddl vpc peerlink link-oam-discovery-timeout link-oam-dying-gasp}	Specifies a condition under which the interface automatically recovers from the error-disabled state, and the device retries bringing the interface up. The device waits 300 seconds to retry. The default is disabled.
Step 3	(Optional) switch(config)# show interface status err-disabled	Displays information about error-disabled interfaces.
Step 4	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to enable error-disabled recovery under all conditions:

```
switch(config)# errdisable recovery cause all
```

Configuring the Error-Disabled Recovery Interval

You can configure the error-disabled recovery timer value.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# errdisable recovery interval <i>interval</i>	Specifies the interval for the interface to recover from the error-disabled state. The range is from 30 to 65535 seconds, and the default is 300 seconds.
Step 3	(Optional) switch(config)# show interface status err-disabled	Displays information about error-disabled interfaces.
Step 4	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to configure the error-disabled recovery timer to set the interval for recovery to 32 seconds:

```
switch(config)# errdisable recovery interval 32
```

Configuring the MDIX Parameter

If you need to detect the type of connection (crossover or straight) with another copper Ethernet port, enable the medium dependent independent crossover (MDIX) parameter for the local port. By default, this parameter is enabled.

Before you begin

You must enable MDIX for the remote port.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface ethernet <i>slot/port</i>	Specifies an interface to configure, and enters interface configuration mode.

	Command or Action	Purpose
Step 3	switch(config-if)# { mdix auto no mdix }	Specifies whether to enable or disable MDIX detection for the port.
Step 4	(Optional) switch(config-if)# show interface ethernet slot/port capabilities	Displays the interface status, which includes the MDIX status.
Step 5	switch(config-if)# exit	Exits the interface mode.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to enable MDIX for Ethernet port 3/1:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# mdix auto
```

This example shows how to disable MDIX for Ethernet port 3/1:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# no mdix
```

Configuring the Debounce Timer

You can enable the debounce timer for Ethernet ports by specifying a debounce time, in milliseconds (ms), or disable the timer by specifying a debounce time of 0.

You can show the debounce times for all of the Ethernet ports by using the **show interface debounce** command.

Procedure

-
- Step 1** switch# **configure terminal**
Enters the global configuration mode.
- Step 2** switch(config)# **interface ethernet slot/port**
Specifies an interface to configure, and enters interface configuration mode.
- Step 3** switch(config-if)# **link debounce [link-up | time] milliseconds**
Enables the debounce link-up or down timer for the amount of time (0 to 5000 ms) specified. The default value for **link debounce link-up** command is 0. We recommended setting the debounce link-up timer value to 100 ms.
- Note** The **link debounce** command without the **link-up** keyword refers to link down debounce time.

Note The **link debounce link-up** command will override all previous values configured by the user.

Disables the debounce timer if you specify 0 milliseconds.

Step 4 switch(config-if)# **exit**

Exits the interface mode.

Step 5 (Optional) switch(config)# **show interface debounce**

Shows the link debounce time for all of the Ethernet interfaces.

Step 6 (Optional) switch(config)# **copy running-config startup-config**

Copies the running configuration to the startup configuration.

Example

This example shows how to enable the link down debounce timer to 1000 ms for the Ethernet port 3/1:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# link debounce time 1000
```

This example shows how to enable the debounce link-up timer and set the debounce time to 1000 ms for the Ethernet port 3/1:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# link debounce link-up time 1000
```

This example shows how to disable the debounce timer for the Ethernet port 3/1:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# link debounce time 0
```

Configuring the Interface Speed and Duplex Mode

The interface speed and duplex mode are interrelated, so you should configure both of their parameters at the same time.

To see which speeds and duplex modes you can configure together for Ethernet and management interfaces, see [Speed Mode and Duplex Mode, on page 5](#).



Note The interface speed that you specify can affect the duplex mode used for an interface, so you should set the speed before setting the duplex mode. If you set the speed for autonegotiation, the duplex mode is automatically set to be autonegotiated. If you specify 10- or 100-Mb/s speed, the port is automatically configured to use half-duplex mode, but you can specify full-duplex mode instead. If you specify a speed of 1000 Mb/s (1 Gb/s) or faster, full duplex is automatically used.

Before you begin

Make sure that the remote port has a speed setting that supports your changes for the local port. If you want to set the local port to use a specific speed, you must set the remote port for the same speed or set the local port to autonegotiate the speed.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface <i>interface</i>	Specifies the interface that you are configuring. You can specify the interface type and identity. For an Ethernet port, use “ethernet slot/port.” For the management interface, use “mgmt0.”
Step 3	switch(config-if)# speed {{ 10 100 1000 auto [10 100 [1000]]}} { 10000 auto }	For Ethernet ports on the 48-port 10/100/1000 modules, sets the speed at 10 Mb/s, 100 Mb/s, or 1000 Mb/s, or sets the port to autonegotiate its speed with the other 10/100/1000 port on the same link. For Ethernet ports on the 32-port 10-Gigabit Ethernet modules, sets the speed at 10,000 Mb/s (10 Gb/s) or sets the port to autonegotiate its speed with the other 10-Gigabit Ethernet port on the link. For management interfaces, sets the speed as 1000 Mb/s or sets the port to autonegotiate its speed.
Step 4	switch(config-if)# duplex { full half auto }	Specifies the duplex mode as full, half, or autonegotiate.
Step 5	switch(config-if)# exit	Exits the interface mode.
Step 6	(Optional) switch(config)# show interface <i>interface</i>	Displays the interface status, which includes the speed and duplex mode parameters.
Step 7	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to set the speed of Ethernet port 1 on the 48-port, 10/100/1000 module in slot 3 to 1000 Mb/s and full-duplex mode:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# speed 1000
switch(config-if)# duplex full
switch(config-if)#
```

Configuring Flow Control

For Ethernet ports that run at 1 Gb/s or faster, you can enable or disable the port's ability to send and receive flow-control pause frames. For Ethernet ports that run slower than 1 Gb/s, you can enable or disable only the port's ability to receive pause frames.

When enabling flow control for the local port, you either fully enable the local port to send or receive frames regardless of the flow-control setting of the remote port, or you set the local port to use the desired setting used by the remote port. If you enable both the local and remote port for flow control, or set the desired flow control of the other port, or set a combination of those two states, flow control is enabled for those ports.



Note For ports that run at 10 Gb/s, you cannot use the desired state for the send or receive parameter. The **desired** keyword in the **flowcontrol** command is not supported for higher port speeds such as 40 Gb/s and 100 Gb/s.

Before you begin

Make sure that the remote port has the corresponding setting for the flow control that you need. If you want the local port to send flow-control pause frames, make sure that the remote port has a receive parameter set to on or desired. If you want the local port to receive flow-control frames, make sure that the remote port has a send parameter set to on or desired. If you do not want to use flow control, you can set the remote port's send and receive parameters to off.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface ethernet <i>slot/port</i>	Specifies an Ethernet interface to configure by its slot number and port number, and enters the interface configuration mode.
Step 3	switch(config-if)# flowcontrol {send receive} {desired on off}	Specifies the flow-control setting for ports. You can set the send setting for only the ports running at 1000 Mb/s or faster. You can set the receive setting for ports running at any speed.
Step 4	switch(config-if)# exit	Exits the interface mode.

	Command or Action	Purpose
Step 5	(Optional) switch(config)# show interface ethernet slot/port	Displays the interface status, which includes the flow control parameters.
Step 6	(Optional) switch(config)# show interface flowcontrol	Displays the flow control status for all Ethernet ports.
Step 7	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to set Ethernet port 3/1 to send flow control pause frames:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# flowcontrol send on
```

Configuring MTU Size

You can configure the maximum transmission unit (MTU) size for Layer 2 and Layer 3 Ethernet interfaces. For Layer 3 interfaces, you can configure the MTU to be between 576 and 9216 bytes (even values are required). For Layer 2 interfaces, you can configure the MTU to be either the system default MTU (1500 bytes) or the system jumbo MTU size (which has the default size of 9216 bytes).



Note You can change the system jumbo MTU size, but if you change that value, the Layer 2 interfaces that use that value automatically changes to the new system jumbo MTU value.

By default, Cisco NX-OS configures Layer 3 parameters. If you want to configure Layer 2 parameters, you need to switch the port mode to Layer 2.

You can change the port mode by using the **switchport** command.

After changing the port mode to Layer 2, you can return to configuring Layer 3 interfaces by changing the port mode again, by using the **no switchport** command.

Configuring Interface MTU Size

For Layer 3 interfaces, you can configure an MTU size that is between 576 and 9216 bytes.

For Layer 2 interfaces, you can configure all Layer 2 interfaces to use either the default MTU size (1500 bytes) or the system jumbo MTU size (default size of 9216 bytes).

If you need to use a different system jumbo MTU size for Layer 2 interfaces, see the “[Configuring System Jumbo MTU Size](#)” section.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface ethernet <i>slot/port</i>	Specifies an Ethernet interface to configure, and enters interface configuration mode.
Step 3	switch(config-if)# { switchport no switchport }	Specifies to use Layer 2 or Layer 3.
Step 4	switch(config-if)# mtu size	For a Layer 2 interface, specifies either the default MTU size (1500) or the system jumbo MTU size (9216 unless you have changed the system jumbo MTU size). For a Layer 3 interface, specifies any even number between 576 and 9216.
Step 5	switch(config-if)# exit	Exits the interface mode.
Step 6	(Optional) switch(config)# show interface ethernet <i>slot/port</i>	Displays the interface status, which includes the MTU size.
Step 7	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to configure the Layer 2 Ethernet port 3/1 with the default MTU size (1500):

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# switchport
switch(config-if)# mtu 1500
```

Configuring System Jumbo MTU Size

To configure jumbo MTU size for a Layer 2 interface and Layer 2 interfaces and subinterfaces, perform the following task. If you do not configure the system jumbo MTU size, it defaults to 9216 bytes.

When you configure jumbo MTU on a port-channel subinterface you must first enable MTU 9216 on the base interface and then configure it again on the subinterface. If you enable the jumbo MTU on the subinterface before you enable it on the base interface then the following error will be displayed on the console:

```
switch(config)# int po 502.4
switch(config-subif)# mtu 9216
ERROR: Incompatible MTU values
```

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# system jumbomtu <i>size</i>	Specifies the system jumbo MTU size. Use an even number between 1500 and 9216.
Step 3	(Optional) switch(config)# show running-config all	Displays the current operating configuration, which includes the system jumbo MTU size.
Step 4	switch(config)# interface type <i>slot/port</i>	Specifies an interface to configure and enters interface configuration mode. When enabling a port-channel sub interface for Jumbo MTU, first enable the base interface with 'mtu 9216' and then configure each sub interface that supports the MTU size with the 'mtu 9216'. If performed in the incorrect order, Jumbo MTU support will not be enabled.
Step 5	switch(config-if)# mtu <i>size</i>	For a Layer 2 interface, specifies either the default MTU size (1500) or the system jumbo MTU size that you specified earlier. For a Layer 3 interface, specifies any even size between 576 and 9216. Note To enable jumbo MTU for Layer 3 port-channel subinterfaces, you must first enable the base (parent) interface using the mtu 9216 command and then configure the mtu 9216 command for each subinterface on which this MTU size is to be supported. If you configure the commands in the reverse order (subinterface first and then the base interface), the following message is displayed: Incompatible MTU values.
Step 6	switch(config-if)# exit	Exits the interface mode.
Step 7	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to configure the system jumbo MTU as 8000 bytes and how to change the MTU specification for an interface that was configured with the previous jumbo MTU size:

```

switch# configure terminal
switch(config)# system jumbomtu 8000
switch(config)# show running-config
switch(config)# interface ethernet 2/2
switch(config-if)# switchport
switch(config-if)# mtu 8000

```

Configuring Bandwidth for Ethernet Interfaces

You can configure the bandwidth for Ethernet interfaces. The physical level uses an unchangeable bandwidth of 1 GB, but you can configure a value of 1 to 10,000,000 Kb for Level 3 protocols.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface ethernet <i>slot/port</i>	Specifies an Ethernet interface to configure, and enters interface configuration mode.
Step 3	switch(config-if)# bandwidth <i>kbps</i>	Specifies the bandwidth as an informational-only value between 1 and 10,000,000.
Step 4	switch(config-if)# exit	Exits the interface mode.
Step 5	(Optional) switch(config)# show interface ethernet <i>slot/port</i>	Displays the interface status, which includes the bandwidth value.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to configure an informational value of 1,000,000 Kb for the Ethernet slot 3, port 1 interface bandwidth parameter:

```

switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# bandwidth 1000000

```

Configuring Throughput Delay

You can configure the interface throughput delay for Ethernet interfaces. The actual delay time does not change, but you can set an informational value between 1 and 16777215, where the value represents the number of tens of microseconds.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface ethernet slot/port	Specifies an Ethernet interface to configure, and enters interface configuration mode.
Step 3	switch(config-if)# delay value	Specifies the delay time in tens of microseconds. You can set an informational value range between 1 and 16777215 tens of microseconds.
Step 4	switch(config-if)# exit	Exits the interface mode.
Step 5	(Optional) switch(config)# show interface ethernet slot/port	Displays the interface status, which includes the throughput-delay time.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to configure the throughput-delay time so that one interface is preferred over another. A lower delay value is preferred over a higher value. In this example, Ethernet 7/48 is preferred over 7/47. The default delay for 7/48 is less than the configured value on 7/47, which is set for the highest value (16777215):

```
switch# configure terminal
switch(config)# interface ethernet 7/47
switch(config-if)# delay 16777215
switch(config-if)# ip address 192.168.10.1/24
switch(config-if)# ip router eigrp 10
switch(config-if)# no shutdown
switch(config-if)# exit
switch(config)# interface ethernet 7/48
switch(config-if)# ip address 192.168.11.1/24
switch(config-if)# ip router eigrp 10
switch(config-if)# no shutdown
```



Note You must first ensure the EIGRP feature is enabled by running the feature eigrp command.

Shutting Down and Activating an Interface

You can shut down and restart Ethernet or management interfaces. When you shut down interfaces, they become disabled and all monitoring displays show them as being down. This information is communicated to other network servers through all dynamic routing protocols. When the interfaces are shut down, the interface is not included in any routing updates. To activate the interface, you must restart the device.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface <i>interface</i>	Specifies the interface that you are configuring. You can specify the interface type and identity. For an Ethernet port, use “ethernet slot/port.” For the management interface, use “mgmt0.”
Step 3	switch(config-if)# shutdown	Disables the interface.
Step 4	(Optional) switch(config-if)# show interface <i>interface</i>	Displays the interface status, which includes the administrative status.
Step 5	switch(config-if)# no shutdown	Reenables the interface.
Step 6	(Optional) switch(config-if)# show interface <i>interface</i>	Displays the interface status, which includes the administrative status.
Step 7	switch(config-if)# exit	Exits the interface mode.
Step 8	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to change the administrative status for Ethernet port 3/1 from disabled to enabled:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# shutdown
switch(config-if)# no shutdown
```

Configuring UDLD Mode

You can configure normal or aggressive unidirectional link detection (UDLD) modes for Ethernet interfaces on devices configured to run UDLD. Before you can enable a UDLD mode for an interface, you must make sure that UDLD is already enabled on the device that includes the interface. UDLD must also be enabled on the other linked interface and its device.

The table below lists CLI details to enable and disable UDLD on different interfaces.

Description	Fiber port	Copper or Nonfiber port
Default setting	Enabled	Disabled
Enable UDLD command	no udld disable	udld enable

Description	Fiber port	Copper or Nonfiber port
Disable UDLD command	udld disable	no udld enable

To use the normal UDLD mode, you must configure one of the ports for normal mode and configure the other port for the normal or aggressive mode. To use the aggressive UDLD mode, you must configure both ports for the aggressive mode.

By default, UDLD is disabled for the 48-port, 10/100/1000 Ethernet module ports but the normal UDLD mode is enabled for the 32-port, 10-Gigabit Ethernet module ports.

Before you begin

You must enable UDLD for the other linked port and its device.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# feature udld	Enables UDLD for the device. The no feature udld disables UDLD for the device.
Step 3	(Optional) switch(config)# udld message-time <i>seconds</i>	Specifies the interval between sending UDLD messages. The range is from 7 to 90 seconds, and the default is 15 seconds. Note The interface level timer changes only if bidirectional UDLD status is detected, otherwise the timer remains at 7 seconds and cannot be changed.
Step 4	(Optional) switch(config)# udld aggressive	Specifies UDLD mode to be aggressive. Note For copper interfaces, you enter the interface command mode for those interfaces you want to configure for UDLD aggressive mode and issue this command in interface command model.
Step 5	(Optional) switch(config)# interface ethernet <i>slot/port</i>	Specifies an Ethernet interface to configure, and enters interface configuration mode.
Step 6	(Optional) switch(config-if)# udld {enable disable}	Enables UDLD on the specified copper port or disables UDLD on the specified fiber port. To enable UDLD on copper ports enter the udld enable command. To enable UDLD on fiber ports, enter the no udld disable command. See the table above for more details.

	Command or Action	Purpose
Step 7	<code>switch(config-if)# exit</code>	Exits the interface mode.
Step 8	(Optional) <code>switch(config)# show udld [ethernet slot/port global neighbors]</code>	Displays the UDLD status.
Step 9	(Optional) <code>switch(config)# copy running-config startup-config</code>	Copies the running configuration to the startup configuration.

Example

This example shows how to enable the UDLD for the device:

```
switch# configure terminal
switch(config)# feature udld
```

This example shows how to set the UDLD message interval to 30 seconds:

```
switch# configure terminal
switch(config)# feature udld
switch(config)# udld message-time 30
```

This example shows how to enable the aggressive UDLD mode for fiber interfaces:

```
switch# configure terminal
switch(config)# feature udld
switch(config)# udld aggressive
```

This example shows how to enable the aggressive UDLD mode for the copper interface Ethernet 3/1:

```
switch# configure terminal
switch(config)# feature udld
switch(config)# udld aggressive
switch(config)# interface ethernet 3/1
switch(config-if-range)# udld enable
```

This example shows how to disable UDLD for Ethernet port 3/1:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if-range)# no udld enable
switch(config-if-range)# exit
```

This example shows how to disable UDLD for the device:

```
switch# configure terminal
switch(config)# no feature udld
switch(config)# exit
```

Configuring Carrier Delay Timer

The carrier delay timer sets a time during which all link-down/link-up events are not detected by any of the other software on the device. When you configure a longer carrier delay time, fewer link-down/link-up events are recorded. When you configure the carrier delay time to 0, the device detects each link-down/link-up event.



Note You can configure the carrier delay timer only on VLAN network interfaces; you cannot configure this timer in any other interface modes.

Before you begin

Ensure that you are in VLAN interface mode. You cannot configure the carrier delay timer in any other interface mode.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface vlan <i>vlan-id</i>	Enters the VLAN interface mode.
Step 3	switch(config-if)# carrier-delay {sec msec number }	Sets the carrier delay timer. You can set the time between 0 to 60 seconds or 0 to 1000 milliseconds. The default is 100 milliseconds.
Step 4	switch(config-if)# exit	Exits the interface mode.
Step 5	(Optional) switch(config)# show interface <i>vlan-id</i>	Displays the interface status.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to set the carrier delay timer to 20 seconds for VLAN 5:

```
switch# configure terminal
switch(config)# interface vlan 5
switch(config-if)# carrier-delay 20
```

Configuring Port Profiles

You can apply several configuration parameters to a range of interfaces simultaneously. All the interfaces in the range must be the same type. You can also inherit the configurations from one port profile into another port profile. The system supports four levels of inheritance.

Creating a Port Profile

You can create a port profile on the device. Each port profile must have a unique name across types and the network.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# port-profile [type { ethernet interface-vlan loopback port channel tunnel }] <i>name</i>	Creates and names a port profile for the specified type of interface and enters the port-profile configuration mode.
Step 3	switch(config-ppm)# exit	Exits the port-profile configuration mode.
Step 4	(Optional) switch(config)# show port-profile	Displays the port-profile configuration.
Step 5	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to create a port profile named test for tunnel interfaces:

```
switch# configure terminal
switch(config)# port-profile type tunnel test
switch(config-ppm)#
```

Entering Port-Profile Configuration Mode and Modifying a Port Profile

You can enter the port-profile configuration mode and modify a port profile. To modify the port profile, you must be in the port-profile configuration mode.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# port-profile [type { ethernet interface-vlan loopback port channel tunnel }] <i>name</i>	Enters the port-profile configuration mode for the specified port profile and allows you to add or remove configurations to the profile.
Step 3	switch(config-ppm)# exit	Exits the port-profile configuration mode.
Step 4	(Optional) switch(config)# show port-profile	Displays the port-profile configuration.
Step 5	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to enter the port-profile configuration mode for the specified port profile and bring all the interfaces administratively up:

```
switch# configure terminal
switch(config)# port-profile type tunnel test
switch(config-ppm)# no shutdown
switch(config-ppm)#
```

Assigning a Port Profile to a Range of Interfaces

You can assign a port profile to an interface or to a range of interfaces. All the interfaces must be the same type.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface [ethernet <i>slot/port</i> interface-vlan <i>vlan-id</i> loopback <i>number</i> port-channel <i>number</i> tunnel <i>number</i>]	Selects the range of interfaces.
Step 3	switch(config-if)# inherit port-profile <i>name</i>	Assigns the specified port profile to the selected interfaces.
Step 4	switch(config-ppm)# exit	Exits the port-profile configuration mode.
Step 5	(Optional) switch(config)# show port-profile	Displays the port-profile configuration.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to assign the port profile named adam to Ethernet interfaces 7/3 to 7/5, 10/2, and 11/20 to 11/25:

```
switch# configure terminal
switch(config)# interface ethernet7/3-5, ethernet10/2, ethernet11/20-25
switch(config-if)# inherit port-profile adam
switch(config-if)#
```

Enabling a Specific Port Profile

To apply the port-profile configurations to the interfaces, you must enable the specific port profile. You can configure and inherit a port profile onto a range of interfaces before you enable that port profile. You would then enable that port profile for the configurations to take effect on the specified interfaces.

If you inherit one or more port profiles onto an original port profile, only the last inherited port profile must be enabled; the system assumes that the underlying port profiles are enabled.

You must be in the port-profile configuration mode to enable or disable port profiles.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# port-profile [type { ethernet interface-vlan loopback port channel tunnel }] <i>name</i>	Creates and names a port profile for the specified type of interface and enters the port-profile configuration mode.
Step 3	switch(config-ppm)# state enabled	Enables that port profile.
Step 4	switch(config-ppm)# exit	Exits the port-profile configuration mode.
Step 5	(Optional) switch(config)# show port-profile	Displays the port-profile configuration.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to enter the port-profile configuration mode and enable the port profile:

```
switch# configure terminal
switch(config)# port-profile type tunnel test
switch(config-ppm)# state enabled
switch(config-ppm)#
```

Inheriting a Port Profile

You can inherit a port profile onto an existing port profile. The system supports four levels of inheritance.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# port-profile <i>name</i>	Enters the port-profile configuration mode for the specified port profile.
Step 3	switch(config-ppm)# inherit port-profile <i>name</i>	Inherits another port profile onto the existing one. The original port profile assumes all the configurations of the inherited port profile.
Step 4	switch(config-ppm)# exit	Exits the port-profile configuration mode.

	Command or Action	Purpose
Step 5	(Optional) switch(config)# show port-profile	Displays the port-profile configuration.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to inherit the port profile named adam onto the port profile named test:

```
switch# configure terminal
switch(config)# port-profile test
switch(config-ppm)# inherit port-profile adam
switch(config-ppm)#
```

Removing a Port Profile from a Range of Interfaces

You can remove a port profile from some or all of the interfaces to which you have applied the profile. You do this configuration in the interfaces configuration mode.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# interface [ethernet <i>slot/port</i> interface-vlan <i>vlan-id</i> loopback <i>number</i> port-channel <i>number</i> tunnel <i>number</i>]	Selects the range of interfaces.
Step 3	switch(config-if)# inherit port-profile <i>name</i>	Assigns the specified port profile to the selected interfaces.
Step 4	switch(config-if)# exit	Exits the port-profile configuration mode.
Step 5	(Optional) switch(config)# show port-profile	Displays the port-profile configuration.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to assign the port profile named adam to Ethernet interfaces 7/3 to 7/5, 10/2, and 11/20 to 11/25:

```
switch# configure terminal
switch(config)# interface ethernet 7/3-5, 10/2, 11/20-25
switch(config-if)# inherit port-profile adam
switch(config-if)#
```

Removing an Inherited Port Profile

You can remove an inherited port profile. You do this configuration in the port-profile mode.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# port-profile name	Enters the port-profile configuration mode for the specified port profile.
Step 3	switch(config-ppm)# inherit port-profile name	Removes an inherited port profile from this port profile.
Step 4	switch(config-ppm)# exit	Exits the port-profile configuration mode.
Step 5	(Optional) switch(config)# show port-profile	Displays the port-profile configuration.
Step 6	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to remove the inherited port profile named adam from the port profile named test:

```
switch# configure terminal
switch(config)# port-profile test
switch(config-ppm)# no inherit port-profile adam
switch(config-ppm)#
```

Performing TDR Cable Diagnostics

You can perform cable diagnostics without the use of expensive third-party equipment. Each port on the line card can independently detect cabling issues and report them to the switch software using TDR diagnostics.

Before you begin

The TDR test guidelines are as follows:

- TDR can test cables up to a maximum length of 115 meters.
- Do not start the test at the same time on both ends of the cable. Starting the test at both ends of the cable at the same time can lead to false test results.
- Do not change the port configuration during any cable diagnostics test. This action may result in incorrect test results.
- All ports in the associated port group must be shut down before running the TDR test.

Procedure

	Command or Action	Purpose
Step 1	switch# test cable-diagnostics tdr interface <i>number</i>	Starts the TDR test on the specified interface. You must have previously run the shutdown command on the interface.
Step 2	(Optional) switch# show interface <i>number</i> cable-diagnostics-tdr	Shows the TDR test results for the specified interface.

Example

This example shows how to perform a TDR test on a specific interface. In this example, ethernet 3/1 has a missing cable, and ethernet 3/12 is a good cable and connection.

```
switch(config)# interface ethernet 3/1-12
switch(config-if-range)# shutdown
switch# test cable-diagnostics tdr interface ethernet 3/1
switch# test cable-diagnostics tdr interface ethernet 3/12
switch# show interface ethernet 3/1 cable-diagnostics-tdr
```

```
-----
Interface      Speed  Pair Cable Length  Distance to fault Channel  Pair Status
-----
Eth3/1         auto   ---   N/A              1 +/- 2 m                Pair A   Open
                auto   ---   N/A              1 +/- 2 m                Pair B   Open
                auto   ---   N/A              1 +/- 2 m                Pair C   Open
                auto   ---   N/A              1 +/- 2 m                Pair D   Open
```

```
n7000# show interface ethernet 3/12 cable-diagnostics-tdr
```

```
-----
Interface      Speed  Pair Cable Length  Distance to fault Channel  Pair Status
-----
Eth3/12        1000   ---   N/A              N/A                      Pair A   Terminated
                ---   N/A              N/A                      Pair B   Terminated
                ---   N/A              N/A                      Pair C   Terminated
                ---   N/A              N/A                      Pair D   Terminated
```

Configuring Rate Limits for Packets that Reach the Supervisor

From Cisco NX-OS Release 5.1, you can configure rate limits globally on the device for packets that reach the supervisor module. For more information, see the [Cisco Nexus 7000 Series NX-OS Security Configuration Guide](#).

You can configure rate limits for packets that reach the supervisor module on a particular interface.



Note If the rate of incoming or outgoing packets exceeds the configured rate limit, the device logs a system message, but does not drop any packets.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# [no] rate-limit cpu direction {input output both} pps <i>packets</i> action log	Configures the rate limits for packets that reach the supervisor module on a particular interface. If the rate of incoming or outgoing packets exceeds the configured rate limit, the device logs a system message but does not drop any packets. The range is from 1 to 100000. The default rate is 10000.
Step 3	switch(config-ppm)# exit	Exits the port-profile configuration mode.
Step 4	(Optional) show system internal pktmgr interface ethernet <i>slot/port</i>	Displays the inbound and outbound rate limit configuration for packets that reach the supervisor module on a specific interface.
Step 5	(Optional) switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to configure the rate limits for packets that reach the supervisor module on a specific interface:

```
switch# rate-limit cpu direction both pps 1000 action log
switch# show system internal pktmgr interface ethernet 4/9
Ethernet4/9, ordinal: 44
SUP-traffic statistics: (sent/received)
Packets: 528 / 0
Bytes: 121968 / 0
Instant packet rate: 0 pps / 0 pps
Packet rate limiter (Out/In): 1000 pps / 1000 pps
Average packet rates(1min/5min/15min/EWMA):
Packet statistics:
Tx: Unicast 0, Multicast 528
Broadcast 0
Rx: Unicast 0, Multicast 0
Broadcast 0
```

Verifying Basic Interface Parameters

You can verify the basic interface parameters by displaying their values. You can also clear the counters listed when you display the parameter values.



Note The system displays only those ports that are allocated to the VDC that you are working in.

Use the information in the below table to verify the basic interface parameters.

Table 7: Verifying Basic Interface Parameters

Command	Purpose
<code>show cdp</code>	Displays the CDP status.
<code>show interface interface</code>	Displays the configured states of one or all interfaces.
<code>show interface brief</code>	Displays a table of interface states.
<code>show interface switchport</code>	Displays the status of Layer 2 ports.
<code>show interface status err-disabled</code>	Displays information about error-disabled interfaces.
<code>show interface status error policy [detail]</code>	Displays errors about interfaces and VLANs that are inconsistent with hardware policies. The detail command displays the details of the interfaces that produce an error.
<code>show vdc</code>	Displays the status of the existing VDCs.
<code>show udld interface</code>	Displays the UDLD status for the current interface or all interfaces.
<code>show udld-global</code>	Displays the UDLD status for the current device.
<code>show port-profile</code>	Displays information about the port profiles.
<code>show system internal pktmgr internal ethernet slot/port</code>	Displays the inbound and outbound rate limit configuration for packets that reach the supervisor module on a specific interface.
<code>show errdisable {recovery detect}</code>	Displays the errdisable recovery and detection runtime information.

For detailed information about the fields in the output from these commands, see the [Cisco Nexus 7000 Series NX-OS Interfaces Command Reference](#).

Monitoring Interface Counters

Displaying Interface Statistics

You can set up to three sampling intervals for statistics collections on interfaces.



Note F2 Series I/O modules do not support per-VLAN statistics. Therefore, the show interface command will not display per-VLAN Rx/Tx counters or statistics for switch virtual interfaces (SVIs).

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters the global configuration mode.
Step 2	switch(config)# load-interval counters {{1 2 3} <i>seconds</i> }	Sets up to three sampling intervals to collect bit-rate and packet-rate statistics. The default values for each counter is as follows: <ul style="list-style-type: none"> • 1—30 seconds; 60 seconds for VLAN network interface • 2—300 seconds • 3—not configured
Step 3	(Optional) switch(config)# show interface <i>interface</i>	Displays the interface status, which includes the counters.
Step 4	switch(config)# exit	Exits the port-profile configuration mode.
Step 5	(Optional) switch# copy running-config startup-config	Copies the running configuration to the startup configuration.

Example

This example shows how to set the three sample intervals for the Ethernet port 3/1:

```
switch# configure terminal
switch(config)# interface ethernet 3/1
switch(config-if)# load-interval counter 1 60
switch(config-if)# load-interval counter 2 135
switch(config-if)# load-interval counter 3 225
switch(config-if)#
```

Clearing Interface Counters

You can clear the Ethernet and management interface counters by using the **clear counters interface** command. You can perform this task from the configuration mode or interface configuration mode.

Procedure

	Command or Action	Purpose
Step 1	switch# clear counters interface {all [snmp] ethernet <i>slot/port</i> [snmp] loopback <i>number</i> mgmt <i>number</i> port channel <i>channel-number</i> tunnel <i>tunnel-number</i> vlan <i>vlan-number</i> }	Clears the interface counters.
Step 2	(Optional) switch# show interface <i>interface</i>	Displays the interface status.

	Command or Action	Purpose
Step 3	(Optional) switch# show interface [ethernet slot/port port-channel channel-number] counters	Displays the interface counters.

Example

This example shows how to clear the Simple Network Management protocol (SNMP) counters on Ethernet port 5/5:

```
switch# clear counters interface ethernet 5/5 snmp
switch#
```

Related Documents

Table 8: Related Documents

Related Topic
Cisco Nexus 7000 Series NX-OS Interfaces Command Reference
Cisco Nexus 7000 Series NX-OS System Management Configuration Guide
Cisco Nexus 7000 Series NX-OS High Availability and Redundancy Guide
Cisco Nexus 2000 Series NX-OS Fabric Extender Software Configuration Guide for Cisco Nexus 7000 Series Switches, Release 6.x
Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide
Cisco NX-OS Licensing Guide
VLANs, MAC address tables, private VLANs, and the Spanning Tree Protocol. Cisco Nexus 7000 Series NX-OS Layer 2 Switching Configuration Guide
Cisco Nexus 7000 Series NX-OS FabricPath Command Reference
Cisco Nexus 7000 Series NX-OS FabricPath Configuration Guide
Cisco Nexus 7000 Series NX-OS Release Notes