Configuring IPv4

This chapter describes how to configure Internet Protocol version 4 (IPv4), which includes addressing, Address Resolution Protocol (ARP), and Internet Control Message Protocol (ICMP), on the Cisco NX-OS switch.

This chapter includes the following sections:

Information About IPv4

You can configure IP on the switch to assign IP addresses to network interfaces. When you assign IP addresses, you enable the interfaces and allow communication with the hosts on those interfaces.

You can configure an IP address as primary or secondary on a switch. An interface can have one primary IP address and multiple secondary addresses. All networking switches on an interface should share the same primary IP address because the packets that are generated by the switch always use the primary IPv4 address. Each IPv4 packet is based on the information from a source or destination IP address. See the "Multiple IPv4 Addresses" section on page 2-2.

You can use a subnet to mask the IP addresses. A mask is used to determine what subnet an IP address belongs to. An IP address contains the network address and the host address. A mask identifies the bits that denote the network number in an IP address. When you use the mask to subnet a network, the mask is then referred to as a subnet mask. Subnet masks are 32-bit values that allow the recipient of IP packets to distinguish the network ID portion of the IP address from the host ID portion of the IP address.

The IP feature in the Cisco NX-OS system is responsible for handling IPv4 packets, as well as the forwarding of IPv4 packets, which includes IPv4 unicast and multicast route lookup, reverse path forwarding (RPF) checks, software access control list/policy based routing (ACL/PBR) forwarding, and

and policy-based routing (PBR). The IP feature also manages the network interface IP address configuration, duplicate address checks, static routes, and packet send and receive interface for IP clients.

This section includes the following topics:

Multiple IPv4 Addresses

The Cisco NX-OS system supports multiple IP addresses per interface. You can specify an unlimited number of secondary addresses for a variety of situations. The most common situations are as follows:

- When there are not enough host IP addresses for a particular network interface. For example, if your subnetting allows up to 254 hosts per logical subnet, but on one physical subnet you must have 300 host addresses, then you can use secondary IP addresses on the routers or access servers to allow you to have two logical subnets using one physical subnet.
- Two subnets of a single network might otherwise be separated by another network. You can create a single network from subnets that are physically separated by another network by using a secondary address. In these instances, the first network is extended, or layered on top of the second network. A subnet cannot appear on more than one active interface of the router at a time.

Note If any switch on a network segment uses a secondary IPv4 address, all other switches on that same network interface must also use a secondary address from the same network or subnet. The inconsistent use of secondary addresses on a network segment can quickly cause routing loops.

Address Resolution Protocol

Networking switches and Layer 3 switches use Address Resolution Protocol (ARP) to map IP (network layer) addresses to (Media Access Control [MAC]-layer) addresses to enable IP packets to be sent across networks. Before a switch sends a packet to another switch, it looks in its own ARP cache to see if there is a MAC address and corresponding IP address for the destination switch. If there is no entry, the source switch sends a broadcast message to every switch on the network.

Each switch compares the IP address to its own. Only the switch with the matching IP address replies to the switch that sends the data with a packet that contains the MAC address for the switch. The source switch adds the destination switch MAC address to its ARP table for future reference, creates a data-link header and trailer that encapsulates the packet, and proceeds to transfer the data. Figure 2-1 shows the ARP broadcast and response process.

Figure 2-1 ARP Process

When the destination switch lies on a remote network which is beyond another switch, the process is the same except that the switch that sends the data sends an ARP request for the MAC address of the default gateway. After the address is resolved and the default gateway receives the packet, the default gateway broadcasts the destination IP address over the networks connected to it. The switch on the destination switch network uses ARP to obtain the MAC address of the destination switch and delivers the packet. ARP is enabled by default.

The default system-defined CoPP policy rate-limits ARP broadcast packets. The default system-defined CoPP policy prevents an ARP broadcast storm from affecting the control plane traffic but does not affect bridged packets.

ARP Caching

ARP caching minimizes broadcasts and limits wasteful use of network resources. The mapping of IP addresses to MAC addresses occurs at each hop (switch) on the network for every packet sent over an internetwork, which may affect network performance.

ARP caching stores network addresses and the associated data-link addresses in memory for a period of time, which minimizes the use of valuable network resources to broadcast for the same address each time a packet is sent. You must maintain the cache entries since the cache entries are set to expire periodically because the information might become outdated. Every switch on a network updates its tables as addresses are broadcast.

Static and Dynamic Entries in the ARP Cache

You must manually configure the IP addresses, subnet masks, gateways, and corresponding MAC addresses for each interface of each switch when using static routes. Static routing enables more control but requires more work to maintain the route table. You must update the table each time you add or change routes.

Dynamic routing uses protocols that enable the switches in a network to exchange routing table information with each other. Dynamic routing is more efficient than static routing because the route table is automatically updated unless you add a time limit to the cache. The default time limit is 25 minutes but you can modify the time limit if the network has many routes that are added and deleted from the cache.

Devices That Do Not Use ARP

When a network is divided into two segments, a bridge joins the segments and filters traffic to each segment based on MAC addresses. The bridge builds its own address table that uses MAC addresses only, as opposed to a switch, which has an ARP cache that contains both IP addresses and the corresponding MAC addresses.

Passive hubs are central-connection switches that physically connect other switches in a network. They send messages out on all their ports to the switches and operate at Layer 1 but do not maintain an address table.

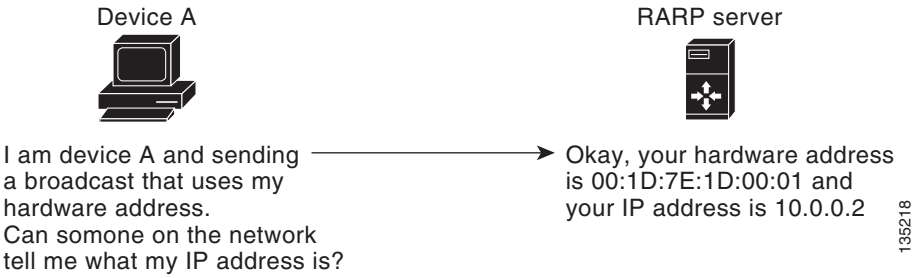
Layer 2 switches determine which port is connected to a device to which the message is addressed and send only to that port, unlike a hub, which sends the message out all of its ports. However, Layer 3 switches are switches that build an ARP cache (table).

Reverse ARP

Reverse ARP (RARP) as defined by RFC 903 works the same way as ARP, except that the RARP request packet requests an IP address instead of a MAC address. RARP often is used by diskless workstations because this type of device has no way to store IP addresses to use when they boot. The only address that is known is the MAC address because it is burned into the hardware.

Use of RARP requires an RARP server on the same network segment as the router interface. Figure 2-2 illustrates how RARP works.

Figure 2-2 Reverse ARP



There are several limitations of RARP. Because of these limitations, most businesses use DHCP to assign IP addresses dynamically. DHCP is cost effective and requires less maintenance than RARP. The following are the most important limitations:

- Because RARP uses hardware addresses, if the internetwork is large with many physical networks, a RARP server must be on every segment with an additional server for redundancy. Maintaining two servers for every segment is costly.
- Each server must be configured with a table of static mappings between the hardware addresses and IP addresses. Maintenance of the IP addresses is difficult.
- RARP only provides IP addresses of the hosts and not subnet masks or default gateways.

Proxy ARP

Proxy ARP enables a switch that is physically located on one network appear to be logically part of a different physical network connected to the same switch or firewall. Proxy ARP allows you to hide a switch with a public IP address on a private network behind a router and still have the switch appear to be on the public network in front of the router. By hiding its identity, the router accepts responsibility for routing packets to the real destination. Proxy ARP can help switches on a subnet reach remote subnets without configuring routing or a default gateway.

When switches are not in the same data link layer network but in the same IP network, they try to transmit data to each other as if they are on the local network. However, the router that separates the switches does not send a broadcast message because routers do not pass hardware-layer broadcasts and the addresses cannot be resolved.

When you enable Proxy ARP on the switch and it receives an ARP request, it identifies the request as a request for a system that is not on the local LAN. The switch responds as if it is the remote destination for which the broadcast is addressed, with an ARP response that associates the MAC address of the switch with the IP address of the remote destination. The local switch believes that it is directly connected to the destination, while in reality its packets are being forwarded from the local subnetwork toward the destination subnetwork by their local switch. By default, Proxy ARP is disabled.

Local Proxy ARP

You can use local Proxy ARP to enable a switch to respond to ARP requests for IP addresses within a subnet where normally no routing is required. When you enable local Proxy ARP, ARP responds to all ARP requests for IP addresses within the subnet and forwards all traffic between hosts in the subnet. Use this feature only on subnets where hosts are intentionally prevented from communicating directly by the configuration on the switch to which they are connected.

Gratuitous ARP

Gratuitous ARP sends a request with identical source IP address and destination IP address to detect duplicate IP addresses. Cisco NX-OS Release 5.0(3) support enabling or disabling gratuitous ARP requests or ARP cache updates.

ACLs for IP Directed Broadcast

You can use IP directed broadcast to broadcast to an IP subnet from a node that does not belong to it. You can specify an ACL list for the broadcast.

Glean Throttling

When forwarding an incoming IP packet in a line card, if the Address Resolution Protocol (ARP) request for the next hop is not resolved, the line card forwards the packets to the supervisor (glean throttling). The supervisor resolves the MAC address for the next hop and programs the hardware.

The Cisco Nexus 6000 Series device hardware has glean rate limiters to protect the supervisor from the glean traffic. If the maximum number of entries is exceeded, the packets for which the ARP request is not resolved continues to be processed in the software instead of getting dropped in the hardware.

When an ARP request is sent, the software adds a /32 drop adjacency in the hardware to prevent the packets to the same next-hop IP address to be forwarded to the supervisor. When the ARP is resolved, the hardware entry is updated with the correct MAC address. If the ARP entry is not resolved before a timeout period, the entry is removed from the hardware.

Path MTU Discovery

Path MTU discovery is a method for maximizing the use of available bandwidth in the network between the endpoints of a TCP connection. It is described in RFC 1191. Existing connections are not affected when this feature is turned on or off.

ICMP

You can use ICMP to provide message packets that report errors and other information that is relevant to IP processing. ICMP generates error messages, such as ICMP destination unreachable messages, ICMP Echo Requests (which send a packet on a round trip between two hosts) and Echo Reply messages. ICMP also provides many diagnostic functions and can send and redirect error packets to the host. By default, ICMP is enabled.

Some of the ICMP message types are as follows:

- Network error messages
- Network congestion messages
- Troubleshooting information
- Timeout announcements

Note ICMP redirects are disabled on interfaces where the local proxy ARP feature is enabled.

Virtualization Support

IPv4 supports Virtual Routing and Forwarding instances (VRFs). By default, Cisco NX-OS places you in the default VRF unless you specifically configure another VRF. For more information, see Chapter 12, "Configuring Layer 3 Virtualization."

Licensing Requirements for IPv4

The following table shows the licensing requirements for this feature:

Product	License Requirement
Cisco NX-OS	IPv4 requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the *Cisco NX-OS Licensing Guide*.

Prerequisites for IPv4

IPv4 has the following prerequisites:

- IPv4 can only be configured on Layer 3 interfaces.

Guidelines and Limitations

IPv4 has the following configuration guidelines and limitations:

- You can configure a secondary IP address only after you configure the primary IP address.

Default Settings

Table 2-1 lists the default settings for IP parameters.

Table 2-1 Default IP Parameters

Parameters	Default
ARP timeout	1500 seconds
proxy ARP	disabled

Configuring IPv4

This section includes the following topics:

Note If you are familiar with the Cisco IOS CLI, be aware that the Cisco NX-OS commands for this feature might differ from the Cisco IOS commands that you would use.

Configuring IPv4 Addressing

You can assign a primary IP address for a network interface.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet** *number*
3. **no switchport**
4. **ip address** *ip-address/length* **[secondary]**
5. (Optional) **show ip interface**
6. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters configuration mode.

Step 2	**interface ethernet** *number*
	
	Example:
	`switch(config)# interface ethernet 2/3`
	`switch(config-if)#`
		Enters interface configuration mode.

Step 3	**no switchport** **Example:** `switch(config-if)# no switchport`	Configures the interface as a Layer 3 routed interface.

	Command	Purpose
Step 4	**ip address** *ip-address/length* [**secondary**] **Example:** `switch(config-if)# ip address 192.2.1.1 255.0.0.0`	Specifies a primary or secondary IPv4 address for an interface. • The network mask can be a four-part dotted decimal address. For example, 255.0.0.0 indicates that each bit equal to 1 means the corresponding address bit belongs to the network address. • The network mask can be indicated as a slash (/) and a number - a prefix length. The prefix length is a decimal value that indicates how many of the high-order contiguous bits of the address comprise the prefix (the network portion of the address). A slash must precede the decimal value and there is no space between the IP address and the slash.
Step 5	**show ip interface** **Example:** `switch(config-if)# show ip interface`	(Optional) Displays interfaces configured for IPv4.
Step 6	**copy running-config startup-config** **Example:** `switch(config-if)# copy running-config startup-config`	(Optional) Saves this configuration change.

This example shows how to assign an IPv4 address:

```
switch# configure terminal
switch(config)# interface ethernet 2/3
switch(config-if)# no switchport
switch(config-if)# ip address 192.2.1.1 255.0.0.0
switch(config-if)# copy running-config startup-config
```

Configuring Multiple IP Addresses

You can only add secondary IP addresses after you configure primary IP addresses.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet** *number*
3. **no switchport**
4. **ip address** *ip-address/length* **[secondary]**
5. (Optional) **show ip interface**
6. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**configure terminal** **Example:** switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	**interface ethernet** *number* **Example:** switch(config)# interface ethernet 2/3 switch(config-if)#	Enters interface configuration mode.
Step 3	no switchport **Example:** switch(config-if)# no switchport	Configures the interface as a Layer 3 routed interface.
Step 4	**ip address** *ip-address/length* [**secondary**] **Example:** switch(config-if)# ip address 192.2.1.1 255.0.0.0 secondary	Specifies the configured address as a secondary IPv4 address.
Step 5	show ip interface **Example:** switch(config-if)# show ip interface	(Optional) Displays interfaces configured for IPv4.
Step 6	**copy running-config startup-config** **Example:** switch(config-if)# copy running-config startup-config	(Optional) Saves this configuration change.

Configuring a Static ARP Entry

You can configure a static ARP entry on the switch to map IP addresses to MAC hardware addresses, including static multicast MAC addresses.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet** *number*
3. **no switchport**
4. **ip arp** *ipaddr mac_addr*
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**configure terminal** **Example:** switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	**interface ethernet** *number* **Example:** switch(config)# interface ethernet 2/3 switch(config-if)#	Enters interface configuration mode.
Step 3	no switchport **Example:** switch(config-if)# no switchport	Configures the interface as a Layer 3 routed interface.
Step 4	**ip arp** *ipaddr mac_addr* **Example:** switch(config-if)# ip arp 192.2.1.1 0019.076c.1a78	Associates an IP address with a MAC address as a static entry.
Step 5	**copy running-config startup-config** **Example:** switch(config-if)# copy running-config startup-config	(Optional) Saves this configuration change.

This example shows how to configure a static ARP entry:

```
switch# configure terminal
switch(config)# interface ethernet 2/3
switch(config-if)# no switchport
switch(config-if)# ip arp 192.2.1.1 0019.076c.1a78
switch(config-if)# copy running-config startup-config
```

Configuring Proxy ARP

You can configure Proxy ARP on the switch to determine the media addresses of hosts on other networks or subnets.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet** *number*
3. **no switchport**
4. **ip proxy-arp**
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**configure terminal** **Example:** switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	**interface ethernet** *number* **Example:** switch(config)# interface ethernet 2/3 switch(config-if)#	Enters interface configuration mode.
Step 3	no switchport **Example:** switch(config-if)# no switchport	Configures the interface as a Layer 3 routed interface.
Step 4	ip proxy-arp **Example:** switch(config-if)# ip proxy-arp	Enables Proxy ARP on the interface.
Step 5	**copy running-config startup-config** **Example:** switch(config-if)# copy running-config startup-config	(Optional) Saves this configuration change.

This example shows how to configure Proxy ARP:

```
switch# configure terminal
switch(config)# interface ethernet 2/3
switch(config-if)# no switchport
switch(config-if)# ip proxy-arp
switch(config-if)# copy running-config startup-config
```

Configuring Local Proxy ARP

You can configure Local Proxy ARP on the switch.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet** *number*
3. **no switchport**
4. **ip local-proxy-arp**
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**configure terminal** **Example:** switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	**interface ethernet** *number* **Example:** switch(config)# interface ethernet 2/3 switch(config-if)#	Enters interface configuration mode.
Step 3	no switchport **Example:** switch(config-if)# no switchport	Configures the interface as a Layer 3 routed interface.
Step 4	ip local-proxy-arp **Example:** switch(config-if)# ip local-proxy-arp	Enables Local Proxy ARP on the interface.
Step 5	**copy running-config startup-config** **Example:** switch(config-if)# copy running-config startup-config	(Optional) Saves this configuration change.

This example shows how to configure Local Proxy ARP:

```
switch# configure terminal
switch(config)# interface ethernet 2/3
switch(config-if)# no switchport
switch(config-if)# ip local-proxy-arp
switch(config-if)# copy running-config startup-config
```

Configuring Gratuitous ARP

You can configure gratuitous ARP on an interface.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet** *number*
3. **no switchport**
4. **ip arp gratuitous** {**request** | **update**}
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**configure terminal** **Example:** switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	**interface ethernet** *number* **Example:** switch(config)# interface ethernet 2/3 switch(config-if)#	Enters interface configuration mode.
Step 3	no switchport **Example:** switch(config-if)# no switchport	Configures the interface as a Layer 3 routed interface.
Step 4	**ip arp gratuitous** {**request** | **update**} **Example:** switch(config-if)# ip arp gratuitous request	Enables gratuitous ARP on the interface. Default is enabled.
Step 5	**copy running-config startup-config** **Example:** switch(config-if)# copy running-config startup-config	(Optional) Saves this configuration change.

This example shows how to disable gratuitous ARP requests:

```
switch# configure terminal
switch(config)# interface ethernet 2/3
switch(config-if)# no switchport
switch(config-if)# no ip arp gratuitous request
switch(config-if)# copy running-config startup-config
```

Configuring Path MTU Discovery

You can configure path MTU discovery on an interface.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet** *number*
3. **ip tcp path-mtu-discovery**
4. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**configure terminal** **Example:** switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	**interface ethernet** *number* **Example:** switch(config)# interface ethernet 2/3 switch(config-if)#	Enters interface configuration mode.
Step 3	ip tcp path-mtu-discovery **Example:** switch(config-if)# ip tcp path-mtu-discovery	Enables path MTU discovery.
Step 4	**copy running-config startup-config** **Example:** switch(config-if)# copy running-config startup-config	(Optional) Saves this configuration change.

Configuring IP Packet Verification

Apolina: Command not available on switch 172.29.231.33 in EXEC, config, interface modes

Cisco NX-OS supports an Intrusion Detection System (IDS) that checks for IP packet verification. You can enable or disable these IDS checks.

To enable IDS checks, use the following commands in global configuration mode:

Command	Purpose
hardware ip verify address {**destination zero** | **identical** | **reserved** | **source** {**broadcast** | **multicast**}}	Performs the following IDS checks on the IP address: • **destination zero**—Drops IP packets if the destination IP address is 0.0.0.0. • **identical**—Drops IP packets if the source IP address is identical to the destination IP address. • **reserved**—Drops IP packets if the IP address is in the 127.x.x.x range. • **source**—Drops IP packets if the IP source address is either 255.255.255.255 (broadcast) or in the 224.x.x.x range (multicast).
hardware ip verify checksum	Drops IP packets if the packet checksum is invalid.
hardware ip verify fragment	Drops IP packets if the packet fragment has a nonzero offset and the DF bit is active.

Command	Purpose
hardware ip verify length {**consistent** | **maximum** {**max-frag** | **max-tcp** | **udp**} | **minimum**}	Performs the following IDS checks on the IP address: • **consistent**—Drops IP packets where the Ethernet frame size is greater than or equal to the IP packet length plus the Ethernet header. • **maximum max-frag**—Drops IP packets if the maximum fragment offset is greater than 65536. • **maximum max-tcp**—Drops IP packets if the TCP length is greater than the IP payload length. • **maximum udp**—Drops IP packets if the IP payload length is less than the UDP packet length. • **minimum**—Drops IP packets if the Ethernet frame length is less than the IP packet length plus four octets (the CRC length).
hardware ip verify tcp tiny-frag	Drops TCP packets if the IP fragment offset is 1, or if the IP fragment offset is 0 and the IP payload length is less than 16.
hardware ip verify version	Drops IP packets if the ethertype is not set to 4 (IPv4).

Use the **show hardware forwarding ip verify** command to display the IP packet verification configuration.

Configuring IP Directed Broadcasts

An IP directed broadcast is an IP packet whose destination address is a valid broadcast address for some IP subnet, but which originates from a node that is not itself part of that destination subnet.

A switch that is not directly connected to its destination subnet forwards an IP directed broadcast in the same way it would forward unicast IP packets destined to a host on that subnet. When a directed broadcast packet reaches a switch that is directly connected to its destination subnet, that packet is "exploded" as a broadcast on the destination subnet. The destination address in the IP header of the packet is rewritten to the configured IP broadcast address for the subnet, and the packet is sent as a link-layer broadcast.

If directed broadcast is enabled for an interface, incoming IP packets whose addresses identify them as directed broadcasts intended for the subnet to which that interface is attached will be exploded as broadcasts on that subnet.

To enable IP directed broadcasts, use the following command in interface configuration mode:

Command	Purpose
ip directed-broadcast *[acl-name]*	Enables the translation of a directed broadcast to physical broadcasts. An Access Control List (ACL) name may be specified. The name is a case-sensitive alphanumeric string up to 63 characters long.

Configuring IP Glean Throttling

Cisco NX-OS software supports glean throttling rate limiters to protect the supervisor from the glean traffic.

You can enable IP glean throttling.

Note We recommend that you configure the IP glean throttle feature by using the **hardware ip glean throttle** command to filter the unnecessary glean packets that are sent to the supervisor for ARP resolution for the next hops that are not reachable or do not exist. IP glean throttling boosts software performance and helps to manage traffic more efficiently.

SUMMARY STEPS

1. **configure terminal**
2. **hardware ip glean throttle**
3. **no hardware ip glean throttle**
4. **(Optional) copy running-config startup-config**

DETAILED STEPS

	Command	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters configuration mode.

Step 2	**hardware ip glean throttle** **Example:** `switch(config)# hardware ip glean throttle`	Enables ARP throttling.
Step 3	`no` **hardware ip glean throttle** **Example:** `switch(config)# no hardware ip glean throttle`	Disables ARP throttling.
Step 4	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves this configuration change.

This example shows how to enable IP glean throttling:

```
switch# configure terminal
switch(config)# hardware ip glean throttle
switch(config-if)# copy running-config startup-config
```

Configuring the Hardware IP Glean Throttle Maximum

You can limit the maximum number of drop adjacencies that are installed in the Forwarding Information Base (FIB).

SUMMARY STEPS

1. **configure terminal**
2. **hardware ip glean throttle maximum** *count*
3. **no hardware ip glean throttle maximum** *count*
4. **(Optional) copy running-config startup-config**

DETAILED STEPS

	Command	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters configuration mode.

Step 2	**hardware ip glean throttle maximum** *count* **Example:** `switch(config)# hardware ip glean throttle maximum 2134`	Configures the number of drop adjacencies that are installed in the FIB.
Step 3	**no hardware ip glean throttle maximum** *count* **Example:** `switch(config)# no hardware ip glean throttle maximum 2134`	Applies the default limits. The default value is 1000. The range is from 0 to 4095 entries.
Step 4	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves this configuration change.

This example shows how to limit the maximum number of drop adjacencies that are installed in the FIB:

```
switch# configure terminal
switch(config)# hardware ip glean throttle maximum 2134
switch(config-if)# copy running-config startup-config
```

Configuring a Hardware IP Glean Throttle Timeout

You can configure a timeout for the installed drop adjacencies to remain in the FIB.

SUMMARY STEPS

1. **configure terminal**
2. **hardware ip glean throttle maximum timeout** *timeout-in-sec*

3. **no hardware ip glean throttle maximum timeout** ***timeout-in-sec***
4. **(Optional) copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**configure terminal** **Example:** switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	**hardware ip glean throttle maximum timeout** ***timeout-in-sec*** **Example:** switch(config)# hardware ip glean throttle maximum timeout 300	Configures the timeout for the installed drop adjacencies to remain in the FIB.
Step 3	**no hardware ip glean throttle maximum timeout** ***timeout-in-sec*** **Example:** switch(config)# no hardware ip glean throttle maximum timeout 300	Applies the default limits. The timeout value is in seconds. The range is from 300 seconds (5 minutes) to 1800 seconds (30 minutes). **Note** After the timeout period is exceeded, the drop adjacencies are removed from the FIB.
Step 4	**copy running-config startup-config** **Example:** switch(config)# copy running-config startup-config	(Optional) Saves this configuration change.

This example shows how to configure a timeout for the drop adjacencies that are installed.

```
switch# configure terminal
switch(config)# hardware ip glean throttle maximum timeout 300
switch(config-if)# copy running-config startup-config
```

Verifying the IPv4 Configuration

To display the IPv4 configuration, perform one of the following tasks:

Command	Purpose
show hardware forwarding ip verify	Displays the IP packet verification configuration.
show ip adjacency	Displays the adjacency table.
show ip arp	Displays the ARP table.
show ip interface	Displays IP-related interface information.
show ip arp statistics [**vrf** *vrf-name*]	Displays the ARP statistics.

Configuration Examples for IPv4

This example shows how to configure an IPv4 address:

```
configure terminal
 interface ethernet 1/2
  no switchport
  ip address 192.2.1.1/16
```

Additional References

For additional information related to implementing IP, see the following sections:

- Related Documents, page 2-20
- Standards, page 2-20

Related Documents

Related Topic	Document Title
IP CLI commands	*Cisco Nexus 6000 Series Command Reference, Cisco NX-OS Releases 7.x*

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—