Configuring IP Source Guard

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Information About IP Source Guard

IP Source Guard

You can use IP source guard (IPSG) to prevent traffic attacks if a host tries to use the IP address of its neighbor and you can enable IP source guard when DHCP snooping is enabled on an untrusted interface.

After IPSG is enabled on an interface, the switch blocks all IP traffic received on the interface except for DHCP packets allowed by DHCP snooping.

The switch uses a source IP lookup table in hardware to bind IP addresses to ports. For IP and MAC filtering, a combination of source IP and source MAC lookups are used. IP traffic with a source IP address in the binding table is allowed, all other traffic is denied.

The IP source binding table has bindings that are learned by DHCP snooping or are manually configured (static IP source bindings). An entry in this table has an IP address, its associated MAC address, and its associated VLAN number. The switch uses the IP source binding table only when IP source guard is enabled.

IPSG is supported only on Layer 2 ports, including access and trunk ports. You can configure IPSG with source IP address filtering or with source IP and MAC address filtering.

IP Source Guard for Static Hosts

Note Do not use IPSGfor static hosts on uplink ports or trunk ports.

IPSG for static hosts extends the IPSG capability to non-DHCP and static environments. The previous IPSG used the entries created by DHCP snooping to validate the hosts connected to a switch. Any traffic received from a host without a valid DHCP binding entry is dropped. This security feature restricts IP traffic on nonrouted Layer 2 interfaces. It filters traffic based on the DHCP snooping binding database and on manually

configured IP source bindings. The previous version of IPSG required a DHCP environment for IPSG to work.

IPSG for static hosts allows IPSG to work without DHCP. IPSG for static hosts relies on IP device tracking-table entries to install port ACLs. The switch creates static entries based on ARP requests or other IP packets to maintain the list of valid hosts for a given port. You can also specify the number of hosts allowed to send traffic to a given port. This is equivalent to port security at Layer 3.

IPSG for static hosts also supports dynamic hosts. If a dynamic host receives a DHCP-assigned IP address that is available in the IP DHCP snooping table, the same entry is learned by the IP device tracking table. In a stacked environment, when the active switch failover occurs, the IP source guard entries for static hosts attached to member ports are retained. When you enter the **show device-tracking database** EXEC command, the IP device tracking table displays the entries as ACTIVE.

Note Some IP hosts with multiple network interfaces can inject some invalid packets into a network interface. The invalid packets contain the IP or MAC address for another network interface of the host as the source address. The invalid packets can cause IPSG for static hosts to connect to the host, to learn the invalid IP or MAC address bindings, and to reject the valid bindings. Consult the vender of the corresponding operating system and the network interface to prevent the host from injecting invalid packets.

IPSG for static hosts initially learns IP or MAC bindings dynamically through an ACL-based snooping mechanism. IP or MAC bindings are learned from static hosts by ARP and IP packets. They are stored in the device tracking database. When the number of IP addresses that have been dynamically learned or statically configured on a given port reaches a maximum, the hardware drops any packet with a new IP address. To resolve hosts that have moved or gone away for any reason, IPSG for static hosts leverages IP device tracking to age out dynamically learned IP address bindings. This feature can be used with DHCP snooping. Multiple bindings are established on a port that is connected to both DHCP and static hosts. For example, bindings are stored in both the device tracking database as well as in the DHCP snooping binding database.

IP Source Guard Configuration Guidelines

- You can configure static IP bindings only on nonrouted ports. If you enter the **ip source binding** *mac-address* **vlan** *vlan-id ip-address* **interface** *interface-id* global configuration command on a routed interface, this error message appears:

  ```
  Static IP source binding can only be configured on switch port.
  ```

- When IP source guard with source IP filtering is enabled on an interface, DHCP snooping must be enabled on the access VLAN for that interface.
- If you are enabling IP source guard on a trunk interface with multiple VLANs and DHCP snooping is enabled on all the VLANs, the source IP address filter is applied on all the VLANs.

Note If IP source guard is enabled and you enable or disable DHCP snooping on a VLAN on the trunk interface, the switch might not properly filter traffic.

- You can enable this feature when 802.1x port-based authentication is enabled.

- When you configure IP source guard smart logging, packets with a source address other than the specified address or an address learned by DHCP are denied, and the packet contents are sent to a NetFlow collector. If you configure this feature, make sure that smart logging is globally enabled.
- In a switch stack, if IP source guard is configured on a stack member interface and you remove the the configuration of that switch by entering the **no switch** *stack-member-number* **provision** global configuration command, the interface static bindings are removed from the binding table, but they are not removed from the running configuration. If you again provision the switch by entering the **switch** *stack-member-number* **provision** command, the binding is restored.

  To remove the binding from the running configuration, you must disable IP source guard before entering the **no switch provision** command. The configuration is also removed if the switch reloads while the interface is removed from the binding table.

How to Configure IP Source Guard

Enabling IP Source Guard

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Device(config)# interface gigabitethernet 1/0/1`	Specifies the interface to be configured, and enters interface configuration mode.
Step 4	**ip verify source** [**mac-check**] **Example:** `Device(config-if)# ip verify source`	Enables IP source guard with source IP address filtering. (Optional) **mac-check**: Enables IP Source Guard with source IP address and MAC address filtering.
Step 5	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 6	**ip source binding** *mac-address* **vlan** *vlan-id ip-address* **interface** *interface-id*	Adds a static IP source binding.

	Command or Action	Purpose
	Example: `Device(config)# ip source binding 0100.0230.0002 vlan 11 10.0.0.4 interface gigabitethernet1/0/1`	Enter this command for each static binding.
Step 7	**end** **Example:** `Device(config)# end`	Exits global configuration mode and reutrns to privileged EXEC mode.

Configuring IP Source Guard for Static Hosts on a Layer 2 Access Port

You must configure the **ip device tracking maximum** *limit-number* interface configuration command globally for IPSG for static hosts to work. If you only configure this command on a port without enabling IP device tracking globally or by setting an IP device tracking maximum on that interface, IPSG with static hosts rejects all the IP traffic from that interface.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ip device tracking** **Example:** `Device(config)# ip device tracking`	Turns on the IP host table, and globally enables IP device tracking.
Step 4	**interface** *interface-id* **Example:** `Device(config)# interface gigabitethernet 1/0/1`	Enters interface configuration mode.
Step 5	**switchport mode access** **Example:** `Device(config-if)# switchport mode access`	Configures a port as access.
Step 6	**switchport access vlan** *vlan-id* **Example:** `Device(config-if)# switchport access vlan 10`	Configures the VLAN for this port.

	Command or Action	Purpose
Step 7	**ip verify source**[**tracking**] [**mac-check**] **Example:** `Device(config-if)# ip verify source tracking mac-check`	Enables IP source guard with source IP address filtering. (Optional) **tracking**: Enables IP source guard for static hosts. (Optional) **mac-check**: Enables MAC address filtering. The command **ip verify source tracking mac-check**enables IP source guard for static hosts with MAC address filtering.
Step 8	**ip device tracking maximum** *number* **Example:** `Device(config-if)# ip device tracking maximum 8`	Establishes a maximum limit for the number of static IPs that the IP device tracking table allows on the port. The range is 1to 10. The maximum number is 10. **Note** You must configure the **ip device tracking maximum** *limit-number* interface configuration command.
Step 9	**end** **Example:** `Device(config-if)# end`	Exits interface configuration mode and returns to privileged EXEC mode.

Monitoring IP Source Guard

Table 1: Privileged EXEC show Commands

Command	Purpose
show ip verify source [**interface** *interface-id*]	Displays the IP source guard configuration on the switch or on a specific interface.
show ip device tracking { **all** | **interface** *interface-id* | **ip** *ip-address* | **mac** *mac-address*}	Displays information about the entries in the IP device tracking table.

Table 2: Interface Configuration Commands

Command	Purpose
ip verify source tracking	Verifies the data source.

Feature History for IP Source Guard

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Everest 16.5.1a	IP Source Guard	You can use IP source guard to prevent traffic attacks if a host tries to use the IP address of its neighbor and you can enable IP source guard when DHCP snooping is enabled on an untrusted interface. Support for this feature was introduced on the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models of the Cisco Catalyst 9500 Series Switches.
Cisco IOS XE Fuji 16.8.1a	IP Source Guard	Support for this feature was introduced on the C9500-24Y4C, C9500-32C, C9500-32QC, and C9500-48Y4C models of the Cisco Catalyst 9500 Series Switches.

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