



# Enhanced IPv6 Neighbor Discovery Cache Management

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The IPv6 highly scalable neighbor discovery feature optimizes IPv6 neighbor discovery by providing Neighbor Discovery (ND) cache autorefresh, unsolicited NA gleaning, and neighbor unreachability detection (NUD) exponential retransmit. This feature makes ND more robust in a large-scale deployment

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## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and 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 feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [www.cisco.com/go/cfn](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

# Information About Enhanced IPv6 Neighbor Discovery Cache Management

## Enhanced IPv6 Neighbor Discovery Cache Management Overview

Neighbor discovery (ND) protocol enforces neighbor unreachability detection (NUD), which can detect failing nodes or routers and changes, to link-layer addresses. NUD is used to maintain reachability information for all paths between hosts and neighboring nodes, including host-to-host, host-to-router, and router-to-host communication.

The neighbor cache maintains mapping information about the IPv6 link-local or global address to the link-layer address. The neighbor cache also maintains the neighbor's reachability state, which is updated using NUD. Neighbors can be in one of the following five possible states:

- **DELAY**—Neighbor is pending re-resolution, and traffic might flow to this neighbor.
- **INCOMPLETE**—Address resolution is in progress, and the link-layer address is not yet known.
- **PROBE**—Neighbor re-resolution is in progress, and traffic might flow to this neighbor.
- **REACHABLE**—Neighbor is known to be reachable within the last reachable time interval.
- **STALE**—Neighbor requires re-resolution, and traffic may flow to this neighbor.

Use the **ipv6 nd na glean** command to configure ND to glean an entry from an unsolicited neighbor advertisement (NA).

Use the **ipv6 nd nud retry** command to configure ND to maintain an ND cache entry for a neighbor during network disruption.

Use the **ipv6 nd cache expire refresh** command to configure the neighbor to maintain an ND cache entry, when no traffic is sent to the neighbor.

# How to Configure Enhanced IPv6 Neighbor Discovery Cache Management

## Customizing the Parameters for IPv6 Neighbor Discovery

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ipv6 nd nud retry** *base interval max-attempts [final-wait-time]*
5. **ipv6 nd cache expire** *expire-time-in-seconds [refresh]*
6. **ipv6 nd na glean**
7. **end**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Device> enable	Enables privileged EXEC mode.  <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Device# configure terminal	Enters global configuration mode.
Step 3	<b>interface</b> <i>type number</i>  <b>Example:</b> Device (config)# interface Ethernet 1/0	Specifies an interface type and number, and places the device in interface configuration mode.
Step 4	<b>ipv6 nd nud retry</b> <i>base interval max-attempts [final-wait-time]</i>  <b>Example:</b> Device (config-if)# ipv6 nd nud retry 1 1000 3 1000	Configures the number of times neighbor unreachability detection (NUD) resends neighbor solicitations (NS) before the final wait time on the last probe and the interval between NS during NUD.  When a device runs NUD to resolve the ND entry for a neighbor, it sends three NS packets 1 second apart. In certain situations (for example, spanning-tree events, high traffic, the end host being reloaded), three NS packets sent at an interval of 1 second may not be sufficient. To help maintain the neighbor cache in such situations, use the <b>ipv6 nd nud retry</b> command to configure exponential timers for NS retransmits.

	Command or Action	Purpose
		<p>The retransmit probe time is calculated by <math>tm^n</math> (where, <math>t</math> = interval, <math>m</math> = base, and <math>n</math> = current attempt). Therefore, <b>ipv6 nd nud retry 3 1000 5</b> command will produce retransmit intervals of 1,3,9,27,81 seconds. If the <i>final-wait-time</i> is not configured, the entry remains for 243 seconds before it is deleted.</p> <ul style="list-style-type: none"> <li>• The range for <i>base</i> is from 1 to 3.</li> <li>• The range for <i>interval</i> is from 1000 to 32000 milliseconds.</li> <li>• The range for <i>max-attempts</i> is from 1 to 128.</li> <li>• The range for <i>final-wait-time</i> is from 1000 to 32000 milliseconds.</li> </ul>
<b>Step 5</b>	<p><b>ipv6 nd cache expire</b> <i>expire-time-in-seconds</i> [<b>refresh</b>]</p> <p><b>Example:</b></p> <pre>Device(config-if)# ipv6 nd cache expire 7200</pre>	<p>Configures the length of time before an IPv6 neighbor discovery cache entry expires. The range is from 1 to 65536 seconds.</p> <p>By default, an ND cache entry is expired and deleted if it remains in the STALE state for 14,400 seconds, or 4 hours. The <b>ipv6 nd cache expire</b> command allows the user to vary the expiry time and to trigger autorefresh of an expired entry before the entry is deleted.</p> <p>When the refresh keyword is used, an ND cache entry is autorefreshed. The entry moves into the DELAY state and the NUD process occurs, in which the entry transitions from the DELAY state to the PROBE state after 5 seconds. When the entry reaches the PROBE state, a neighbor solicitation (NS) is sent and then retransmitted as per the configuration.</p> <p>When you configure the expiry duration, the device will probe the neighbor on entry expiration, that is, the neighbor discovery enters into the probe state and sends a neighbor solicitation to the neighbor. If the neighbor responds, the ND cache entry reverts to the reachable state. If the neighbor does not respond, the cache entry is deleted.</p> <p>This maintains an entry in the ND cache until the neighbor exists and is reachable, even if no traffic is sent to the neighbor.</p>
<b>Step 6</b>	<p><b>ipv6 nd na glean</b></p> <p><b>Example:</b></p> <pre>Device(config-if)# ipv6 nd na glean</pre>	<p>Configures ND to glean an entry from an unsolicited neighbor advertisement (NA).</p> <p>The IPv6 ND ignores an unsolicited NA packet if it does not have a cache entry for the neighbor that is sending the NA. If the ND is configured on an interface to glean an entry from an unsolicited NA, the neighbor discovery protocol creates neighbor discovery cache entries based on unsolicited NA packets sent from the previously unknown neighbors on that interface. This allows the device to populate its ND cache with an entry for a neighbor in advance of any data traffic exchange with the neighbor.</p>
<b>Step 7</b>	<p>end</p> <p><b>Example:</b></p> <pre>Device(config-if)# end</pre>	<p>Exits interface configuration mode and returns to privileged EXEC mode.</p>

# Configuration Examples for Enhanced IPv6 Neighbor Discovery Cache Management

## Example: Customizing the Parameters for IPv6 Neighbor Discovery

In the following example, IPv6 ND NA gleaning is enabled and the IPv6 ND cache expiry is set to 7200 seconds (2 hours):

```
interface Port-channel189
 no ip address
 ipv6 address FC07::789:1:0:0:3/64
 ipv6 nd nud retry 1 1000 3 1000
 ipv6 nd na glean
 ipv6 nd cache expire 7200
 no ipv6 redirects
```

## Additional References

### Related Documents

Related Topic	Document Title
IPv6 addressing and connectivity	<i>IPv6 Configuration Guide</i>
Cisco IOS commands	<a href="#">Cisco IOS Master Commands List, All Releases</a>
IPv6 commands	<i>Cisco IOS IPv6 Command Reference</i>
Cisco IOS IPv6 features	<a href="#">Cisco IOS IPv6 Feature Mapping</a>

### Standards and RFCs

Standard/RFC	Title
RFCs for IPv6	<i>IPv6 RFCs</i>

**MIBs**

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:  <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

**Technical Assistance**

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>

## Feature Information for Enhanced IPv6 Neighbor Discovery Cache Management

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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**Table 1: Feature Information for Enhanced IPv6 Neighbor Discovery Cache Management**

Feature Name	Releases	Feature Information
Enhanced IPv6 Neighbor Discovery Cache Management	12.2(33)SX17 Cisco IOS Release 15.2(1)E	The IPv6 highly scalable neighbor discovery feature optimizes IPv6 neighbor discovery by providing ND cache autorefresh, unsolicited NA gleaning, and NUD exponential retransmit.  The following commands were introduced or modified: <b>ipv6 nd cache expire</b> , <b>ipv6 nd na glean</b> , <b>ipv6 nd nud retry</b> .



