Neighbor Discovery Configuration

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Chapter 1 Neighbor Discovery Configuration

1.1 Neighbor Discovery Overview

A node (host and router) uses ND (Neighbor Discovery protocol) to determine the link-layer addresses of the connected neighbors and to delete invalid cache rapidly. The host also uses the neighbor to discover the packet-forwarding neighboring routers. Additionally, the node uses the ND mechanism to positively trace which neighbors are reachable or unreachable and to test the changed link-layer address. When a router or the path to a router has trouble, the host positively looks for another working router or another path.

IPv6 ND corresponds to IPv4 ARP, ICMP router discovery and ICMP redirect.

ND supports the following link types: P2P, multicast, NBMA, shared media, changeable MTU and asymmetric reachability. The ND mechanism has the following functions:

(1) To discover routers: how the host to locate the routers on the connected links.

(2) To discover prefixes: how the host to find a group of address prefixes, defining which destinations are on-link on the connected links.

(3) To discover parameters: how the node to know the link-related or network-related parameters of the transmission interface.

(4) To automatically set addresses: how the node to set the address of an interface automatically.

(5) Address solution: When the IP of a destination is given, how a node determines the link-layer address of the on-link destination.

(6) To determine the next hop: it is an algorithm to map the IP address of a destination to the neighboring IP. The next hop can be a router or destination.

(7) To test unreachable neighbors: how a node to determine unreachable neighbors; if neighbor is a router, the default router can be used. If the neighbor is both router and host, it needs address resolution.

(8) To test repeated address: how a node to determine whether a to-be-used address is not used by another node.

(9) Redirect: how a router to notify the host of the best next hop.

1.2 Address Resolution

Address resolution is a procedure of resolving the link-layer address through node's IP. Packet exchange is realized through ND request and ND notification.

● Configuring a static ND cache

In most cases, dynamic address resolution is used and static ND cache configuration is not needed. If necessary, you can set static ND cache in global mode and the system will use it to translate IP into the link-layer address. The following table shows how to set a static-IP-to-link-layer-address mapping.

Run the following relative command in global mode:

Command	Purpose
ipv6 neighbor *ipv6address* **vlan** *vlanid hardware-address*	Sets a static ND cache and translates IPv6 address into a link-layer address.

1.3 ND Configuration

The ND protocol is used not only for address resolution but for other functions such as neighbor solicitation (NS), neighbor advertisement (NA), router solicitation (RS), router advertisement (RA) and redirect.

Following commands must be configured under the interface configuration mode and the command **ipv6 enable** needs to be configured in advance.

● Setting the number of transmitted NSs when ND performs DAD on a local port

Before the IPv6 port is started, it should send the NS information to the local machine to find if there is any duplicate IPv6 address existing on links through DAD.

Command	Purpose
ipv6 nd dad attempts *num*	Sets the number of transmitted NSs when the local port performs DAD. The default is 1.

● Setting the M flag in the RA message transmitted by the local port

The M flag indicates that the RA message host should obtain addresses through on-status automatic configuration. To set the M flag in the RA message transmitted by the local port to 1, run the following command.

Command	Purpose
ipv6 nd managed-flag	Sets the M flag in the RA message transmitted by the local port.

● Setting the NS transmission interval of the local port and the retrans-timer field in the RA message

This command can be used to set the NS transmission interval of the local OLT on the local port and at the same time the retrans-timer field in the RA message on the local port. The host sets its retrans-timer variable according to the retrans-timer field in RA.

Command	Purpose
ipv6 nd ns-interval *milliseconds*	Means the NS retransmission interval in the local port and the retrans-timer field in the RA message. Its default value is 1000ms.

● The O flag indicates that the RA message host should obtain other information through on-status automatic configuration.

To set the O flag in the RA message transmitted by the local port to 1, run the following command: To set the O flag in the RA message transmitted by the local port to 1, run the following command:

Command	Purpose
ipv6 nd other-flag	Sets the O flag in the RA message transmitted by the local port.

- Setting the prefix of the RA message

The router releases address prefixes to the network host via RA message. The address prefix plus the host address is the entire unicast address. The prefix option is carried by the RA message, and the host obtains the IPv6 address prefix and related parameter from this option.

Command	Purpose
ipv6 nd prefix {*ipv6-prefix/prefix-length* | **default**} [**no-advertise** | [*valid-lifetime preferred-lifetime* [**off-link** | **no-autoconfig**]]]	Means that the local port transmits the prefix option's content in the RA message.

- Setting the RA transmission interval

The following command is used to set the range of RA transmission interval. The RA transmission interval is in general an indefinite value but a random value in a fixed range, which can avoid abrupt flow surge in the network.

Command	Purpose
ipv6 nd ra-interval-range *max min*	Sets the range of RA transmission interval. The maximum RA transmission interval is 600s and the minimum RA transmission interval is 200s.

The interval for the local port to transmit the first three messages cannot be more than 16 seconds, while that to transmit the following messages varies between the maximum interval (600 seconds) and the minimum interval (200 seconds).

- Setting a specific RA transmission interval

RA packets are transmitted in an interval configured by ra-interval-range, but if users want to use a specific transmission interval, they can set this value through the following command:

Command	Purpose
ipv6 nd ra-interval *interval*	Setting the router-lifetime field in the

	RA message transmitted by the local port The command is not configured by default.

- Setting the router-lifetime field in the RA message transmitted by the local port

The router-lifetime field in the RA message is the triple of the maximum value of ipv6 nd ra-interval-range.

Command	Purpose
ipv6 nd ra-lifetime *seconds*	Sets the router-lifetime field in the RA message transmitted by the local port. Default MaxRtrAdvInterval*3(s)

- Setting the reachable-time field of the RA message and the reachable time of all automatically configured neighbor caches on the local port, run the following command:

The reachable-time table in the RA information means "Neighbor Reachable Time"; the default i s 0, which means "no specification".

Command	Purpose
ipv6 nd reachable-time *milliseconds*	Sets the reachable-time field in the RA message transmitted by the local port. Its default value is 0ms.

- Setting the value of the OLT preference in the RA message, run the following command:

router-preference means the router's priority, which accounts for two bits in the flags domain in the RA message. The router's priority can be high, medium and low. The medium priority is the default settings.

Command	Purpose
ipv6 nd router-preference *preference*	Sets the router-preference field in the RA message transmitted by the local port. It is medium by default.

- Disabling a port to be the notification port of an OLT, run the following command:

Only the notification port can transmit RA packets. The notification port supports multicast and is set to have at least one unicast IP address. Its "AdvSendAdvertisment flag" is TRUE in value.

The configuration of ipv6 nd suppress-ra in the VLAN port means shutdown the notification port. This command is configured in the vlan interface configuration mode.

Command	Purpose
ipv6 nd suppress-ra	Means the value of the AdvSendAdvertisment flag on the

	local port. It is true by default.