

Configuring IPv6 First Hop Security

This chapter describes how to configure First Hop Security (FHS) features on Cisco NX-OS devices.

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About First-Hop security

First-Hop Security (FHS) is a set of features that optimize IPv6 link operation and provide protection from rogue or misconfigured users in large Layer 2 domains.

- FHS operates on Layer 2 and Layer 3 switches facing end nodes, often referred to as "first hops".
- FHS features help secure networks by preventing attacks from unauthorized or misconfigured devices.
- Extended FHS features can be used for different deployment scenarios or attack vectors.

Supported First-Hop security features

The following FHS features are supported:

- IPv6 RA Guard
- DHCPv6 Guard
- IPv6 Snooping

Note See Guidelines and limitations of First-Hop security, on page 2 for information about enabling this feature.

Note Use the **feature dhcp** command to enable the FHS features on a switch.

Enabling First-Hop security features

For example, to enable FHS features on a switch, use the **feature dhcp** command. This ensures that the supported features such as IPv6 RA Guard, DHCPv6 Guard, and IPv6 Snooping are active for end node protection.

IPv6 global policies

IPv6 global policies are mechanisms that provide storage and access policy database services for IPv6 features, including IPv6 Snooping, DHCPv6 Guard, and IPv6 RA Guard.

- Policy attributes are stored in the software policy database each time an IPv6 global policy is configured.
- When a policy is applied to an interface, the database entry is updated to include the interface.
- IPv6 global policies support features such as IPv6 Snooping, DHCPv6 Guard, and RA Guard.

IPv6 global policies are implemented and managed through specific commands and hardware configurations, and their behavior may vary depending on the platform.

- All port level FHS policies are programmed in the ifacl region, while VLAN level policies are programmed in the FHS region.
- Use the **hardware profile tcam regionfhs tcam_size** command to configure the FHS. The range for the TCAM size is 0-4096.
- Use the **hardware access-list tcam region ing-redirect tcam_size** command to configure FHS. You can resize the **ing-racl** region to allocate space to the **ing-redirect** region.
- Cisco Nexus 9200, 9300-EX, and 9300-FX/FX2 platform switches: FHS packets take the **copp-s-dhcpreq** queue for software processing.
- Cisco Nexus 9300, 9500 platform switches , N9K-X9432C-S line card use the class default.

IPv6 First-Hop security binding table

A database table of IPv6 neighbors connected to the device is created from information sources such as IPv6 snooping. This database, or binding table is used by various IPv6 guard features to validate the link-layer address (LLA), the IPv6 address, and prefix binding of the neighbors to prevent spoofing and redirect attacks.

Guidelines and limitations of First-Hop security

Use this reference to review the guidelines and limitations of First-Hop security.

- First-Hop Security (FHS) requires **ing-redirect** TCAM carving before enabling FHS on an interface or VLAN.

- Use the **hardware access-list tcam region ing-redirect** *tcam_size* command to perform TCAM carving.
- You can resize the **ing-racl** region to allocate space to the **ing-redirect** region.

Supported platform and release for First-Hop security

The following table lists the supported software releases and corresponding Cisco Nexus switch platforms for First-Hop Security.

Table 1: Supported releases and platforms for First-Hop security

Supported Release	Supported Platform
7.0(3)I7(1) and later	Cisco Nexus 9300- EX/ FX/FX2 Series switches
9.3(5) and later	Cisco Nexus 9300-GX Series switches and N9K-C93180YC-FX3S switches
10.1(1) and later	CiscoNexus 9300-FX3 Series switches
10.2(3)Fand later	CiscoNexus 9300-GX2 Series switches
10.4(1)Fand later	CiscoNexus 9332D-H2R Series switches
10.4(2)Fand later	CiscoNexus 93400LD-H1 Series switches
10.4(3)Fand later	CiscoNexus 9364C-H1 Series switches

About vPC First-Hop security configuration

vPC First-Hop Security Configuration refers to the recommended methods for deploying IPv6 First-Hop Security in a vPC environment.

- Supports deployment of DHCP relay on-stack.
- Allows DHCP relay on vPC leg.
- Enables DHCP client and relay on orphan ports.

Best practice deployment scenarios for vPC First-Hop security

You can deploy IPv6 First-Hop Security vPC in several ways, with the following scenarios recommended as best practices.

- DHCP relay on-stack
- DHCP relay on vPC leg
- DHCP client and relay on orphan ports

vPC First-Hop security deployment

For example, in a typical deployment, you might configure DHCP relay on the vPC stack to ensure redundancy, or use orphan ports for DHCP client and relay roles when devices are not part of the vPC domain.

DHCP relay on-stack

DHCP Relay On-stack is a deployment scenario in which DHCP relay is configured on a Nexus switch, allowing clients to connect either directly behind the vPC link or through an intermediary switch. This setup enables efficient configuration of IPv6 Snooping at the interface level and optimizes control traffic processing.

- Clients can be connected directly behind the vPC link or through an intermediary switch with DHCP relay on the Nexus switch.
- IPv6 Snooping can be configured on vPC interface links directly, rather than at the VLAN level.
- Control traffic (DHCP/ND) is not redirected to the CPU for processing on both vPC peers if it traverses the peer link, and packets are not processed a second time.

Efficient DHCP relay deployment with vPC and IPv6 snooping

In this scenario, connecting clients behind an intermediary switch with DHCP relay running on the Nexus switch is ideal for efficient configuration and traffic processing.

- Direct client connection behind vPC link
- Client connection through intermediary switch with DHCP relay on Nexus switch

Configuration at the interface level is efficient for the following reasons:

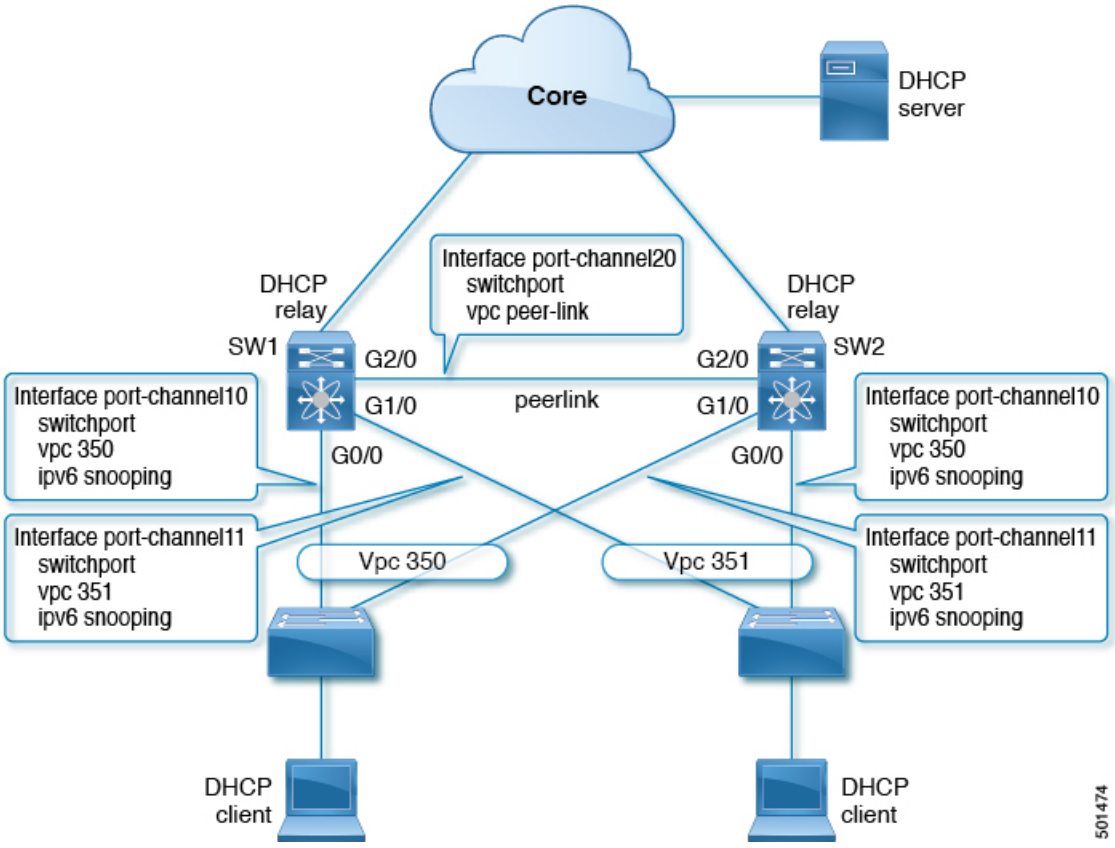
1. Control traffic (DHCP/ND) is not redirected to CPU for processing on both vPC peers if it goes over the peer link.
2. Packets switched over the peer link are not processed a second time.

In this scenario, the two vPC peers learn all the host IP/MAC bindings behind the vPC links and synchronize these bindings between themselves using both IPv6 ND and IPv6 DHCP control protocols.

Note TIP: Configuring snooping policy at the interface level improves efficiency and reduces unnecessary CPU processing on vPC peers.

The following figure illustrates FHS configuration with DHCP relay on-stack:

Figure 1: FHS Configuration with DHCP relay on-stack



DHCP relay on-stack deployment

For example, when clients are connected through an intermediary switch with DHCP relay enabled on the Nexus switch, IPv6 Snooping can be applied directly to the vPC interfaces, allowing both vPC peers to learn and synchronize host IP/MAC bindings efficiently.

DHCP relay on vPC leg

DHCP relay on a vPC leg refers to a deployment where the DHCP relay agent or server is positioned behind a vPC link, rather than running directly on the vPC peers.

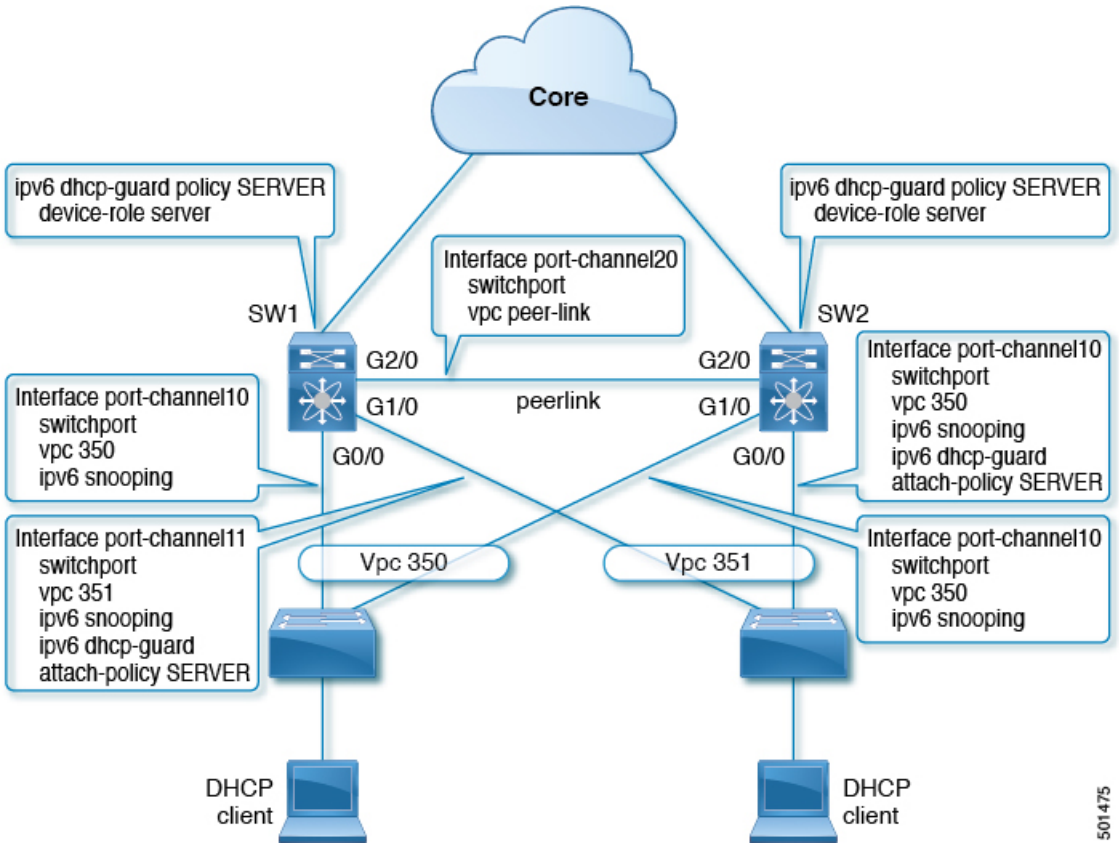
- The relay agent does not run on the vPC peers; it operates behind the vPC link.
- IPv6 Snooping does not implicitly trust DHCP server messages in this scenario and drops them by default.
- Custom IPv6 policies are required to allow DHCP server messages and ensure correct client binding creation.

In this configuration, the relay agent does not run on the vPC peers. Instead, the DHCP relay agent (or a DHCP server) runs behind a vPC link, which can be towards the access or even somewhere in the core. In such a deployment scenario, the IPv6 Snooping feature does not implicitly trust DHCP Server messages and drops DHCP Server messages by default.

- Security-level glean
- IPv6 DHCP Guard policy with device-role server. In this configuration, IPv6 Snooping trusts DHCP server messages attached to the vPC link.

Both server or relay facing and client facing IPv6 snooping policies are needed to create client binding entries via DHCP control traffic. IPv6 Snooping must see both client and server packets to create the binding. The IPv6 DHCP Guard policy must be configured to allow DHCP server traffic by the IPv6 Snooping policy. Both vPC peers require the same configuration because they synchronize all newly learned client entries on the vPC port.

Figure 2: FHS Configuration with external DHCP relay



Example: DHCP relay on vPC leg

For example, clients are located behind the vPC links with the default IPv6 Snooping policy. By attaching both IPv6 Snooping and ipv6 dhcp-guard attach-policy SERVER policies to the links where DHCP server traffic arrives, you ensure that both client and server packets are visible to IPv6 Snooping, allowing for proper client binding creation.

DHCP client relay on orphan ports

DHCP client relay on orphan ports refers to the process of handling DHCP client traffic when the client is connected via an orphan port, which is not directly connected to both vPC peers.

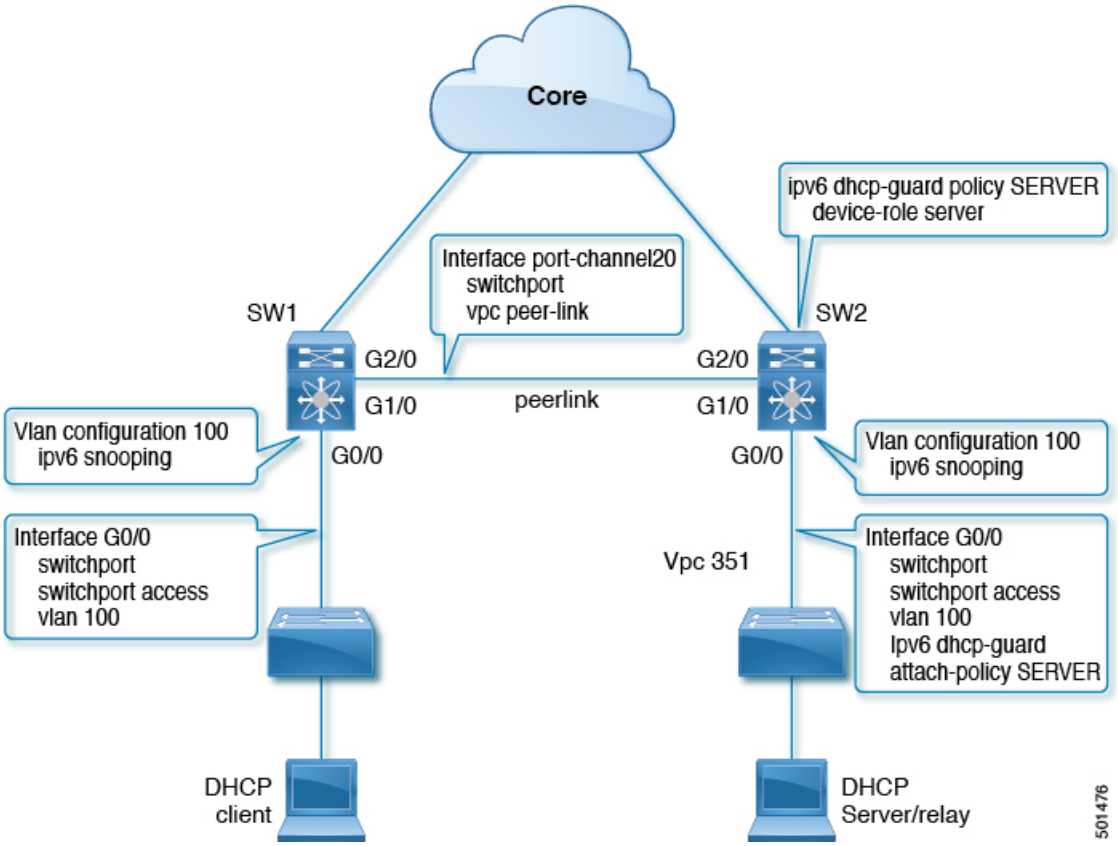
- IPv6 Snooping only syncs client bindings on vPC ports, not on orphan ports.
- On orphan ports, IPv6 Snooping runs independently on each switch.
- Special configuration is required to ensure DHCP server packets are properly handled on orphan ports.

Configuration and behavior of DHCP client relay on orphan ports

When a client is connected via an orphan port, IPv6 Snooping does not synchronize client bindings between vPC peers. Each switch manages its own bindings independently, and specific configuration steps are required to ensure correct DHCP traffic handling.

- Attach the IPv6 Snooping policy on the client-facing interface of the first switch.
- To accommodate DHCP server packets from an orphan port behind the vPC peer, apply the policy at the VLAN level. This allows inspection of both client and server traffic.
- DHCP traffic arriving via the vPC peer is implicitly trusted; if policing is required, the vPC peer automatically drops such traffic.
- On the second switch, configure IPv6 at the VLAN level and apply the IPv6 DHCP Guard policy with a “device-role server” on the server-facing orphan port to prevent dropping DHCP server packets.
- Both switches learn client binding entries individually and do not synchronize them, as the client is not on a vPC link.

Figure 3: FHS configuration with client and DHCP relay on orphan port



DHCP client relay on orphan ports

For example, if a client is connected to an orphan port, apply the IPv6 Snooping policy at the VLAN level on both switches and configure the DHCP Guard policy with the appropriate device role to ensure correct DHCP packet handling.

RA guard

Explains RA guard.

Overview of IPv6 RA guard

The IPv6 RA Guard feature is a security mechanism that allows network administrators to control and filter Router Advertisement (RA) messages on network devices.

- Blocks or rejects unwanted or rogue RA messages arriving at the device.
- Analyzes and filters RAs sent by unauthorized devices.
- Validates RA and router redirect messages against device configuration before forwarding or dropping them.

Supporting reference information for IPv6 RA guard

The IPv6 RA Guard feature operates by comparing configuration information on the Layer 2 (L2) device with the information found in received RA frames. In host mode, all RA and router redirect messages are disallowed on the port. If the L2 device validates the content of the RA frame and router redirect frame against the configuration, it forwards the RA to its unicast or multicast destination. If not validated, the RA is dropped.

IPv6 RA guard in operation

For example, when an unauthorized device attempts to send a rogue RA message, the IPv6 RA Guard feature detects and blocks the message, preventing it from reaching other devices on the network.

IPv6 RA router advertisement and the flags

IPv6 Router Advertisement (RA) is a mechanism that informs devices on a network how to configure their IPv6 addresses and obtain other network information using specific flags.

- The A (Address Autoconfiguration) flag enables hosts to use the specified prefix for IPv6 autoconfiguration.
- The O (Other Configuration) flag instructs hosts to obtain additional information, such as DNS server addresses, from a stateless DHCPv6 server.
- The M (Managed Address Configuration) flag directs hosts to use a stateful DHCPv6 server for their global unicast address and other configuration details.

- The L (On-Link) flag identifies that a specific prefix is on the local link or subnet, affecting how packets are routed.

IPv6 RA flags and their functions

IPv6 Router Advertisement messages use four primary flags to guide hosts in address configuration and network communication.

- **A flag (Address Autoconfiguration)** : Enabled by default; allows hosts to use the advertised prefix for IPv6 autoconfiguration.
- **O flag (Other Configuration)** : Disabled by default; instructs hosts to obtain additional configuration (such as DNS) from a stateless DHCPv6 server.
- **M flag (Managed Address Configuration)** : Disabled by default; tells hosts to use a stateful DHCPv6 server for address assignment and other information.
- **L flag (On-Link)** : Enabled by default; indicates that the prefix is on the local link or subnet.

1. Address Autoconfiguration (A flag) is enabled by default and allows hosts to use the prefix for autoconfiguration.
2. Other Configuration (O flag) is disabled by default and is used for obtaining additional information from a stateless DHCPv6 server.
3. Managed Address Configuration (M flag) is disabled by default and is used for stateful DHCPv6 address assignment.
4. On-Link (L flag) is enabled by default and identifies the prefix as being on the local link.

Note When the M flag is enabled, the A flag should usually be disabled. Manually enabling the M flag does not automatically disable the A flag. To disable the A flag, use the **ipv6 nd prefix** *ipv6-prefix/prefix-length* **no-autoconfig** command.

Using IPv6 RA flags

For example, enabling the **ipv6 managed-config-flag** command activates the M flag, instructing hosts to use a stateful DHCPv6 server for address assignment. By default, the A and L flags are advertised via ICMPv6 Router Advertisement (RA).

Guidelines and limitations of IPv6 RA guard

Use this reference to review the guidelines and limitations of IPv6 RA guard.

- The IPv6 RA Guard feature does not offer protection in environments where IPv6 traffic is tunneled.
- Beginning with Cisco NX-OS Release 10.1(1), IPv6 RA Guard is supported on Cisco Nexus 9300-GX platform switches.

- This feature is supported only in hardware when the ternary content addressable memory (TCAM) is programmed.
- This feature can be configured on a switch port interface in the ingress direction.
- This feature supports host mode and router mode.
- This feature is supported only in the ingress direction; it is not supported in the egress direction.
- This feature is supported on auxiliary VLANs and private VLANs (PVLANs). In the case of PVLANs, primary VLAN features are inherited and merged with port features.
- Packets dropped by the IPv6 RA Guard feature can be spanned.

Dhcpv6 guard

Explains dhcpv6 guard.

Overview of DHCP—DHCPv6 guard

The DHCPv6 Guard feature is a security mechanism that blocks DHCP reply and advertisement messages from unauthorized DHCP servers and relay agents.

- Blocks DHCP reply and advertisement messages from unauthorized sources.
- Allows client messages and relay agent messages from clients to servers without blocking.
- Filtering decisions are based on the device role assigned to the receiving switch port, trunk, or VLAN.

How DHCPv6 guard works

The DHCPv6 Guard feature determines whether to block or allow DHCP messages based on the type of message and the device role configuration.

- Packets are classified into three DHCP message types: client messages, server messages, and relay agent messages.
- All client messages are always switched, regardless of device role.
- DHCP server messages are only processed further if the device role is set to server.
- Further processing of DHCP server advertisements occurs for server preference checking.
- If the device is configured as a DHCP server, all messages are switched, regardless of device role configuration.

DHCPv6 guard in action

For example, if a switch port is configured with the DHCPv6 Guard feature and receives a DHCP advertisement from an unauthorized server, the message is blocked, preventing potential DoS attacks or traffic redirection.

Limitation of DHCPv6 guard

Use this reference to review the limitations of DHCPv6 guard.

DHCPv6 guard limitations

- If a packet arriving from a DHCP server is a Relay Forward or a Relay Reply, only the device role is checked.
- IPv6 DHCP Guard does not apply the policy for a packet sent out by the local relay agent running on the switch.

IPv6 snooping

Explains IPv6 snooping.

Overview of IPv6 snooping

IPv6 snooping is a Layer 2 security feature that learns and secures IPv6 address bindings, analyzes snooping messages, and builds a trusted binding table to mitigate vulnerabilities in neighbor discovery mechanisms.

- Operates at Layer 2 or between Layer 2 and Layer 3 to provide IPv6 security and scalability.
- Mitigates vulnerabilities such as attacks on duplicate address detection (DAD), address resolution, device discovery, and the neighbor cache.
- Builds and maintains a trusted binding table by analyzing snooping and DHCPv6 messages and enforcing address ownership.

Supporting reference information for IPv6 snooping

IPv6 snooping provides several mechanisms to secure IPv6 address assignments and neighbor discovery at Layer 2, supporting accurate binding tables and integration with other security features.

- Secures stateless autoconfiguration addresses in Layer 2 neighbor tables.
- Analyzes snooping messages to build a trusted binding table and drops messages without valid bindings.
- Redirects snooping protocol and DHCPv6 traffic to the switch integrated security features (SISF) infrastructure for processing.
- Registers capture rules to the classifier, which aggregates and installs rules as ACLs in platform-dependent modules.
- Provides host liveness tracking to update neighbor tables when IPv6 hosts disappear.
- Enforces address ownership and limits the number of addresses a node can claim.

IPv6 snooping in operation

For example, when IPv6 snooping is enabled on a switch port, the device inspects Neighbor Discovery Protocol (NDP) and DHCPv6 messages, verifies IPv6-to-MAC mappings, and updates the binding

table. If a message does not have a valid binding, it is dropped, preventing unauthorized address usage.

Guidelines and limitations for IPv6 snooping

Use this reference to review the guidelines and limitations for IPv6 snooping.

The guidelines and limitations of IPv6 Snooping are as follows:

- You must perform the same configurations on both the vPC peers. Automatic consistency checker for IPv6 snooping is not supported.
- The IPv6 Snooping feature is supported only in hardware when the ternary content addressable memory (TCAM) is programed.
- This feature can be configured on a switch port interface or VLAN only on the ingress port.
- For IPv6 Snooping to learn DHCP bindings, it must see both server and client replies. A IPv6 snooping policy must be attached to both the client facing the interface (or VLAN) as well as the DHCP server facing interface (or VLAN). In the case of DHCP Relay, an IPv6 Snooping policy must be attached at the VLAN level to see the server replies.

How to configure IPv6 FHS

Explains how to configure IPv6 FHS.

Configure the IPv6 RA guard policy on the device



Note When the **ipv6 nd raguard** command is configured on ports, router solicitation messages are not replicated to these ports. To replicate router solicitation messages, all ports that face routers must be set to the router role.

Procedure

Step 1 Use the **ipv6 nd raguard policy** *policy-name* command to define the RA guard policy name and enters RA guard policy configuration mode.

Example:

```
switch#configure terminal
switch(config)#ipv6 nd raguard policy policy1
```

Step 2 Use the **device-role** {**host** | **router** | **monitor** | **switch**} command to specify the role of the device attached to the port.

Example:

```
switch(config-raguard-policy)#device-role router
```

- device-role host —Interface or VLAN where you connect a regular node or host. This where you apply the IPV6 RA Guard policy. The device-role host allows incoming RS packets, and blocks incoming RA or RR packets. RS packets that are received on another interface, are not redirected to the device-role host. Only RA and RR packets (that are allowed) are redirected to the device-role host.
- device-role switch —The device-role switch behaves similar to the device-role host. For example, you can use it as a label for a trunk port.
- device-role monitor —This device monitors network traffic. It behaves similar to the device-role host, except that RS packets are also sent to this interface. This helps capture traffic.
- device-role router —Interface that connects to the router. This interface allows incoming RS, RA, or RR packets.

Step 3 (Optional) Use the **hop-limit** {**maximum** | **minimum** *limit*} command to enable verification of the advertised hop count limit.

Example:

```
switch(config-raguard-policy)#hop-limit minimum 3
```

If not configured, this check will be bypassed.

Step 4 (Optional) Use the **managed-config-flag** {**on** | **off**} command to enable verification that the advertised managed address configuration flag is on.

Example:

```
switch(config-raguard-policy)#managed-config-flag on
```

Note
When enabling the M flag, it is recommended to disable the A flag.

If not configured, this check will be bypassed.

Step 5 (Optional) Use the **other-config-flag** {**on** | **off**} command to enable verification of the advertised *other* configuration parameter.

Example:

```
switch(config-raguard-policy)#other-config-flag on
```

Step 6 (Optional) Use the **router-preference maximum** {**high** | **low** | **medium**} command to enable verification that the advertised default router preference parameter value is lower than or equal to a specified limit.

Example:

```
switch(config-raguard-policy)#router-preference maximum high
```

Step 7 (Optional) Use the **trusted-port** command to specify that this policy is being applied to trusted ports.

Example:

```
switch(config-raguard-policy)#trusted-port
switch(config-raguard-policy)#exit
```

All RA guard policing will be disabled.

Configure IPv6 RA guard on an interface

Procedure

Step 1 **interface** *type number*

Example:

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

Example:

```
switch(config)#vlan configuration 10
```

Specifies an interface type and number, and places the device in interface or VLAN configuration mode.

Step 2 **ipv6 nd raguard attach-policy** [*policy-name*]

Example:

```
switch(config-if)#ipv6 nd raguard attach-policy policy1
switch(config-if)#exit
switch(config)#exit
switch#exit
```

Applies the IPv6 RA Guard feature to a specified interface.

Step 3 **show ipv6 nd raguard policy** [*policy-name*]

Example:

```
switch#show ipv6 nd raguard policy host
Policy host configuration:
  device-role host
Policy applied on the following interfaces:
  Et0/0        vlan all
  Et1/0        vlan all
```

Displays the RA guard policy on all interfaces configured with the RA guard.

Step 4 **debug ipv6 snooping raguard** [*filter* | *interface* | *vlanid*]

Example:

```
switch#debug ipv6 snooping raguard
```

Enables debugging for IPv6 RA guard snooping information.

Configure DHCPv6 guard

Procedure

Step 1 **ipv6 dhcp guard policy** *policy-name*

Example:

```
Device#configure terminal
Device(config)#ipv6 dhcp guard policy pol1
Device(config-dhcpg-policy)#device-role server
```

Defines the DHCPv6 guard policy name and enters DHCP guard configuration mode and Specifies the device role of the device attached to the target (interface or VLAN).

- **device-role client** —Interface where a normal DHCPv6 client is connected. It blocks any incoming server packets.
- **device-role server** —Interface where a normal DHCPv6 server is connected. It allows all DHCPv6 packets originating on this interface.

Step 2 **preference min** *limit*

Example:

```
Device(config-dhcpg-policy)#preference min 0
Device(config-dhcpg-policy)#preference max 255
```

(Optional) Enables verification that the advertised preference (in preference option) is greater than the specified limit. If not specified, this check will be bypassed.

(Optional) Enables verification that the advertised preference (in preference option) is less than the specified limit. If not specified, this check will be bypassed.

Step 3 **trusted-port**

Example:

```
Device(config-dhcpg-policy)#trusted-port
Device(config-dhcpg-policy)#exit
```

(Optional) Specifies that this policy is being applied to trusted ports. All DHCP guard policing will be disabled.

Step 4 **interface** *type number*

Example:

```
Device(config)#interface Ethernet 1/1
```

Specifies an interface and enters interface configuration mode.

Step 5 **switchport**

Example:

```
Device(config-if)#switchport
```

Puts an interface that is in Layer 3 mode into Layer 2 mode for Layer 2 configuration.

Step 6 **ipv6 dhcp guard** [**attach-policy** *policy-name*]

Example:

```
Device(config-if)#ipv6 dhcp guard attach-policy pol1
Device(config-if)#exit
```

Attaches a DHCPv6 guard policy to an interface.

Step 7 **vlan configuration** *vlan-id*

Example:

```
Device(config)#vlan configuration 1
```

Specifies a VLAN and enters VLAN configuration mode.

Step 8 **ipv6 dhcp guard** [**attach-policy** *policy-name*]

Example:

```
Device(config-vlan-config)#ipv6 dhcp guard attach-policy pol1
Device(config-vlan-config)#exit
```

Attaches a DHCPv6 guard policy to a VLAN.

Step 9 (Optional) **show ipv6 dhcp guard policy** [*policy-name*]

Example:

```
Device#show ipv6 dhcp policy guard pol1
```

Displays the policy configuration as well as all the interfaces where the policy is applied.

Configure an IPv6 snooping policy

Create and apply IPv6 snooping policies to control IPv6 address bindings and improve security.

IPv6 snooping policies help monitor, restrict, and secure IPv6 address assignment on a network by tracking bindings and setting appropriate controls.

Before you begin

- Ensure you have access privileges for configuration.
- Identify the interfaces or VLANs requiring IPv6 snooping policies.
- Determine policy settings: address limits, roles, protocols, security level.

Procedure

Step 1 Enter configuration mode and create a new IPv6 snooping policy.

Example:

```
Device#configure terminal
Device(config)#ipv6 snooping policy policy1
```

Enters IPv6 snooping configuration mode.

Step 2 Assign the device role (node or switch) for the policy.

Example:

```
Device(config-snoop-policy)#device-role node
```

```
Device(config-snoop-policy)#device-role switch
```

- Node: Default—creates bindings and probes entries.
- Switch: Does not probe entries or create bindings if trusted port is enabled.

Step 3 Set a limit on address binding entries, or remove the limit if desired.

Example:

```
Device(config-snoop-policy)#limit address-count 500
Device(config-snoop-policy)#no limit address-count
```

Limits or removes binding entry restriction.

Step 4 Enable protocol monitoring for DHCP or NDP as needed.

Example:

```
Device(config-snoop-policy)#protocol dhcp
Device(config-snoop-policy)#protocol ndp
```

Step 5 Apply the policy to trusted ports if required.

Example:

```
Device(config-snoop-policy)#trusted-port
```

Traffic is not blocked or dropped on trusted ports.

Step 6 Set the desired security level for the policy.

Example:

```
Device(config-snoop-policy)#security-level glean
Device(config-snoop-policy)#security-level inspect
Device(config-snoop-policy)#security-level guard
```

- Glean: Learns bindings, doesn't drop packets.
- Inspect: Learns bindings, drops packets if issues detected.
- Guard: Drops packets on threat (e.g., IPv6, ND, RA, DHCP Server).

Step 7 Enable tracking and exit policy configuration mode.

Example:

```
Device(config-snoop-policy)#tracking enable
Device(config-snoop-policy)#exit
```

Step 8 Attach the policy to an interface or VLAN.

Example:

Interface:

```
Device(config)#interface ethernet 1/25
Device(config-if)#ipv6 snooping attach-policy policy1
Device(config-if)#exit
```

VLAN:

```
Device(config)#vlan configuration 333
Device(config-vlan-config)#ipv6 snooping attach-policy policy1
Device(config-vlan-config)#exit
```

Step 9 Verify the configuration and attached interfaces/VLANs.

Example:

```
Device#show ipv6 snooping policy policy1
```

Displays policy configuration and usage.

IPv6 snooping policy is configured and applied, securely managing address bindings and network traffic.

What to do next

Monitor logs and snooping reports to ensure the policy is effective.

Verify and troubleshoot IPv6 snooping

Procedure

Step 1 **show ipv6 snooping capture-policy** [**interface** *type number*]

Example:

```
Device#show ipv6 snooping capture-policy interface ethernet 0/0
```

Displays snooping message capture policies.

Step 2 **show ipv6 snooping counter** [**interface** *type number*]

Example:

```
Device#show ipv6 snooping counter interface Ethernet 1/1
```

Displays information about the packets counted by the interface counter.

Step 3 **show ipv6 snooping features**

Example:

```
Device#show ipv6 snooping features
```

Displays information about snooping features configured on the device.

Step 4 **show ipv6 snooping policies** [**interface** *type number*]

Example:

```
Device#show ipv6 snooping policies
```

Displays information about the configured policies and the interfaces to which they are attached.

Step 5 **debug ipv6 snooping**

Example:

```
Device#debug ipv6 snooping
```

Enables debugging for snooping information in IPv6.

Configuration examples

Explains configuration examples.

Example: IPv6 RA guard configuration

This example demonstrates the configuration of IPv6 RA Guard on an interface and how to display the running configuration.

Configutation

```
Device(config)#interface ethernet 1/1
Device(config-if)#ipv6 nd raguard attach-policy policy1
```

Configutation output

```
Device#show running-config interface ethernet 1/1
Building configuration...
Current configuration : 129 bytes
!
interface ethernet1/1
 switchport
 switchport access vlan 222
 switchport mode access
 access-group mode prefer port
 ipv6 nd raguard
end
```

Example: configuring DHCPv6 guard

The following example displays a sample configuration for DHCPv6 guard.

DHCPv6 guard configuration example

```
configure terminal
ipv6 dhcp guard policy pol1
device-role server
preference min 0
preference max 255
trusted-port
interface Ethernet 1/1
switchport
ipv6 dhcp guard attach-policy pol1
vlan configuration 1
ipv6 dhcp guard attach-policy pol1
show ipv6 dhcp guard policy pol1
```

Example: configuring IPv6 First-Hop security binding table

This example demonstrates the configuration of the IPv6 First-Hop Security Binding table.

```
configure terminal
 ipv6 neighbor binding vlan 100 2001:db8::1 interface ethernet3/0
 ipv6 neighbor binding max-entries 100
 ipv6 neighbor binding logging
 ipv6 neighbor binding retry-interval 8
```

```
 exit
show ipv6 neighbor binding
```

Example: configuring IPv6 snooping

This example demonstrates the configuration steps for IPv6 snooping and how to verify the applied policy.

Configuration

```
Device#configure terminal
Device(config)#ipv6 snooping policy policy1
Device(config-ipv6-snooping)#exit
Device(config)#vlan configuration 333
Device(config-vlan-config)#switchport
Device(config-vlan-config)#ipv6 snooping attach-policy policy1
```

Configuration output

```
Device#show ipv6 snooping policies policy1
Policy policy1 configuration:
  trusted-port
  device-role node
Policy applied on the following interfaces:
   Et0/0                vlan all
   Et1/0       vlan all
Policy applied on the following vlans:
   vlan 1-100,200,300-400
```

Additional references for IPv6 First-Hop security

This section includes additional information related to configuring IPv6 First-Hop Security.

Table 2: Related documents

Related Topic	Document Title
Cisco NX-OS Licensing	*Cisco NX-OS Licensing Guide*
Command reference	*Cisco Nexus 7000 Series NX-OS Security Command Reference*