

Chapter 17

Neighbor Discovery Configuration Guidelines

To configure neighbor discovery, you include statements at the [edit protocols router-advertisement] hierarchy level of the configuration. You configure router advertisement on a per-interface basis.

```
protocols {
  router-advertisement {
    interface interface-name {
      current-hop-limit number;
      default-lifetime seconds;
      (managed-configuration | no-managed-configuration);
      max-advertisement-interval seconds;
      min-advertisement-interval seconds;
      (other-stateful-configuration | no-other-stateful-configuration);
      prefix prefix {
        (autonomous | no-autonomous);
        (on-link | no-on-link);
        preferred-lifetime seconds;
        valid-lifetime seconds;
      }
      reachable-time milliseconds;
      retransmit-timer milliseconds;
      traceoptions {
        file name <replace> <size size> <files number> <no-stamp>
          <(world-readable | no-world-readable)>;
        flag flag <detail> <disable>;
      }
    }
  }
}
```

This chapter describes the following tasks for configuring and monitoring neighbor discovery router advertisement messages:

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Minimum Neighbor Discovery Configuration

To configure the router to send router advertisement messages, you must include at least the following statements in the configuration. All other router advertisement configuration statements are optional.

```
[edit]
protocols {
  router-advertisement {
    interface interface-name {
      prefix prefix;
    }
  }
}
```



Note

When you configure neighbor discovery router advertisement on an interface, you must also configure family inet6 at the [edit interfaces *interface-name* unit *logical-unit-number*] hierarchy level. For more information about the family inet6 statement, see “Configure the IPv6 Address on an Interface” on page 42.

Configure Router Advertisement on an Interface

To configure an interface to send router advertisement messages, include the interface statement at the [edit protocols router-advertisement] hierarchy level:

```
[edit protocols router-advertisement]
interface interface-name;
```

Specify the interface name in the following format:

```
physical<:channel>.logical
```

For more information about interface names, see “Configure the Interface Name” on page 40.

Configure the Hop Limit

The current hop limit field in the router advertisement messages indicates the default value placed in the hop count field of the IP header for outgoing packets. To configure the hop limit, include the `current-hop-limit` statement at the [edit protocols router-advertisement interface *interface-name*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name]  
current-hop-limit number;
```

The default hop limit is 64.

Modify the Default Router Lifetime

The default lifetime in router advertisement messages indicates the lifetime associated with the default router. To modify the default lifetime timer, include the `default-lifetime` statement at the [edit protocols router-advertisement interface *interface-name*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name]  
default-lifetime seconds;
```

By default, the default router lifetime is three times the maximum advertisement interval. For more information about the maximum advertisement interval, see “Configure the Frequency of Router Advertisements” on page 190.

Enable Stateful Autoconfiguration

You can set two fields in the router advertisement message to enable stateful autoconfiguration on a host: the managed configuration field and the other stateful configuration field. Setting the managed configuration field enables the host to use a stateful autoconfiguration protocol for address autoconfiguration, along with any stateless autoconfiguration already configured. Setting the other stateful configuration field enables autoconfiguration of other nonaddress-related information.

By default, stateful autoconfiguration is disabled.

To set the managed configuration field and enable address autoconfiguration, include the `managed-configuration` statement at the [edit protocols router-advertisement interface *interface-name*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name]  
managed-configuration;
```

To disable managed configuration field, include the `no-managed-configuration` statement at the [edit protocols router-advertisement interface *interface-name*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name]  
no-managed-configuration;
```

To set the other stateful configuration field and enable autoconfiguration of other types of information, include the other-stateful-configuration statement at the [edit protocols router-advertisement interface *interface-name*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name]
  other-stateful-configuration;
```

To disable other stateful configuration, include the no-other-stateful-configuration statement at the [edit protocols router-advertisement interface *interface-name*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name]
  no-other-stateful-configuration;
```

Configure the Frequency of Router Advertisements

The router sends router advertisements on each interface configured to transmit messages. The advertisements include route information and indicate to network hosts that the router is operational. The router sends these messages periodically, with a time range defined by minimum and maximum values.

To modify the router advertisement interval, include the min-advertisement-interval and max-advertisement-interval statements at the [edit protocols router-advertisement interface *interface-name*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name]
  min-advertisement-interval seconds;
  max-advertisement-interval seconds;
```

By default, the maximum advertisement interval is 600 seconds and the minimum advertisement interval is one-third the maximum interval, or 200 seconds.

Modify the Reachable Time Limit

After receiving a reachability confirmation from a neighbor, a node considers that neighbor reachable for a certain amount of time without receiving another confirmation. This mechanism is used for neighbor unreachability detection, a mechanism for finding link failures to a target node.

To modify the reachable time limit, include the reachable-time statement at the [edit protocols router-advertisement interface *interface-name*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name]
  reachable-time milliseconds;
```

By default, the reachable time period is 0 milliseconds.

Modify the Frequency of Neighbor Solicitation Messages

The retransmit timer determines the retransmission frequency of neighbor solicitation messages. This timer is used to detect when a neighbor has become unreachable and to resolve addresses. To modify the retransmit timer, include the retransmit-timer statement at the [edit protocols router-advertisement interface *interface-name*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name]
 retransmit-timer milliseconds;
```

By default, the retransmit timer is 0 milliseconds.

Configure Prefix Information

Router advertisement messages carry prefixes and information about them. A prefix is onlink when it is assigned to an interface on a specified link. The prefixes specify whether they are onlink or not onlink. A node considers a prefix to be onlink if it is represented by one of the link's prefixes, a neighboring router specifies the address as the target of a redirect message, a neighbor advertisement message is received for the (target) address, or any neighbor discovery message is received from the address. These prefixes are also used for address autoconfiguration. The information about the prefixes specifies the lifetime of the prefixes, whether the prefix is autonomous, and whether the prefix is onlink.

You can configure the following prefix information:

Set the Prefix for Onlink Determination on page 191

Set the Prefix for Stateless Address Autoconfiguration on page 192

Configure the Preferred Lifetime on page 192

Configure the Valid Lifetime on page 192

Set the Prefix for Onlink Determination

You can specify prefixes in the router advertisement messages as onlink. When set as onlink, the prefixes are used for onlink determination. By default, prefixes are onlink.

To explicitly set prefixes as onlink, include the on-link statement at the [edit protocols router-advertisement interface *interface-name* prefix *prefix*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name prefix prefix]
 on-link;
```

To set prefixes as not onlink, include the no-on-link statement at the [edit protocols router-advertisement interface *interface-name* prefix *prefix*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name prefix prefix]
 no-on-link;
```

Set the Prefix for Stateless Address Autoconfiguration

You can specify prefixes in the router advertisement messages as autonomous. When set as autonomous, the prefixes are used for stateless address autoconfiguration. By default, prefixes are autonomous.

To explicitly specify prefixes as autonomous, include the autonomous statement at the [edit protocols router-advertisement interface *interface-name* prefix *prefix*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name prefix prefix]
autonomous;
```

To specify prefixes as not autonomous, include the no-autonomous statement at the [edit protocols router-advertisement interface *interface-name* prefix *prefix*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name prefix prefix]
no-autonomous;
```

Configure the Preferred Lifetime

The preferred lifetime for the prefixes in the router advertisement messages specifies how long the prefix generated by stateless autoconfiguration remains preferred. By default, the preferred lifetime is set to 604,800 seconds.

To configure the preferred lifetime, include the preferred-lifetime statement at the [edit protocols router-advertisement interface *interface-name* prefix *prefix*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name prefix prefix]
preferred-lifetime seconds;
```

If you set the preferred lifetime to 0xffffffff, the lifetime is infinite.

The preferred lifetime value must never exceed the valid lifetime value.

Configure the Valid Lifetime

The valid lifetime for the prefixes in the router advertisement messages specifies how long the prefix remains valid for onlink determination. By default, the valid lifetime is set to 2,592,000 seconds.

To configure the valid lifetime, include the valid-lifetime statement at the [edit protocols router-advertisement interface *interface-name* prefix *prefix*] hierarchy level:

```
[edit protocols router-advertisement interface interface-name prefix prefix]
valid-lifetime seconds;
```

If you set the valid lifetime to 0xffffffff, the lifetime is infinite.

The valid lifetime value must never be smaller than the preferred lifetime value.

Trace Router Advertisement Traffic

To trace router advertisement traffic, you can specify options in the global traceoptions statement at the [edit routing-options] hierarchy level, and you can specify router advertisement options by including the traceoptions statement at the [edit protocols router-advertisement] hierarchy level:

```
[edit protocols router-advertisement]
traceoptions {
  file name <replace> <size size> <files number> <no-stamp>
    <(world-readable | no-world-readable)>;
  flag flag <flag-modifier> <disable>;
}
```

Neighbor Discovery CLI Commands

From the command-line interface (CLI), you can run show and clear commands to display neighbor discovery information. The output contains statistics about sent and received messages on that interface, as well as information received from advertisements from other routers.

clear ipv6 neighbors

Syntax clear ipv6 neighbors (all | host *host-name*)

Description Clear IPv6 router advertisement counters.

Options all—Clear IPv6 neighbors.

host *host-name*—Clear the specified IPv6 neighbors.

Required Privilege Level view

See Also show ipv6 neighbors on page 194

clear ipv6 router-advertisement

Syntax clear ipv6 router-advertisement <interface *interface*>

Description Clear IPv6 router advertisement counters.

Options none—Clear IPv6 router advertisement counters for all interfaces.

interface *interface*—(Optional) Clear IPv6 router advertisement counters for the specified interface.

Required Privilege Level view

See Also show ipv6 router-advertisement on page 195

show ipv6 neighbors

Syntax show ipv6 neighbors

Description Display information about the IPv6 neighbor cache.

Required Privilege Level view

Output Fields IPv6 Address—Name of IPv6 interface.

Linklayer Address—Link-layer address.

State—State of link. It can be up, down, reachable, or unreachable.

Exp—Number of seconds until entry expires.

Rtr—Neighbor is a router. It can be yes or no.

Interface—Name of interface.

Sample Output

```

user@host> show ipv6 neighbors
IPv6 Address          Linklayer Address  State      Exp  Rtr  Interface
fe80::2a0:c9ff:fe5b:4c1e  00:a0:c9:5b:4c:1e  reachable  15   yes  fxp0.0

```

show ipv6 router-advertisement

Syntax show ipv6 router-advertisement <conflicts> <interface *interface*><prefix *prefix/prefix length*>

Description Display information about IPv6 router advertisements.

Options conflicts—Display only the IPv6 router advertisement information that is conflicting.

interface *interface*—Display IPv6 router advertisement information for the specified interface.

prefix *prefix/prefix length*—Display IPv6 router advertisement information for the specified prefix.

Required Privilege Level view

See Also clear ipv6 router-advertisement on page 193

Output Fields Interface—Name of interface.

Advertisements sent—Number of router advertisements sent and time since they were sent.

Solicits received—Number of solicitation messages received.

Advertisements received—Number of router advertisements received.

Advertisements from—Names of interfaces from which router advertisements have been received and time since the last one was received.

Managed—Managed address configuration flag. It can be 0 (stateless) or 1 (stateful).

Other configuration—Other stateful configuration flag. It can be 0 (stateless) or 1 (stateful).

Reachable time—The time, in milliseconds, that a node assumes a neighbor is reachable after receiving a reachability confirmation.

Default lifetime—Default lifetime, in seconds. It can be from 0 seconds to 18.2 hours. A setting of 0 indicates that the router is not a default router.

Retransmit timer—The time, in milliseconds, between retransmitted Neighbor Solicitation messages.

Current hop limit—Configured current hop limit. It can be 1 to 255.

Prefix—Name and length of prefix.

Valid lifetime—Prefix valid lifetime specifies how long the prefix remains valid for onlink determination. By default, the valid lifetime is set to 2,592,000 seconds. When 0xffffffff is specified, the valid lifetime is infinite.

Preferred lifetime—Prefix preferred lifetime specifies how long the prefix generated by stateless autoconfiguration remains preferred. By default, the preferred lifetime is set to 604,800 seconds. When preferred lifetime is set to 0xffffffff, the preferred lifetime is infinite. The preferred lifetime is never greater than the valid lifetime.

On link—Onlink flag. It can be “not onlink” (0) or “onlink” (1). The default is 1.

Autonomous—Autonomous address configuration flag. It can be “not autonomous” (0) or autonomous (1). The default is 1.

**Sample Output: show ipv6
router-advertisement**

```
user@host> show ipv6 router-advertisement prefix 8040::/16
Interface: fe-0/1/3.0
  Advertisements sent: 3, last sent 00:04:11 ago
  Solicits received: 0
  Advertisements received: 3
  Advertisement from fe80::290:69ff:fe9a:5403, heard 00:00:05 ago
  Managed: 0
  Other configuration: 0
  Reachable time: 0 ms
  Default lifetime: 180 sec [1800 sec]
  Retransmit timer: 0 ms
  Current hop limit: 64
  Prefix: 8040:1::/64
    Valid lifetime: 2592000 sec
    Preferred lifetime: 604800 sec
    On link: 1
    Autonomous: 1
```

Conflicting information is denoted by displaying the value the router is advertising in brackets:

Sample Output: show ipv6 router-advertisement

```
user@host> show ipv6 router-advertisement
Interface: fe-0/1/1.0
  Advertisements sent: 0
  Solicits received: 0
  Advertisements received: 0
Interface: fxp0.0
  Advertisements sent: 0
  Solicits received: 0
  Advertisements received: 1
  Advertisement from fe80::2d0:b7ff:fe1e:7b0e, heard 00:00:13 ago
  Managed: 0
  Other configuration: 0 [1]
    Reachable time: 0 ms
    Default lifetime: 1800 sec
    Retransmit timer: 0 ms
    Current hop limit: 64
```

**Sample Output: show ipv6
router-advertisement
conflicts**

```
user@host> show ipv6 router-advertisement conflicts
Interface: fxp0.0
  Advertisement from fe80::2d0:b7ff:fe1e:7b0e, heard 00:01:08 ago
  Other configuration: 0 [1]
```

If there are no conflicts, nothing is displayed:

```
user@host> show ipv6 router-advertisement conflicts
```