

## IPv6 Configuration Command

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# Chapter 1 IPv6 Configuration Commands

## 1.1 IPv6 Configuration Commands

IPv6 configuration commands include the following ones:

- `ipv6 address`
- `ipv6 address anycast`
- `ipv6 address autoconfig`
- `ipv6 address eui-64`
- `ipv6 address link-local`
- `ipv6 enable`
- `show ipv6 interface`

### 1.1.1 ipv6 address

#### Syntax

To set an IPv6 address in port configuration mode and meanwhile enable IPv6 on a port, run **ipv6 address** command. To delete the IPv6 address on a port, run **no ipv6 address** command.

**ipv6 address** { *ipv6-address/prefix-length* | **general-prefix** *prefix-name sub-bits/prefix-length* }

**no ipv6 address** [ *ipv6-address/prefix-length* | **general-prefix** *prefix-name sub-bits/prefix-length* ]

#### Parameter

Parameter	Description
<i>ipv6-address</i>	Means the to-be-added IPv6 address.
<i>/prefix-length</i>	Means the IPv6 prefix' length. It is a decimal value behind the symbol "/", meaning the successive bits in the network part in an address.
<i>Prefix-name</i>	Means a general prefix, defining the network part of the IPv6 address.
<i>Sub-bits</i>	Means the host part of the IPv6 address. It combines with the prefix, which is defined by prefix-name, to form an IPv6 address. This parameter must support the IPv6 address format regulated in RFC2373.

#### Default

No default IPv6 address exists on the VLAN port.

## Command Mode

VLAN Interface configuration mode

## Usage Guidelines

If you run **no ipv6 address**, which has no parameters, all manually configured IPv6 addresses on the VLAN port will be deleted.

## Example

The following example shows how to set an IPv6 address in VLAN port configuration mode and meanwhile enable IPv6 on the VLAN port.

```
Switch_config_v1# ipv6 address 2001:0:0:0:0DB8:800:200C:417A/64
```

## Related Commands

**ipv6 address anycast**

**ipv6 address eui-64**

**ipv6 address link-local**

**show ipv6 interface**

### 1.1.2 ipv6 address anycast

#### Syntax

To set an anycast address and enable IPv6 on the VLAN port, run the first one of the following two commands:

**ipv6 address *ipv6-prefix/prefix-length* anycast**

**no ipv6 address [ *ipv6-prefix/prefix-length* anycast ]**

#### Parameter

Parameter	Description
<i>ipv6-prefix</i>	Means the network part of the IPv6 address.
<i>/prefix-length</i>	Means the IPv6 prefix length. It is a decimal value behind the symbol "/", meaning the successive bits in the network part in an address.

#### Default

It is set as an anycast address on the VLAN port by default.

## Command Mode

VLAN Interface configuration mode

## Usage Guidelines

If you run **no ipv6 address**, which has no parameters, all manually configured IPv6 addresses on the VLAN port will be deleted.

## Example

```
Switch_config_v1# ipv6 address 2001:0DB8:1:1:FFFF:FFFF:FFFF:FFFE/64 anycast
```

## Related Commands

**ipv6 address eui-64**

**ipv6 address link-local**

**show ipv6 interface**

### 1.1.3 ipv6 address autoconfig

#### Syntax

To use the stateless auto-configuration protocol to set an IPv6 address, run **ipv6 address autoconfig** in VLAN port configuration mode.

**ipv6 address autoconfig**

**no ipv6 address autoconfig**

#### Parameter

None

#### Default

By default, IPv6 address auto-configuration is not used.

#### Command Mode

VLAN Interface configuration mode

#### Example

```
Switch_config_v1# ipv6 address autoconfig
```

### 1.1.4 ipv6 address eui-64

#### Syntax

To set an IPv6 address in VLAN port configuration mode, run **ipv6 address eui-64**. To remove the setting, use the no form of the command.

**ipv6 address ipv6-prefix/prefix-length eui-64**

**no ipv6 address [ ipv6-prefix/prefix-length eui-64 ]**

## Parameter

Parameter	Description
<i>ipv6-prefix</i>	Means the network part of the IPv6 address.
<i>/prefix-length</i>	Means the IPv6 prefix length. It is a decimal value behind the symbol "/", meaning the successive bits in the network part in an address.

## Default

The IPv6 address in the eui-64 form is not configured on the VLAN port.

## Command Mode

VLAN Interface configuration mode

## Usage Guidelines

If you run **no ipv6 address**, which has no parameters, all manually configured IPv6 addresses on the VLAN port will be deleted.

If the **prefix-length** parameter is bigger than 64 bits, the prefix-length is prior to the length of the VLAN port ID.

## Example

```
Switch_config_v1# ipv6 address 2001:0:0:0:0DB8::/64 eui-64
```

## Related Commands

```
ipv6 address link-local  
show ipv6 interface
```

## 1.1.5 ipv6 address link-local

## Syntax

To set a link-local address in VLAN port configuration mode and meanwhile enable IPv6 on the VLAN port, run the first one of the following two commands:

```
ipv6 address ipv6-address link-local  
no ipv6 address [ ipv6-address link-local ]
```

## Parameter

Parameter	Description
-----------	-------------

<i>ipv6-address</i>	Means the to-be-added IPv6 address. The format of this address must abide by the definition in RFC 4291 strictly.
<b>link-local</b>	Means a link-local address. The link-local address designated by the <b>ipv6-address</b> command will automatically replace the automatically configured link-local address.

### Default

No default IPv6 link-local address exists on the VLAN port.

### Command Mode

Interface configuration mode

### Usage Guidelines

If you run **no ipv6 address**, which has no parameters, all manually configured IPv6 addresses on the VLAN port will be deleted. If you run **ipv6 enable**, a link-local address will be automatically set. Of course you can set the link-local address manually, the command you will use is **ipv6 address link-local**.

### Example

The following example shows how to set a link-local address manually on the VLAN port:

```
Switch_config_v1# ipv6 address FE80::A00:3EFF:FE12:3457 link-local
```

### Related Commands

**ipv6 address eui-64**  
**show ipv6 interface**

## 1.1.6 ipv6 enable

### Syntax

If the IPv6 address is not set on the VLAN port but users want to enable the IPv6 protocol on this port, run **ipv6 enable**.

**ipv6 enable**

**no ipv6 enable**

### Parameter

None

### Default

The IPv6 protocol is forbidden on the VLAN port.

## Command Mode

VLAN Interface configuration mode

## Usage Guidelines

After the **ipv6 enable** command is run, the system will add a link-local address on the VLAN port automatically. At the same time, the communication range of the IPv6 protocol on the VLAN port is confined to the links that the VLAN port connects. If the IPv6 address has already configured on the VLAN port explicitly, you cannot forbid IPv6 processing on the VLAN port even though you use the **no ipv6 enable** command.

## Example

```
Switch_config# interface vlan 1
Switch_config_v1# ipv6 enable
```

## Related Commands

```
ipv6 address link-local
ipv6 address eui-64
show ipv6 interface
```

### 1.1.7 show ipv6 interface

## Syntax

To show the information about the VLAN port on which the IPv6 protocol is enabled, run the following command:

**show ipv6 interface** [ *interface-type interface-number* ] | [**brief**]

## Parameter

Parameter	Description
<i>interface-type</i>	Stands for the type of the VLAN port.
<i>interface-number</i>	Stands for the ID of the VLAN port.

## Default

Those VLAN ports on which the IPv6 protocol is enabled will all be displayed.

## Command Mode

Global configuration mode

## Usage Guidelines

This command can be used to display the state of IPv6 on the VLAN port, the configured IPv6 address and other IPv6 related parameters.

## Example

The following example shows how to display the IPv6 state on port vlan1:

```
Switch# show ipv6 interface vlan 1
```

```
Vlan1 is up, line protocol is down
IPv6 is enabled, link-local address is FE80::A00:3EFF:FE12:3457 [TENTATIVE]
Global unicast address(es):
5678::111, subnet is 5678::/64 [TENTATIVE]
Joined group address(es):
FF02::1
FF02::2
FF02::1:FF12:3457
FF02::1:FF00:111
MTU is 1500 bytes
ICMP error messages limited to one every 100 milliseconds
ICMP redirects are enabled
ICMP unreachable are enabled
```

Field	Description
Vlan1 is up(down/administratively down)	Indicates whether the physical layer of the VLAN port is accessible or whether it can be shut down manageably.
line protocol is up(down)	Indicates whether the line protocol (the software layer) is accessible.
IPv6 is enabled	Enables the IPv6 protocol.
link-local address	Displays the link-local address of a port.
Global unicast address(es)	Displays the unicast address of a port.
Joined group address(es)	Displays the multicast address of a port.
MTU	Displays the MTU of a port.
ICMP error messages	Displays the transmission frequency of ICMPv6 error packets (the minimum interval).
ICMP redirects	Displays whether the redirection packet will be sent or not.
ICMP unreachable	Displays whether the destination unreachable packet will be enabled or shut down.

## Related Command

None

# Chapter 2 IPv6 Configuration Commands

## 2.1 IPv6 Configuration Commands

IPv6 configuration commands include the following ones:

- clear ipv6 traffic
- debug ipv6 packet
- ipv6 mtu
- ipv6 redirect
- ipv6 access-group
- ipv6 unreachable
- ipv6 route default
- show ipv6 general-prefix
- show ipv6 pmtu
- show ipv6 traffic

### 2.1.1 clear ipv6 traffic

#### Syntax

To delete the statistics information about the IPv6 flow, run the following command:

**clear ipv6 traffic**

#### Parameter

None

#### Command Mode

EXEC

#### Usage Guidelines

This command is used to delete all the statistics information about IPv6 flow.

#### Example

The following example shows how to delete the statistics information about IPv6 flow:

```
Switch# clear ipv6 traffic
```

```
Switch# show ipv6 traffic
IPv6 statistics:
Rcvd: 0 total, 0 local destination
0 badhdrs, 0 badvers
0 tooshort, 0 toosmall, 0 toomanyhdrs
0 source-routed, 0 badscope
0 badopts, 0 unknowopts, 0 exthdrtoolong
0 fragments, 0 total reassembled
0 reassembly timeouts, 0 reassembly failures
Sent: 0 generated, 0 forwarded, 0 cant forwarded
0 fragmented into 0 fragments, 0 failed
0 no route
Mcast: 0 received, 0 sent
```

```
ICMP statistics:
Rcvd: 0 total, 0 format errors, 0 checksum errors
0 unreachable, 0 packet too big
0 time exceeded, 0 parameter problem
0 echos, 0 echo replies
0 membership query, 0 membership report, 0 membership reduction
0 Switch solicitations, 0 Switch advertisements
0 neighbor solicitations, 0 neighbor advertisements, 0 redirect
Sent: 0 total, 0 bandwidth limit
0 unreachable, 0 packet too big
0 time exceeded, 0 parameter problem
0 echos, 0 echo replies
0 membership query, 0 membership report, 0 membership reduction
0 Switch solicitations, 0 Switch advertisements
0 neighbor solicitations, 0 neighbor advertisements, 0 redirect
```

## Related Commands

### **show ipv6 traffic**

## 2.1.2 debug ipv6 packet

### Syntax

To display the debug information about the IPv6 packet, run the first one of the following two commands:

```
debug ipv6 packet [ interface interface-type interface-number | access-list [ access-list-name ] | detail ]
```

```
no debug ipv6 packet
```

### Parameter

Parameter	Description
<i>Interface-type</i>	Type of the interface (optional)

<i>Interface-number</i>	ID of an interface (optional)
<i>access-list-name</i>	Name of ACL (optional)

## Default

The debug information is disabled in default settings.

## Command Mode

EXEC

## Example

The following example shows how to export the IPv6 debug information:

```
Switch# debug ipv6 packet
2002-1-1 05:07:16
IPv6: source FE80::A00:3EFF:FE12:3459, dest FF02::1
      plen 32, proto 58, hops 255
      sending on Ethernet1/0
```

Field	Description
source	Source address in the IPv6 packet
dest	Destination address in the IPv6 packet
plen	Load length in the IPv6 packet
proto	Protocol for the next header encapsulation, which is presented by next-header in the IPv6 packet
hops	Value of hop-limit in the IPv6 packet
sending (receiving, forwarding) on Ethernet	Displays packet transmission, reception and forwarding on an interface.

## 2.1.3 ipv6 mtu

### Syntax

To set the MTU of the VLAN port, run the first one of the following two commands. To return to the default setting, use the no form of this command.

**ipv6 mtu bytes**

**no ipv6 mtu**

### Parameter

Parameter	Description
<i>bytes</i>	MTU(unit : byte)

### Default

The default value depends on the port type, but the minimum value of any port is 1280 bytes.

### Command Mode

VLAN interface configuration mode

### Usage Guidelines

When MTU is the default value, RA has the MTU option.

When a switch forwards packet, a packet will not be fragmented just because the MTU of the egress is smaller than the packet's length. But it will be fragmented only when the transmitted packet is generated.

### Example

The following example shows how to set MTU of the interface:

```
Switch_config_v1# ipv6 mtu 1400
```

### Related Command

```
show ipv6 interface
```

## 2.1.4 ipv6 redirects

### Syntax

To control whether to transmit a redirection packet after the packet is forwarded, run **ipv6 redirects**.

**ipv6 redirects**

**no ipv6 redirects**

### Parameter

None

### Default

The redirection packet will be transmitted by default.

### Command Mode

VLAN Interface configuration mode

## Usage Guidelines

The redirection packets are transmitted through the ICMPv6 protocol.

## Example

1. The following example shows how to enable a port to transmit the redirection packet.

```
Switch_config_v1# ipv6 redirects
```

2. The following example shows how to disable a port to transmit the redirection packet.

```
Switch_config_v1# no ipv6 redirects
```

Use **show ipv6 interface** command can check whether the port will transmit the redirection packet.

## Related Commands

**show ipv6 interface**

## 2.1.5 ipv6 access-group

### Syntax

To filter the received packet of some port, run the first one of the following commands.

To return to the default setting, use the no form of this command.

**ipv6 access-group access-list-name { in | out }**

**no ipv6 access-group { in | out }**

### Parameter

Parameter	Description
<i>access-list-name</i>	access list name
<b>In</b>	Filter direction, receiving packets
<b>Out</b>	Filter direction, forwarding packets

### Default

The filter function is not set by default.

### Command Mode

VLAN interface configuration

### Usage Guidelines

None

### Example

The following example shows how to use the access list test to filter packets when received in port vlan 1:

```
Switch_config_v1# ipv6 access-group test in
```

### Related Commands

Ipv6 access-list

Show ipv6 interface

## 2.1.6 ipv6 unreachable

### Syntax

To enable an interface to generate and transmit the ICMPv6 unreachable packets, run **ipv6 unreachable**.

**ipv6 unreachable**

**no ipv6 unreachable**

### Parameter

None

### Default

The unreachable packets are transmitted by default.

### Command Mode

VLAN Interface configuration mode

### Usage Guidelines

The unreachable packets are transmitted through the ICMPv6 protocol.

### Example

The following example shows how to disable the VLAN interface to transmit the unreachable packets.

```
Switch_config_v1# no ipv6 unreachable
```

### Related Commands

None

### 2.1.7 ipv6 route default

#### Syntax

To configure the default ip6 gateway, use ipv6 route default command.

ipv6 route default [NULL | X:X:X:X::X]

no ipv6 route default [NULL | X:X:X:X::X]

#### Parameter

Parameter	Description
<i>NULL</i>	NULL interface
X:X:X:X::X	Gateway address

#### Default

None

#### Command Mode

Global configuration mode

#### Example

The following example shows how to set the address of 2008::1 as the route default of the switch.

```
ipv6 route default 2008::1
```

#### Related Command

None

### 2.1.8 show ipv6 general-prefix

#### Syntax

To display the detailed information about the general prefix of IPv6, run the following command:

**show ipv6 general-prefix**

#### Parameter

None

#### Command Mode

EXEC

### Example

```
Switch_config#show ipv6 general-prefix
IPv6 Prefix my-prefix, acquired via manual
2002::/64
Vlan1 (Address command)
```

Field	Remarks
IPv6 Prefix	Stands for the name of the general IPv6 prefix defined by user.
Acquire via	Stands for the configuration method of the general prefix. At present, the manual configuration and the automatic DHCP obtainment are supported.
Vlan1 (Address command)	Stands for a list of ports that use this general prefix.

### Related Commands

#### **ipv6 general-prefix**

#### 2.1.9 show ipv6 pmtu

##### Syntax

To display the cache options of path MTU, run the following command:

**show ipv6 pmtu**

##### Parameter

None

##### Command Mode

EXEC

### Example

```
Switch_config#show ipv6 pmtu
PMTU Expired Destination Address
1300 00:04:00 2002:1::1
1280 00:01:00 2001:2::2
```

The cache of path MTU stores the path MTU which is applied to reach a destination address. If the to-be-transmitted packets generated by routers or switches are bigger than the path MTU, they will be fragmented during being transmitted.

The switch will create a path MTU record when receiving an ICMPv6 too-big packet.

Field	Remarks
MTU	Stands for the value of the path MTU. It is this MTU that is contained in the received ICMPv6 too-big packet.
Expired	It means expiration. The expiration time starts counting when the ICMPv6 “too-big” packet is received. When the <b>expired</b> parameter is 0, this path MTU record will be deleted.
Destination Address	Stands for the destination address. It is this destination address that is contained in the received ICMPv6 too-big packet.

### Related Commands

#### **ipv6 mtu**

#### 2.1.10 show ipv6 traffic

##### Syntax

To display the statistics of IPv6 flow, run the following command:

**show ipv6 traffic**

##### Parameter

None

##### Command Mode

EXEC

##### Example

```
Switch#show ipv6 traffic
IPv6 statistics:
Rcvd: 0 total, 0 local destination
0 badhdrs, 0 badvers
0 tooshort, 0 toosmall, 0 toomanyhdrs
0 source-routed, 0 badscope
0 badopts, 0 unknowopts, 0 exthdrtoolong
0 fragments, 0 total reassembled
0 reassembly timeouts, 0 reassembly failures
Sent: 25 generated, 0 forwarded, 0 cant forwarded
0 fragmented into 0 fragments, 0 failed
0 no route
Mcast: 0 received, 25 sent
```

**ICMP statistics:**

Rcvd: 25 total, 0 format errors, 0 checksum errors  
0 unreachable, 0 packet too big  
0 time exceeded, 0 parameter problem  
0 echos, 0 echo replies  
0 membership query, 0 membership report, 0 membership reduction  
0 Switch solicitations, 0 Switch advertisements  
0 neighbor solicitations, 0 neighbor advertisements, 0 redirect  
Sent: 0 total, 0 bandwidth limit  
0 unreachable, 0 packet too big  
0 time exceeded, 0 parameter problem  
0 echos, 0 echo replies  
0 membership query, 0 membership report, 0 membership reduction  
0 Switch solicitations, 0 Switch advertisements  
0 neighbor solicitations, 0 neighbor advertisements, 0 redirect

**Related Commands**

clear ipv6 traffic

## 2.2 Network Test Tools Commands

IPv6 network test tools commands include:

- ping6
- traceroute6

### 2.2.1 ping6

**Syntax**

To test the accessibility and connectivity of the host, run the following command. The command enables the host forwards ICMP packets to another host and get ICMP response packets from it.

ping6 host [-a] [-l length] [-n number] [-v] [-w waittime] [-b internal]

**Parameter**

Parameter	Description
-----------	-------------

<i>host</i>	Destination host address or host name.
<b>-a</b>	Continuous forward icmp echo request packets until the user disable it manually.
<b>-l length</b>	Set the length of the ICMO data in the packets. The default is 56 bytes.
<b>-n number</b>	Set the number of total transmitted packets. The default one is 5 packets.
<b>-w waittime</b>	The time of waiting each packet response. The default one is 2 seconds.
<b>-b interval</b>	Set the time interval of transmitting ping packets. Unit: 10ms; value ranges: 0-65535; the default is 0.

### Command Mode

Exec, global configuration mode

### Usage Guidelines

To disable ping, press “q” or “Q”.

The output by default:

Parameter	Description
!	Receive the response packet.
.	No response packet in timeout.
U	Receive the ICMP destination unreachable packet.
R	Receive the ICMP redirection packet.
T	Receive the ICMP timeout packet.
P	Receive the ICMP parameter packet.

The output of statistics information:

Parameter	Description
packets transmitted	The number of transmitted packets.
packets received	The number of received packets, not include other ICMP packets.
packet loss	The proportion of packet loss.
round-trip min/avg/max	The minimum/average/max response time (ms).

The routing switch supports the destination address is the link-local address or multicast address. When ping this address, the command must designate the vlan interface first and forward ICMP echo packets on the interface. The routing switch will output all addresses of response hosts.

### Example

```
switch#ping6 2008::2 -l 10000 -n 30
PING 2008::2 (2008::2): 10000 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
--- 2008::2 ping6 statistics ---
30 packets transmitted, 30 packets received, 0% packet loss
round-trip min/avg/max = 0/1/20 ms

·ping multicast address:
switch#ping6 ff02::1 vlan 1 -n 2
PING 1 (FF02:1B::1): 56 data bytes
Reply to request 0 from FE80::2E0:FFF:FEDB:583F, <10 ms
Reply to request 0 from FE80::1EAF:F7FF:FE35:D02A, 10 ms
Reply to request 1 from FE80::2E0:FFF:FEDB:583F, <10 ms
Reply to request 1 from FE80::1EAF:F7FF:FE35:D02A, 10 ms
```

### 2.2.2 traceroute6

The command is used to trace the destination route.

Transmit the UDP packets (or ICMP ECHO packets) with different TTL (Time to Live) to the destination, so that the route of the destination can be traced. Each router in the path has to reduce its TTL by 1 at least before transmitting the ICMP response packets, therefore, TTL is an effective way for accounting. When the TTL of the packet reduce to 0, the router sends back ICMP timeout information to the source system. Transmit first response packet whose TTL is 1 and add 1 to the TTL in subsequent transmission until the receive the response packet or reach the max TTL value.

Trace the router by detecting ICMP Time Exceeded information it sends back. When reaching the destination, the destination node can only sends back ICMP information that the port is unreachable, as traceroute transmit UDP packets whose port number is greater than 30000. The destination is arrived as the report is received.

### Syntax

```
traceroute6 host [-i source-ip-address] [-p port-number] [-q probe-count] [-t ttl] [-w
waittime] [-x icmp]
```

### Parameter

Parameter	Description
<i>host</i>	Destination host address or host name.
<i>-i source-ip-address</i>	Sets the source IP address.

<b>-p</b> <i>port-number</i> ]	Sets the destination port number transmitting UDP packets. The default is 33434.
<b>-q</b> <i>probe-count</i>	Sets the packet number of each detection. The default is 3 packets.
<b>-t</b> <i>tll</i>	Sets the IP TTL of the packet to tll. The TTL is 1 in minimum by default and 30 in maximum.
<b>-w</b> <i>waittime</i>	The time of each packet for waiting response. The default time is 3 seconds.
<b>-x</b> <b>icmp</b>	Sets the detection packet as the ICMP ECHO packet. The default is UDP packet.

## Command Mode

EXEC, Global Configuration Mode

## Usage Guidelines

The command is used to trace the router by UDP packets. To trace the router by ICMP ECHO packets by command `-x icmp`. To disable traceroute, press “q” or “Q”.

Output by default:

Parameter	Description
!N	Receive ICMP destination unreachable packets (the route is unreachable, code: 0)
!P	Receive ICMP destination unreachable packets (forbid out of management, code: 1)
!S	Receive ICMP destination unreachable packets (not neighbor, code: 2)
!A	Receive ICMP destination unreachable packets (unreachable address, code: 3)
!	Receive ICMP destination unreachable packets (unreachable port, code: 4)

The output of statistics information:

Parameter	Description
hops max	Max trace hop number (The uplimit of ICMP increment)
byte datalen	Size of each trace packet

## Example

```
switch#traceroute6 2008::2
tracert6 to 2008::2 , 30 hops max, 12 byte datalen
1 2008::2 0 ms * 0 ms
```