



H3C MSR Router Series

Comware 5 High Availability Command Reference

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Preface

This command reference describes configuration commands for high availabilities mechanisms and features supported on the H3C MSR router series, including Interface Backup, Track, VRRP, and BFD.

This preface includes the following topics about the documentation:

- [Audience.](#)
- [Conventions.](#)
- [Documentation feedback.](#)

Audience

This documentation is intended for:

- Network planners.
- Field technical support and servicing engineers.
- Network administrators working with the routers.

Conventions

The following information describes the conventions used in the documentation.

Command conventions

Convention	Description
Boldface	Bold text represents commands and keywords that you enter literally as shown.
<i>Italic</i>	<i>Italic</i> text represents arguments that you replace with actual values.
[]	Square brackets enclose syntax choices (keywords or arguments) that are optional.
{ x y ... }	Braces enclose a set of required syntax choices separated by vertical bars, from which you select one.
[x y ...]	Square brackets enclose a set of optional syntax choices separated by vertical bars, from which you select one or none.
{ x y ... }*	Asterisk marked braces enclose a set of required syntax choices separated by vertical bars, from which you select a minimum of one.
[x y ...]*	Asterisk marked square brackets enclose optional syntax choices separated by vertical bars, from which you select one choice, multiple choices, or none.
&<1-n>	The argument or keyword and argument combination before the ampersand (&) sign can be entered 1 to n times.
#	A line that starts with a pound (#) sign is comments.

GUI conventions

Convention	Description
Boldface	Window names, button names, field names, and menu items are in Boldface. For example, the New User window opens; click OK .
>	Multi-level menus are separated by angle brackets. For example, File > Create >

Convention	Description
	Folder.

Symbols

Convention	Description
 WARNING!	An alert that calls attention to important information that if not understood or followed can result in personal injury.
 CAUTION:	An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software.
 IMPORTANT:	An alert that calls attention to essential information.
NOTE:	An alert that contains additional or supplementary information.
 TIP:	An alert that provides helpful information.

Network topology icons

Convention	Description
	Represents a generic network device, such as a router, switch, or firewall.
	Represents a routing-capable device, such as a router or Layer 3 switch.
	Represents a generic switch, such as a Layer 2 or Layer 3 switch, or a router that supports Layer 2 forwarding and other Layer 2 features.
	Represents an access controller, a unified wired-WLAN module, or the access controller engine on a unified wired-WLAN switch.
	Represents an access point.
	Represents a wireless terminator unit.
	Represents a wireless terminator.
	Represents a mesh access point.
	Represents omnidirectional signals.
	Represents directional signals.
	Represents a security product, such as a firewall, UTM, multiservice security gateway, or load balancing device.
	Represents a security module, such as a firewall, load balancing, NetStream, SSL VPN, IPS, or ACG module.

Examples provided in this document

Examples in this document might use devices that differ from your device in hardware model, configuration, or software version. It is normal that the port numbers, sample output, screenshots, and other information in the examples differ from what you have on your device.

Documentation feedback

You can e-mail your comments about product documentation to info@h3c.com.

We appreciate your comments.

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BFD configuration commands

bfd authentication-mode

Use **bfd authentication-mode** to configure the BFD authentication mode on the interface.

Use **undo bfd authentication-mode** to restore the default.

Syntax

bfd authentication-mode { **md5** *key-id* [**cipher**] *key* | **sha1** *key-id* [**cipher**] *key* | **simple** *key-id* [**cipher**] *password* }

undo bfd authentication-mode

Default

No authentication is configured on an interface.

Views

Interface view

Default command level

2: System level

Parameters

md5: Specifies the MD5 authentication mode.

sha1: Specifies the SHA-1 authentication mode.

simple: Specifies the simple authentication mode.

key-id: Sets the authentication key ID in the range of 1 to 255.

cipher: Sets a ciphertext authentication key or password. If this keyword is not specified, you set a plaintext authentication key or password.

key: Sets the MD5 or SHA-1 authentication key. This argument is case sensitive. It must be a plaintext string of 1 to 16 characters or a ciphertext string of 33 to 53 characters.

password: Sets the password for simple authentication. This argument is case sensitive. It must be a plaintext string of 1 to 16 characters or a ciphertext string of 33 to 53 characters.

Usage guidelines

For security purposes, all authentication passwords, including passwords configured in plain text, are saved in cipher text.

The authentication mode, *key-id*, *key* (or *password*) used by both ends trying to establish a BFD session must be the same. If one end changes its authentication mode, it sends the authentication packets in both the new and the old mode at the same time until the other end also changes to the same authentication mode.

Examples

Configure Ethernet 1/1 to support MD5 authentication, setting the authentication *key-id* to 15 and plaintext authentication key to **BfdKey**.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] bfd authentication-mode md5 15 BfdKey
```

bfd detect-interface

Use **bfd detect-interface** to create a BFD session to detect the local interface status.

Use **undo bfd detect-interface** to delete the BFD session.

Syntax

bfd detect-interface source-ip *source-ip-address*

undo bfd detect-interface

Default

No BFD session is created to detect the local interface status.

Views

Interface view

Default command level

2: System level

Parameters

source-ip-address: Specifies the source IP address for BFD control packets.

Usage guidelines

By using a millisecond-level detection time, BFD can immediately shut down an interface after detecting that the BFD session on it goes down.

You must specify the BFD control packet mode on both ends.

The default destination IP address of BFD control packets is 224.0.0.184, which cannot be modified.

Examples

Create a BFD session to detect the status of interface Ethernet 1/1, and specify the source IP address of BFD control packets as 10.0.0.1.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] bfd detect-interface source-ip 10.0.0.1
[Sysname-Ethernet1/1] display bfd session
Total session number: 1   Up session number: 0   Init mode: Active
  IPv4 session working under Ctrl mode:
  LD/RD      SourceAddr      DestAddr      State Holdtime Interface
  11/516     10.0.0.1      224.0.0.184  Init  2100ms  Eth1/1
```

bfd echo-source-ip

Use **bfd echo-source-ip** to configure the source IP address of BFD echo packets.

Use **undo bfd echo-source-ip** to remove the configured source IP address of BFD echo packets.

Syntax

bfd echo-source-ip *ip-address*

undo bfd echo-source-ip

Views

System view

Default command level

2: System level

Parameters

ip-address: Source IP address of BFD echo packets.

Usage guidelines

Do not configure the source IP address of the BFD echo packets to belong to the same network segment as any interface address of the device. Otherwise a large amount of ICMP redirect packets might be sent by the remote device, causing network congestion.

Examples

```
# Configure the source IP address of echo packets as 10.1.1.1.
<Sysname> system-view
[Sysname] bfd echo-source-ip 10.1.1.1
```

bfd min-echo-receive-interval

Use **bfd min-echo-receive-interval** to configure the minimum interval for receiving BFD echo packets.

Use **undo bfd min-echo-receive-interval** to restore the default minimum interval for receiving BFD echo packets.

Syntax

```
bfd min-echo-receive-interval value
undo bfd min-echo-receive-interval
```

Default

The minimum interval for receiving BFD echo packets is 400 milliseconds.

Views

Interface view

Default command level

2: System level

Parameters

value: Specifies the minimum interval for receiving BFD echo packets, in the range of 200 to 1000 milliseconds. The value must be a multiple of 100.

Examples

```
# Configure the minimum interval for receiving BFD echo packets on Ethernet 1/1 as 500
milliseconds.
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] bfd min-echo-receive-interval 500
```

bfd min-receive-interval

Use **bfd min-receive-interval** to configure the minimum interval for receiving BFD control packets.

Use **undo bfd min-receive-interval** to restore the default minimum interval for receiving BFD control packets.

Syntax

bfd min-receive-interval *value*
undo bfd min-receive-interval

Default

The minimum interval for receiving BFD control packets is 400 milliseconds.

Views

Interface view

Default command level

2: System level

Parameters

value: Specifies the minimum interval for receiving BFD control packets, in the range of 200 to 1000 milliseconds. The value must be a multiple of 100.

Usage guidelines

If the remote device sends BFD control packets at an interval shorter than the minimum receiving interval of the local device, the remote device changes its sending interval to the minimum receiving interval of the local device.

Examples

Configure the minimum interval for receiving BFD control packets on Ethernet 1/1 as 500 milliseconds.

```
<Sysname> system-view  
[Sysname] interface ethernet 1/1  
[Sysname-Ethernet1/1] bfd min-receive-interval 500
```

bfd min-transmit-interval

Use **bfd min-transmit-interval** to configure the minimum interval for transmitting BFD control packets.

Use **undo bfd min-transmit-interval** to restore the default minimum interval for transmitting BFD control packets.

Syntax

bfd min-transmit-interval *value*
undo bfd min-transmit-interval

Default

The minimum interval for transmitting BFD control packets is 400 milliseconds.

Views

Interface view

Default command level

2: System level

Parameters

value: Specifies the minimum interval for transmitting BFD control packets, in the range of 200 to 1000 milliseconds. The value must be a multiple of 100.

Usage guidelines

A proper interval ensures that BFD control packets are not transmitted faster than the device can deal with. The actual interval for transmitting BFD control packets at the local device should be the greater between the minimum interval for sending BFD control packets configured on the local interface and the minimum interval for receiving BFD control packets on the remote device.

Examples

```
# Configure the minimum interval for transmitting BFD control packets on Ethernet 1/1 as 500 milliseconds.
```

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] bfd min-transmit-interval 500
```

bfd multi-hop destination-port

Use **bfd multi-hop destination-port** to configure the destination port number for multi-hop BFD control packets as 3784 or 4784.

Use **undo bfd multi-hop destination-port** to restore the default.

Syntax

```
bfd multi-hop destination-port port-number
undo bfd multi-hop destination-port
```

Default

The destination port number for multi-hop BFD control packets is 4784.

Views

System view

Default command level

2: System level

Parameters

port-number: Destination port number of multi-hop BFD control packets, 3784 or 4784.

Examples

```
# Configure the destination port number for multi-hop BFD control packets as 3784.
```

```
<Sysname> system-view
[Sysname] bfd multi-hop destination-port 3784
```

bfd session init-mode

Use **bfd session init-mode** to configure the mode for establishing a BFD session.

Use **undo bfd session init-mode** to restore the default.

Syntax

```
bfd session init-mode { active | passive }
undo bfd session init-mode
```

Default

BFD uses the **active** mode.

Views

System view

Default command level

2: System level

Parameters

active: Uses the active mode. In the active mode, BFD actively transmits BFD control packets to the remote device.

passive: Uses the passive mode. In the passive mode, BFD does not actively transmit a BFD control packet to the remote end; it transmits a BFD control packet only after receiving a BFD control packet from the remote end.

Examples

Configure the session establishment mode as **passive**.

```
<Sysname> system-view
```

```
[Sysname] bfd session init-mode passive
```

display bfd debugging-switches

Use **display bfd debugging-switches** to display enabled BFD debugging switches.

Syntax

```
display bfd debugging-switches [ | { begin | exclude | include } regular-expression ]
```

Views

Any view

Default command level

1: Monitor level

Parameters

|: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, a case-sensitive string of 1 to 256 characters.

Examples

Display enabled BFD debugging switches.

```
<Sysname> display bfd debugging-switches
```

```
BFD Error debugging is on
```

```
BFD Event debugging is on
```

```
BFD FSM debugging is on
```

```
BFD Packet Receive debugging is on
```

```
BFD Packet Send debugging is on
```

```
BFD SCM debugging is on
```

```
BFD Timer debugging is on
```

display bfd interface

Use **display bfd interface** to display information about BFD-enabled interfaces.

Syntax

```
display bfd interface [ verbose ] [ [ { begin | exclude | include } regular-expression ]
```

Views

Any view

Default command level

1: Monitor level

Parameters

verbose: Displays detailed interface information.

]: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, a case-sensitive string of 1 to 256 characters.

Examples

Display information about BFD-enabled interfaces.

```
<Sysname> display bfd interface
```

```
Total Interface Num: 1
```

```
      Interface: Serial2/1          Session Num: 1
Min Trans Inter: 200ms           Min Recv Inter: 200ms
      DetectMult: 3                Min Echo Recv Inter: 400ms
      Auth mode: Simple
```

Display detailed information about BFD-enabled interfaces.

```
<Sysname> display bfd interface verbose
```

```
Total Interface Num: 1
```

```
      Interface: Serial2/1          Session Num: 1
Min Trans Inter: 200ms           Min Recv Inter: 200ms
      DetectMult: 3                Min Echo Recv Inter: 400ms
      Auth mode: Simple
```

```
LD/RD      SourceAddr      DestAddr      ConnType  State      Mode
2/2        192.168.11.11      192.168.11.10  Direct    Up         Ctrl
```

Table 1 Command output

Field	Description
Interface	Interface name.
Session Num	Number of sessions established on the local interface.

Field	Description
Min Trans Inter	Minimum control packet transmit interval configured on the interface.
Min Recv Inter	Minimum control packet receive interval configured on the interface.
DetectMult	Detection time multiplier.
Min Echo Recv Inter	Minimum echo packet receive interval configured on the interface.
Auth mode	Session authentication mode: simple, MD5, or SHA-1.
LD	Local ID of the session.
RD	Remote ID of the session.
SourceAddr	Source IP address of the session.
DestAddr	Destination IP address of the session.
ConnType	Connection type of the interface.
State	Session state.
Mode	Working mode of the session: control (Ctrl) mode or echo (Echo) mode.

display bfd session

Use **display bfd session** to display BFD session information.

Syntax

```
display bfd session [ verbose ] [ [ { begin | exclude | include } regular-expression ]
```

Views

Any view

Default command level

1: Monitor level

Parameters

verbose: Displays detailed BFD session information.

]: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, a case-sensitive string of 1 to 256 characters.

Examples

Display detailed BFD session information on the device.

```
<Sysname> display bfd session verbose
```

```
Total session number: 1   Up session number: 1   Init mode: Active
```

IPv4 session working under Ctrl mode:

```

Local Discr: 1                Remote Discr: 1
  Source IP: 111.1.1.1        Destination IP: 111.1.1.2
Session State: Up            Interface: Ethernet1/1
Min Trans Inter: 400ms       Act Trans Inter: 400ms
Min Recv Inter: 400ms       Act Detect Inter: 2000ms
  Recv Pkt Num: 18           Send Pkt Num: 18
  Hold Time: 1900ms         Connect Type: Direct
Running Up for: 00:56:25     Auth mode: None
  Protocol: OSPF
  Diag Info: No Diagnostic

```

Table 2 Command output

Field	Description
Total session number	Total number of BFD sessions.
Up session number	Total number of active BFD sessions.
Init mode	BFD operating mode: active or passive.
session working under xx mode	BFD session mode: <ul style="list-style-type: none"> • Ctrl—Control packet mode. • Echo—Echo packet mode.
Local Discr	Local ID of the session.
Remote Discr	Remote ID of the session.
Source IP	Source IP address of the session.
Destination IP	Destination IP address of the session.
Session State	Session state.
Interface	Name of the interface of the session.
Min Trans Inter	Expected minimum transmit interval configured on the interface.
Min Recv Inter	Expected minimum receive interval configured on the interface.
Act Trans Inter	Actual transmit interval.
Act Detect Inter	Actual session detection timer.
Recv Pkt Num	Number of packets received.
Send Pkt Num	Number of packets sent.
Hold Time	Length of time before session detection timer expires.
Auth mode	Session authentication mode: simple, MD5, or SHA-1.
Connect Type	Connection type of the interface.
Running up for	Time interval for which the session has been up.
Protocol	Registered protocol.
Diag Info	Diagnostic information about the session.

reset bfd session statistics

Use **reset bfd session statistics** to clear the BFD session statistics.

Syntax

reset bfd session statistics

Views

User view

Default command level

1: Monitor level

Examples

Clear statistics about all the BFD sessions.

```
<Sysname> reset bfd session statistics
```

Interface backup configuration commands

display standby flow

Use **display standby flow** to display statistics about traffic on the active interfaces participating in load balancing.

Syntax

```
display standby flow [ | { begin | exclude | include } regular-expression ]
```

Views

Any view

Default command level

1: Monitor level

Parameters

|: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, which is a case-sensitive string of 1 to 256 characters.

Examples

Display statistics about the traffic on the active interface participating in load balancing.

```
<Sysname> display standby flow
```

```
Interfacename : Serial2/0
```

```
Flow-interval(s) : 100
```

```
LastInOctets : 868168
```

```
LastOutOctets : 1818667
```

```
InFlow(Octets) : 50070
```

```
OutFlow(Octets) : 100088
```

```
BandWidth(b/s) : 9000
```

```
UsedBandWidth(b/s) : 8000
```

Table 3 Command output

Field	Description
Interfacename	Name of the active interface.
Flow-interval(s)	Intervals for checking traffic on the active interface.
LastInOctets	Sum of the octets received on the active interface until the last check.
LastOutOctets	Sum of the octets sent on the active interface until the last check.
InFlow(Octets)	Sum of the octets received on the active interface during the last interval.
OutFlow(Octets)	Sum of the octets sent on the active interface during the last interval.
BandWidth(b/s)	Bandwidth of the active interface.

Field	Description
UsedBandWidth(b/s)	Actual bandwidth for the active interface participating in load balancing during the last interval.

display standby state

Use **display standby state** to display the state information of the active and standby interfaces.

Syntax

display standby state [| { **begin** | **exclude** | **include** } *regular-expression*]

Views

Any view

Default command level

1: Monitor level

Parameters

|: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, which is a case-sensitive string of 1 to 256 characters.

Examples

Display the state information of the active and standby interfaces.

```
<Sysname> display standby state
```

```
Interface      Interfacestate Standbystate Standbyflag Pri Loadstate
Ethernet1/1    UP             MUP           MUD           TO-HYPNOTIZE
Ethernet1/2    STANDBY       STANDBY      BU            30
Ethernet1/3    STANDBY       STANDBY      BU            20
```

Backup-flag meaning:

```
M---MAIN  B---BACKUP  V---MOVED  U---USED
D---LOAD  P---PULLED
```

The following tables describe the meanings of each state.

Table 4 States of active and standby interfaces

State	Active interface	Standby interface
UP	Indicates that the physical link is functioning correctly for data transmission.	
DOWN	Indicates that the physical link is not available for data transmission, for example, because no cable connection is present.	
STANDBY	N/A	The state of the standby interfaces when the active interface is functioning. Data transmission is disabled.

Table 5 Backup state of the active interface

State	Description
MUP	The active interface is working correctly for data transmission.
MUPDELAY	The active interface is experiencing a delay before it transits from the non-working state to the working state to take over. At this time, the standby interface is still active.
MDOWN	The active interface cannot work correctly. A standby interface must be brought up to take over.
MDOWNDELAY	The active interface is experiencing a delay before it transits from the working state to the non-working state. At this time, the standby interface does not really take over the job of the active interface.

Table 6 Backup state of a standby interface

State	Description
UP	State of the standby interface when it is enabled.
UPDELAY	The standby interface is experiencing a delay before it transits from the non-working state to the working state to take over.
DOWN	The standby interface cannot work correctly.
DOWNDELAY	The standby interface is experiencing a delay before it transits from the working state to the non-working state. At this time, the standby interface is probably still working.
STANDBY	State of the standby interface when the active interface is working. At this time, the standby interface cannot send or receive data.

Table 7 Backup flags

Flag	Description
M---MAIN	Indicates an active interface.
B---BACKUP	Indicates a standby interface.
V---MOVED	Indicates that the interface is removed (the active interface is removed, or all standby interfaces are removed).
U---USED	Indicates that the interface is being used as an active interface or standby interface.
D---LOAD	Indicates that the active interface participates in load balancing.
P---PULLED	Indicates that the interface board where the interface is located is removed.

Table 8 Load balancing states

State	Description
WAKE	The active interface is transiting from the working state to the non-working state. The standby interface is working in the load balancing state to transmit data together with the active interface.
TO-HYPNOTIZE	The standby interface is transiting from the working state to the non-working state after the traffic size decreases below the lower backup load balancing threshold. In this state, the standby interface is still working.
TO-WAKE	The standby interface is transiting from the non-working state to the working state after the traffic size increases above the upper backup load balancing threshold.
Null	State other than the above three. At this time, the value for the loadstate field is null.

standby bandwidth

Use **standby bandwidth** to configure the active interface bandwidth used for setting the thresholds.

Use **undo standby bandwidth** to restore the default.

Syntax

standby bandwidth *size*

undo standby bandwidth

Default

The available bandwidth used for setting the thresholds is 0 kbps.

Views

Interface view

Default command level

2: System level

Parameters

size: Specifies the active interface bandwidth used for setting the thresholds, in the range of 0 to 4000000 kbps.

Usage guidelines

Use this command after standby interfaces are specified.

If the available bandwidth used for setting the thresholds is 0 kbps (the default value), the interface backup module automatically obtains the actual bandwidth of the active interface to set the thresholds.

If the available bandwidth configured for setting the thresholds exceeds the actual bandwidth on the interface, load balancing does not take effect.

Examples

```
# Configure the available bandwidth used for setting the thresholds on active interface Serial 2/0 for load balancing as 10000 kbps.
```

```
<Sysname> system-view
[Sysname] interface serial 2/0
[Sysname-Serial2/0] standby bandwidth 10000
```

Related commands

standby interface

standby interface

Use **standby interface** to specify a standby interface for the current interface.

Use **undo standby interface** to remove the specified standby interface.

Syntax

standby interface *interface-type interface-number* [**priority**]

undo standby interface *interface-type interface-number*

Default

No standby interface is specified.

Views

Interface view

Default command level

2: System level

Parameters

interface-type interface-number: Specifies an interface by its type and number.

priority: Specifies the priority of a standby interface, in the range of 0 to 255. The default is 0. The greater the value, the higher the priority.

Usage guidelines

This command and the **standby interface** command cannot be configured at the same time. If you have configured the **standby interface** command on the active interface, you cannot configure the **standby track** command on both the active interface and its standby interface. If you have associated an interface with a track entry, you cannot configure the interface as the active interface or a standby interface.

Examples

```
# Specify interface Serial 2/1 to back up interface Serial 2/0, and assign it the priority of 50.
<Sysname> system-view
[Sysname] interface serial 2/0
[Sysname-Serial2/0] standby interface serial 2/1 50
```

Related commands

standby track

standby threshold

Use **standby threshold** to configure load balancing thresholds.

Use **undo standby threshold** to restore the default.

Syntax

standby threshold *enable-threshold* *disable-threshold*

undo standby threshold

Default

Load balancing threshold is disabled.

Views

Interface view

Default command level

2: System level

Parameters

enable-threshold: Specifies the upper load balancing threshold in the range of 1 to 99. It indicates the percentage of the available active-interface bandwidth that the traffic load must exceed for the standby interface to come up for load balancing.

disable-threshold: Specifies the lower load balancing threshold in the range of 1 to 99. It indicates the percentage of the available active-interface bandwidth that the traffic load must be less than for the standby interface in load balancing to shut down. The disable-threshold must be smaller than the enable-threshold.

Usage guidelines

The following is how backup/load balancing works:

- If the available bandwidth used for setting the thresholds is 0 kbps (the default value), the interface backup module automatically obtains the actual bandwidth of the active interface to set the thresholds. If the available bandwidth configured for setting the thresholds exceeds the actual bandwidth on the interface, load balancing does not take effect.
- When the traffic on the active interface increases above the enable-threshold, the standby interface starts to participate in load balancing. When the traffic on the active interface decreases below the disable-threshold, the standby interface frequently switches its state from up and down. To avoid this problem, H3C recommends that you set the disable-threshold to lower than half of the enable-threshold.
- You can only use the **standby threshold** command on active interfaces and after standby interfaces are specified.

Examples

```
# Configure the enable-threshold of load balancing on interface Serial 2/0 as 80 and the
disable-threshold as 20.
```

```
<Sysname> system-view
[Sysname] interface serial 2/0
[Sysname-Serial2/0] standby threshold 80 20
```

Related commands

- **standby interface**
- **standby bandwidth**

standby timer delay

Use **standby timer delay** to set switchover delays on the interface.

Use **undo standby timer delay** to restore the default.

Syntax

standby timer delay *enable-delay* *disable-delay*

undo standby timer delay

Default

Switchover delays on the active and standby interfaces are 0, indicating immediate switch without any delay.

Views

Interface view

Default command level

2: System level

Parameters

enable-delay: Specifies switchover delay from the active interface to the standby interface, in the range of 0 to 65535 seconds.

disable-delay: Specifies switchover delay from the standby interface to the active interface, in the range of 0 to 65535 seconds.

Usage guidelines

This command sets the delay timer for a standby interface to startup when the active interface is down, and the delay timer for a standby interface to be disabled after the active interface is recovered.

This command must be executed after standby interfaces are specified.

Examples

Configure interface Serial 2/1 to use interface Serial 2/0 for backup, and to experience 10 seconds of delay before switchover.

```
<Sysname> system-view
[Sysname] interface serial 2/0
[Sysname-Serial2/0] standby interface serial 2/1
[Sysname-Serial2/0] standby timer delay 10 10
```

Related commands

standby interface

standby timer flow-check

Use **standby timer flow-check** to configure the interval for checking the traffic size on the active interface.

Use **undo standby timer flow-check** to restore the default.

Syntax

standby timer flow-check *interval*

undo standby timer flow-check

Default

The interval for checking the traffic size on the active interface is 30 seconds.

Views

Interface view

Default command level

2: System level

Parameters

interval: Specifies flow check interval in the range of 30 to 600 seconds.

Usage guidelines

Use this command after standby interfaces are specified.

Examples

Configure load balancing, backup bandwidth and flow check interval on interface Serial 2/0 as 60 seconds.

```
<Sysname> system-view
[Sysname] interface serial 2/0
[Sysname-Serial2/0] standby timer flow-check 60
```

Related commands

standby interface

standby timer startup

Use **standby timer startup** to set the delay timer for the backup function to take effect on system startup.

Use **undo standby timer startup** to restore the default.

Syntax

standby timer startup *seconds*

undo standby timer startup

Default

The backup function takes effect after a delay of 30 seconds.

Views

System view

Default command level

2: System level

Parameters

seconds: Specifies the delay timer for the backup function to take effect on system startup, in the range of 0 to 65535 seconds.

Usage guidelines

This command takes effect on all standby interfaces working in active/backup mode, and does not take effect on the standby interfaces working in load balancing mode.

Examples

```
# Set the delay timer for the backup function to take effect on system startup to 40 seconds.
```

```
<Sysname> system-view
```

```
[Sysname] standby timer startup 40
```

standby track

Use **standby track** to associate an interface with a track entry.

Use **undo standby track** to remove the association.

Syntax

standby track *track-entry-number*

undo standby track

Default

An interface is not associated with a track entry.

Views

Interface view

Default command level

2: System level

Parameters

track-entry-number: Specifies a track entry to be monitored by its number in the range of 1 to 1024.

Usage guidelines

This command and the **standby interface** command cannot be configured at the same time. If you have configured the **standby interface** command on the active interface, you cannot configure the **standby track** command on both the active interface and its standby interface. If you have associated an interface with a track entry, you cannot configure the interface as the active interface or a standby interface.

One interface can be associated with one track entry. If you execute this command multiple times, the most recent configuration takes effect.

You can associate an interface with a nonexistent track entry. The Track function can take effect after the track entry is created with the **track** command.

Examples

Configure interface Serial 2/0 to be associated with track entry 1.

```
<Sysname> system-view
[Sysname] interface serial 2/0
[Sysname-Serial2/0] standby track 1
```

Related commands

- **standby interface**
- **track**

Track configuration commands

display track

Use **display track** to display track entry information.

Syntax

```
display track { track-entry-number | all } [ | { begin | exclude | include } regular-expression ]
```

Views

Any view

Default command level

1: Monitor level

Parameters

track-entry-number: Displays information about the specified track entry in the range of 1 to 1024.

all: Displays information about all the track entries.

|: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, a case-sensitive string of 1 to 256 characters.

Examples

Display information about all track entries.

```
<Sysname> display track all
Track ID: 1
  Status: Positive (notify 13 seconds later)
  Duration: 0 days 0 hours 0 minutes 7 seconds
  Notification delay: Positive 20, Negative 30 (in seconds)
  Reference object:
    NQA entry: admin test
    Reaction: 10
Track ID: 2
  Status: Invalid
  Duration: 0 days 0 hours 0 minutes 32 seconds
  Notification delay: Positive 20, Negative 30 (in seconds)
  Reference object:
    BFD session:
      Packet type: Echo
      Interface   : Ethernet1/1
      Remote IP   : 192.168.40.1
      Local IP    : 192.168.40.2
Track ID: 3
  Status: Negative
  Duration: 0 days 0 hours 0 minutes 32 seconds
```

Notification delay: Positive 20, Negative 30 (in seconds)

Reference object:

```
Track interface :
Interface status : Inserted
Interface       : Ethernet1/2
Protocol        : IPv4
```

Table 9 Command output

Field	Description
Track ID	ID of a track entry.
Status	Status of a track entry: <ul style="list-style-type: none"> • Positive—The tracked object functions correctly. • Invalid—The tracked object is invalid. • Negative—The tracked object is abnormal.
notify 13 seconds later	The Track module notifies the application modules of the track entry state change 13 seconds later. The information is not displayed after the Track module notifies the application modules.
Duration	Time period during which the track entry stays in the state.
Notification delay: Positive 20, Negative 30 (in seconds)	<ul style="list-style-type: none"> • The Track module notifies the application modules that the status of the track entry changes to Positive after a delay time of 20 seconds. • The Track module notifies the application modules that the status of the track entry changes to Negative after a delay time of 30 seconds.
Reference object	Tracked object associated with the track entry.
NQA entry	NQA test group associated with the track entry.
Reaction	Reaction entry associated with the track entry.
BFD session	Information about the BFD session associated with the track entry.
Packet type	Type of the BFD session packets, which can only be Echo.
Interface	Outgoing interface of BFD echo packets.
Remote IP	Remote IP address of the BFD echo packets.
Local IP	Local IP address of the BFD echo packets.
Track interface	Information of the interface associated with the track entry.
Interface status	Interface status: <ul style="list-style-type: none"> • Inserted. • Removed.
Interface	Interface to be monitored.
Protocol	Physical status or Layer 3 protocol status of the monitored interface: <ul style="list-style-type: none"> • None—Physical status of the monitored interface. • IPv4—IPv4 protocol status of the monitored Layer 3 interface. • IPv6—IPv6 protocol status of the monitored Layer 3 interface.

track bfd echo

Use **track bfd echo** to create a track entry, associate it with the BFD session, specify to use echo packets in BFD probes, and specify the delay time for the Track module to notify the application modules when the status of the track entry changes.

Use **undo track** to remove the track entry.

Syntax

track *track-entry-number* **bfd echo interface** *interface-type interface-number* **remote ip** *remote-ip* **local ip** *local-ip* [**delay** { **negative** *negative-time* | **positive** *positive-time* } *]

undo track *track-entry-number*

Default

No track entry exists.

Views

System view

Default command level

2: System level

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

interface *interface-type interface-number*: Specifies an interface by its type and number to save BFD configurations. The interface also serves as the outgoing interface for BFD packets.

remote ip *remote-ip*: Specifies the destination IP address of the BFD echo packets.

local ip *local-ip*: Specifies the source IP address of the BFD echo packets.

delay: Specifies that the Track module notifies the application modules of the track entry status change after a specific delay time. If this keyword is not provided, the Track module notifies the application modules immediately when the track entry status changes.

negative *negative-time*: Specifies the delay time for the Track module to notify the application modules that the status of the track entry changes to Negative. The *negative-time* argument represents the delay time, in the range of 1 to 300 seconds.

positive *positive-time*: Specifies the delay time for the Track module to notify the application modules that the status of the track entry changes to Positive. The *positive-time* argument represents the delay time, in the range of 1 to 300, in seconds.

Usage guidelines

After a track entry is created, you cannot change its settings except the delay time. To change the delay time for this track entry, use the **track bfd echo delay** command. To modify other settings of this track entry, first delete the entire track entry, and then create a new track entry.

When you configure collaboration between Track and BFD, do not configure the virtual IP address of a VRRP group as the local or remote address of a BFD session.

Associating a track entry with the echo-mode BFD session detects a directly connected link. Before that, you must configure the source IP address of BFD echo packets.

Examples

Create track entry 1, which uses BFD to monitor the link between local IP address 192.168.40.2 and remote IP address 192.168.40.1 by sending BFD echo packets.

```
<Sysname> system-view
```

```
[Sysname] track 1 bfd echo interface ethernet 1/1 remote ip 192.168.40.1 local ip 192.168.40.2
```

Related commands

display track

track nqa

Use **track nqa** to create a track entry, associate it with the specified reaction entry of the NQA test group, and specify the delay time for the Track module to notify the application modules when the status of the track entry changes.

Use **undo track** to remove the track entry.

Syntax

track *track-entry-number* **nqa entry** *admin-name operation-tag reaction item-number* [**delay** { **negative** *negative-time* | **positive** *positive-time* } *]

undo track *track-entry-number*

Default

No track entry exists.

Views

System view

Default command level

2: System level

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

entry *admin-name operation-tag*: Specifies the NQA test group to be associated with the track entry. The *admin-name* argument is the name of the NQA test group administrator who creates the NQA operation, and is a case-insensitive string of 1 to 32 characters. The *operation-tag* argument is the NQA operation tag, a case-insensitive string of 1 to 32 characters.

reaction *item-number*: Specifies the reaction entry to be associated with the track entry. The *item-number* argument is the reaction entry ID in the range of 1 to 10.

delay: Specifies that the Track module notifies the application modules of the track entry status change after a specific delay time. If this keyword is not provided, the Track module notifies the application modules immediately when the track entry status changes.

negative *negative-time*: Specifies the delay time for the Track module to notify the application modules that the status of the track entry changes to Negative. The *negative-time* argument represents the delay time, in the range of 1 to 300 seconds.

positive *positive-time*: Specifies the delay time for the Track module to notify the application modules that the status of the track entry changes to Positive. The *positive-time* argument represents the delay time, in the range of 1 to 300 seconds.

Usage guidelines

After a track entry is created, you cannot change its settings except the delay time. To change the delay time, use the **track nqa delay** command. To modify other settings of this track entry, first delete the entire track entry, and then create a new track entry.

Examples

Create track entry 1, and associate it with reaction entry 3 of the NQA test group (admin-test).

```
<Sysname> system-view
```

```
[Sysname] track 1 nqa entry admin test reaction 3
```

Related commands

- **display track**
- **nqa**
- **reaction** (*Network Management and Monitoring Command Reference*)

track interface

Use **track interface** to create a track entry, associate it with the physical status of a specific interface, and specify the delay time for the Track module to notify the application modules when the status of the track entry changes.

Use **undo track** to remove the track entry.

Syntax

```
track track-entry-number interface interface-type interface-number [ delay { negative negative-time | positive positive-time } * ]
```

```
undo track track-entry-number
```

Default

No track entry exists.

Views

System view

Default command level

2: System level

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

interface-type interface-number: Specifies an interface by its type and number.

delay: Specifies that the Track module notifies the application modules of the track entry status change after a specific delay time. If this keyword is not provided, the Track module notifies the application modules immediately when the track entry status changes.

negative *negative-time*: Specifies the delay time for the Track module to notify the application modules that the status of the track entry changes to Negative. The *negative-time* argument represents the delay time, in the range of 1 to 300 seconds.

positive *positive-time*: Specifies the delay time for the Track module to notify the application modules that the status of the track entry changes to Positive. The *positive-time* argument represents the delay time, in the range of 1 to 300 seconds.

Usage guidelines

After a track entry is created, you cannot change its settings except the delay time. To change the delay time, use the **track interface delay** command. To modify other settings of this track entry, first delete the entire track entry, and then create a new track entry.

When a track entry to be associated with the physical status of a specific interface is created, the status of the track entry is Positive if the physical status of the interface is up. The status of the track entry is Negative if the physical status of the interface is down. To display the physical status of an interface, use the **display ip interface brief** command.

Examples

```
# Create track entry 1, and associate it with the physical status of interface Ethernet 1/1.
```

```
<Sysname> system-view
```

```
[Sysname] track 1 interface ethernet 1/1
```

Related commands

- **display track**
- **display ip interface brief** (*Layer 3—IP Services Command Reference*)

track interface protocol

Use **track interface protocol** to create a track entry, associate it with the protocol status of a specific interface, and specify the delay time for the Track module to notify the application modules when the status of the track entry changes.

Use **undo track** to remove the track entry.

Syntax

```
track track-entry-number interface interface-type interface-number protocol { ipv4 | ipv6 } [ delay { negative negative-time | positive positive-time } * ]
```

```
undo track track-entry-number
```

Default

No track entry exists.

Views

System view

Default command level

2: System level

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

interface-type interface-number: Specifies an interface by its type and number.

ipv4: Monitors the IPv4 protocol status. When the IPv4 protocol status of an interface is up, the status of the track object is Positive. When the IPv4 protocol status of an interface is down, the status of the track object is Negative. To display the IPv4 protocol status of an interface, use the **display ip interface brief** command.

ipv6: Monitors the IPv6 protocol status. When the IPv6 protocol status of an interface is up, the status of the track object is Positive. When the IPv6 protocol status of an interface is down, the status of the track object is Negative. To display the IPv6 protocol status of an interface, use the **display ipv6 interface** command.

delay: Specifies that the Track module notifies the application modules of the track entry status change after a specific delay time. If this keyword is not provided, the Track module notifies the application modules immediately when the track entry status changes.

negative *negative-time*: Specifies the delay time for the Track module to notify the application modules that the status of the track entry changes to Negative. The *negative-time* argument represents the delay time, in the range of 1 to 300 seconds.

positive *positive-time*: Specifies the delay time for the Track module to notify the application modules that the status of the track entry changes to Positive. The *positive-time* argument represents the delay time, in the range of 1 to 300 seconds.

Usage guidelines

After a track entry is created, you cannot change its settings except the delay time. To change the delay time, use the **track interface protocol delay** command. To modify other settings of this track entry, first delete the entire track entry, and then create a new track entry.

Examples

Create track entry 1, and associate it with the IPv4 protocol status of interface Ethernet 1/1.

```
<Sysname> system-view
```

```
[Sysname] track 1 interface ethernet 1/1 protocol ipv4
```

Related commands

- **display track**
- **display ip interface brief** (*Layer 3—IP Services Command Reference*)
- **display ipv6 interface** (*Layer 3—IP Services Command Reference*)

VRRP configuration commands

The interfaces that VRRP involves can only be Layer 3 Ethernet interfaces and VLAN interfaces unless otherwise specified.

VRRP cannot be configured on interfaces in aggregation groups.

Common VRRP configuration commands

vrrp mode

Use **vrrp mode** to configure the VRRP working mode.

Use **undo vrrp mode** to restore the default.

Syntax

vrrp mode load-balance

undo vrrp mode

Default

VRRP operates in standard mode.

Views

System view

Default command level

2: System level

Parameters

load-balance: Specifies the load balancing mode.

Usage guidelines

- When you configure the working mode of VRRP by using this command, both IPv4-based and IPv6-based VRRP groups operate in the specified mode.
- When VRRP operates in load balancing mode, the virtual IP address cannot be the same as the IP address of any interface in the VRRP group, and the virtual IP address should be mapped to the virtual MAC address. Otherwise, VRRP cannot operate in load balancing mode.
- When a VRRP group is created, you can still change the VRRP working mode. When you change the VRRP working mode, all VRRP groups on the router operate in the specified mode.

Examples

```
# Configure VRRP to operate in load balancing mode.
```

```
<Sysname> system-view
```

```
[Sysname] vrrp mode load-balance
```

Related commands

- **display vrrp**
- **display vrrp ipv6**

vrrp version

Use **vrrp version** to specify the version of VRRP on an interface.

Use **undo vrrp version** to restore the default.

Syntax

vrrp version *version-number*

undo vrrp version

Default

VRRPv2 is used.

Views

Interface view

Default command level

2: System level

Parameters

version-number: Specifies a VRRP version. The version number is 2 or 3, where 2 indicates IPv4 VRRPv2 (described in RFC 2338) or IPv6 VRRPv2 (described in RFC 3768), and 3 indicates IPv4/IPv6 VRRPv3 (described in RFC 5798).

Usage guidelines

RFC 3768 does not define the packet format of IPv6 VRRPv2 packets. Before RFC 5798 is released, H3C implements IPv6 VRRPv2 based on RFC 3768. In IPv6 VRRPv2 packets, the Version field is 3.

This command does not apply to VRRP load balancing mode.

The version of VRRP on all routers in a VRRP group must be the same.

Examples

```
# Specify VRRPv3 to run on interface Ethernet 1/1.
```

```
<Sysname> system-view
```

```
[Sysname] interface ethernet 1/1
```

```
[Sysname-Ethernet1/1] vrrp version 3
```

IPv4-based VRRP configuration commands

display vrrp

Use **display vrrp** to display the state information of VRRP groups.

Syntax

```
display vrrp [ verbose ] [ interface interface-type interface-number [ vrid virtual-router-id ] ] [ { begin | exclude | include } regular-expression ]
```

Views

Any view

Default command level

1: Monitor level

Parameters

verbose: Displays detailed state information of VRRP groups.

interface *interface-type interface-number*: Displays VRRP group state information of the specified interface. *interface-type interface-number* specifies an interface by its type and number.

vrvid *virtual-router-id*: Displays state information of the specified VRRP group. The *virtual-router-id* argument specifies a VRRP group by its group number in the range of 1 to 255.

|: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, a case-sensitive string of 1 to 256 characters.

Usage guidelines

If you do not specify **verbose**, only the brief state information of VRRP group is displayed.

If you specify both an interface and a VRRP group, only the state information of the specified VRRP group on the interface is displayed. If you only specify an interface, the state information of all the VRRP groups on the interface is displayed. If you specify neither, the state information of all the VRRP groups on the router is displayed.

Examples

When VRRP operates in standard mode, display brief information about all VRRP groups on the device.

```
<Sysname> display vrrp
IPv4 Standby Information:
  Run Mode      : Standard
  Run Method    : Virtual MAC
Total number of virtual routers : 1
Interface      VRID  State      Run      Adver   Auth     Virtual
                Pri   Timer     Type
-----
Eth1/1         1    Master     140     1       Simple  1.1.1.1
```

Table 10 Command output (standard mode)

Field	Description
Run Mode	Current VRRP working mode: <ul style="list-style-type: none"> Standard—Standard mode. Load Balance—Load balancing mode.
Run Method	Current VRRP running mode: <ul style="list-style-type: none"> Real MAC—Real MAC mode, which means the virtual IP address of the VRRP group is mapped to the real MAC address of the interface. Virtual MAC—Virtual MAC mode, which means the virtual IP address of the VRRP group is mapped to the virtual MAC address.
Total number of virtual routers	Number of VRRP groups.
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group.
Run Pri	Running priority of the router, or in other words, the current priority of the router. With VRRP tracking configured, the priority of the router changes when the state of the monitored interface or track entry changes.
Adver. Timer	VRRP advertisement interval, in seconds.
Auth Type	Authentication type: <ul style="list-style-type: none"> None—No authentication.

Field	Description
	<ul style="list-style-type: none"> • Simple—Simple authentication. • MD5—MD5 authentication.
Virtual IP	Virtual IP address of the VRRP group.

When VRRP operates in standard mode, display detailed information about all VRRP groups on the device.

```
<Sysname> display vrrp verbose
IPv4 Standby Information:
  Run Mode      : Standard
  Run Method    : Virtual MAC
Total number of virtual routers : 1
Interface Ethernet1/1
  VRID          : 1                Adver Timer   : 1
  Admin Status  : Up              State          : Master
  Config Pri    : 150             Running Pri    : 140
  Preempt Mode  : Yes             Delay Time     : 5
  Auth Type     : Simple          Key            : hello
  Virtual IP    : 1.1.1.1
  Virtual MAC   : 0000-5e00-0101
  Master IP     : 1.1.1.2
VRRP Track Information:
  Track Interface: Eth1/2          State : Down           Pri Reduced : 10
  Track Object   : 1              State : Positive       Pri Reduced : 50
```

Table 11 Command output (standard mode)

Field	Description
Run Mode	Current VRRP working mode: <ul style="list-style-type: none"> • Standard—Standard mode. • Load Balance—Load balancing mode.
Run Method	Current VRRP running mode: <ul style="list-style-type: none"> • Real MAC—Real MAC mode, which means the virtual IP address of the VRRP group is mapped to the real MAC address of the interface. • Virtual MAC—Virtual MAC mode, which means the virtual IP address of the VRRP group is mapped to the virtual MAC address.
Total number of virtual routers	Number of VRRP groups.
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group.
Adver. Timer	VRRP advertisement interval, in seconds.
Admin Status	Administrative state: <ul style="list-style-type: none"> • UP. • DOWN.
State	Status of the router in the VRRP group: <ul style="list-style-type: none"> • Master. • Backup. • Initialize.
Config Pri	Configured priority of the router, or in other words, the priority value

Field	Description
	specified by using the vrrp vrid priority command.
Running Pri	Running priority of the router, or in other words, the current priority of the router. With VRRP tracking configured, when the state of the monitored interface or track entry changes, the priority of the router changes.
Preempt Mode	Preemptive mode: <ul style="list-style-type: none"> • Yes—The router in the VRRP group operates in preemptive mode. • No—The router in the VRRP group operates in non preemptive mode.
Delay Time	Preemption delay, in seconds.
Become Master	Time to wait before the router becomes the master. The unit is milliseconds. Only routers in backup mode have this information.
Auth Type	Authentication type: <ul style="list-style-type: none"> • None—No authentication. • Simple—Simple authentication. • MD5—MD5 authentication.
Key	Authentication key.
Virtual IP	Virtual IP address of the VRRP group.
Virtual MAC	Virtual MAC address that corresponds to the virtual IP address of the VRRP group. It is displayed only when the router is in master state.
Master IP	Primary IP address of the interface where the router in master state resides.
VRRP Track Information	Information about the tracked interface or object. It is displayed only when the vrrp vrid track or vrrp vrid track interface command is executed.
Track Interface	Interface to be tracked. It is displayed only when the vrrp vrid track interface command is executed.
Track Object	Track entry to be tracked. It is displayed only when the vrrp vrid track command is executed.
State	State of the tracked interface or track entry. State of a tracked interface: <ul style="list-style-type: none"> • Up. • Down. • Removed. State of a track entry: <ul style="list-style-type: none"> • Invalid. • Negative. • Positive. • Not existing.
Pri Reduced	Priority value that is reduced when the monitored interface is down or removed, or when the status of the monitored track entry turns to negative . It is displayed only when the vrrp vrid track interface command or the vrrp vrid track command is executed.

When VRRP operates in load balancing mode, display brief information about all VRRP groups on the device.

```
<Sysname> display vrrp
IPv4 Standby Information:
  Run Mode      : Load Balance
```

```

Run Method      : Virtual MAC
Total number of virtual routers : 1
Interface      VRID  State      Run   Address      Active
                Pri
-----
Eth1/1         1      Master    140   1.1.1.1      Local
-----
                VF 1  Active    255   000f-e2ff-0011  Local

```

Table 12 Command output (load balancing mode)

Field	Description
Run Mode	Current VRRP working mode: <ul style="list-style-type: none"> Standard—Standard mode. Load Balance—Load balancing mode.
Run Method	Current VRRP running mode: <ul style="list-style-type: none"> Real MAC—Real MAC mode, which means the virtual IP address of the VRRP group is mapped to the real MAC address of the interface. Virtual MAC—Virtual MAC mode, which means the virtual IP address of the VRRP group is mapped to the virtual MAC address.
Total number of virtual routers	Number of VRRP groups.
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group or ID of the virtual forwarder (VF).
State	<ul style="list-style-type: none"> If the VRID is <i>number</i>, this field indicates the status of the router in the VRRP group, including Master, Backup, and Initialize. If the VRID is <i>VF number</i>, this field indicates the status of the VF in the VRRP group, including Active, Listening, and Initialize.
Run Pri	<ul style="list-style-type: none"> If the VRID is <i>number</i>, this field indicates the running priority of the router, or in other words, the current priority of the router. With VRRP tracking configured, the priority of the router changes if the state of the monitored interface or track entry changes. If the VRID is <i>VF number</i>, this field indicates the running priority of the VF. With VF tracking configured, the priority of the VF changes if the state of the monitored track entry changes.
Address	<ul style="list-style-type: none"> If the VRID is <i>number</i>, this field indicates the virtual IP address of the VRRP group. If the VRID is <i>VF number</i>, this field indicates the virtual MAC address of the VF.
Active	<ul style="list-style-type: none"> If the VRID is <i>number</i>, this field indicates the IP address of the interface of the master. If the current router is the master, it is displayed as local. If the VRID is <i>VF number</i>, this field indicates the IP address of the interface of the active virtual forwarder (AVF). If the current VF is the AVF, it is displayed as local.

When VRRP operates in load balancing mode, display detailed information about all VRRP groups on the device.

```

<Sysname> display vrrp verbose
IPv4 Standby Information:
  Run Mode      : Load Balance
  Run Method    : Virtual MAC
Total number of virtual routers : 1
  Interface Ethernet1/1

```

```

VRID          : 1                Adver Timer   : 1
Admin Status  : Up                State        : Master
Config Pri    : 120              Running Pri   : 110
Preempt Mode  : Yes              Delay Time    : 5
Auth Type     : None
Virtual IP    : 10.1.1.1
Member IP List : 10.1.1.2 (Local, Master)
                10.1.1.3 (Backup)

VRRP Track Information:
Track Interface: Eth1/2          State : Down          Pri Reduced : 10
Track Object   : 1              State : Positive      Pri Reduced : 50

Forwarder Information: 2 Forwarders 1 Active
Config Weight  : 255
Running Weight : 255

Forwarder 01
State          : Active
Virtual MAC    : 000f-e2ff-0011 (Owner)
Owner ID       : 0000-5e01-1101
Priority        : 255
Active         : local

Forwarder 02
State          : Listening
Virtual MAC    : 000f-e2ff-0012 (Learnt)
Owner ID       : 0000-5e01-1103
Priority        : 127
Active         : 10.1.1.3

Forwarder Weight Track Information:
Track Object   : 1              State : Positive      Weight Reduced : 250

Forwarder Switchover Track Information:
Track Object   : 2              State : Positive
Member IP      : 10.1.1.3

```

Table 13 Command output (load balancing mode)

Field	Description
Run Mode	Current VRRP working mode: <ul style="list-style-type: none"> • Standard—Standard mode. • Load Balance—Load balancing mode.
Run Method	Current VRRP running mode: <ul style="list-style-type: none"> • Real MAC—Real MAC mode, which means the virtual IP address of the VRRP group is mapped to the real MAC address of the interface. • Virtual MAC—Virtual MAC mode, which means the virtual IP address of the VRRP group is mapped to the virtual MAC address.
Total number of virtual routers	Number of VRRP groups.
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group.
Adver Timer	VRRP advertisement interval, in seconds.
Admin Status	Administrative state:

Field	Description
	<ul style="list-style-type: none"> UP. DOWN.
State	Status of the router in the VRRP group: <ul style="list-style-type: none"> Master. Backup. Initialize.
Config Pri	Configured priority of the router, that is, the priority value specified by using the vrrp vrid priority command.
Running Pri	Running priority of the router, that is, the current priority of the router. With VRRP tracking configured, the priority of the router changes if the state of the monitored interface or track entry changes.
Preempt Mode	Preemptive mode: <ul style="list-style-type: none"> Yes—The router in the VRRP group operates in preemptive mode. No—The router in the VRRP group operates in non-preemptive mode.
Delay Time	Preemption delay, in seconds.
Become Master	Time to wait before the router becomes the master. The unit is milliseconds. Only routers in backup mode have this information.
Auth Type	Authentication type: <ul style="list-style-type: none"> None—No authentication. Simple—Simple authentication. MD5—MD5 authentication.
Virtual IP	Virtual IP address of the VRRP group.
Member IP List	List of IP addresses of members in the VRRP group. This address list is displayed only when the VRRP group operates in load balancing mode. <ul style="list-style-type: none"> Local—IP address of the local device. Master—IP address of the master. Backup—IP address of the backup.
VRRP Track Information	Information of the tracked interface or track entry.
Track Interface	Interface to be tracked. It is displayed only when the vrrp vrid track interface command is executed.
Track Object	Object to be tracked. It is displayed only when the vrrp vrid track command is executed.
State	State of the tracked interface or track entry. State of a tracked interface: <ul style="list-style-type: none"> Up. Down. Removed. State of a track entry: <ul style="list-style-type: none"> Invalid. Negative. Positive. Not existing.
Pri Reduced	Priority value that is reduced when the monitored interface is down or removed, or when the status of the monitored track entry turns to negative . It is displayed only when the vrrp vrid track interface

Field	Description
	command or the vrrp vrid track command is executed.
Forwarder Information: 2 Forwarders 1 Active	VF Information: The number of VFs of the router is 2, and the number of AVFs is 1.
Config Weight	Configured weight of the VF, the value is 255.
Running Weight	Running weight of the VF, or in other words, the current weight of the VF. When VF tracking is configured, if the state of the monitored track entry changes, the weight of the VF changes.
Forwarder 01	Information about VF 01.
State	State of a VF: <ul style="list-style-type: none"> • Active. • Listening. • Initialize.
Virtual MAC	Virtual MAC address of the VF.
Owner ID	Real MAC address of the interface of the VF owner.
Priority	VF priority.
Active	IP address of the interface of the AVF. If the current VF is the AVF, it is displayed as local.
Forwarder Weight Track Configuration	Weight track configuration of the VF. It is displayed only when the vrrp vrid weight track command is executed.
Track Object	Weight track entry. It is displayed only when the vrrp vrid weight track command is executed.
State	A track entry has the following states: <ul style="list-style-type: none"> • Invalid. • Negative. • Positive. • Not existing.
Weight Reduced	Weight value that is reduced when the status of the monitored track entry turns to negative . It is displayed only when the vrrp vrid weight track command is executed.
Forwarder Switchover Track Information	VF switchover information. The information is displayed only after the vrrp vrid track forwarder-switchover command is executed.
Track Object	Track entry monitored by the VF switchover feature. The information is displayed only after the vrrp vrid track forwarder-switchover command is executed.
State	A track entry has the following states: <ul style="list-style-type: none"> • Invalid. • Negative. • Positive. • Not existing.
Member IP	IP address of the member device. If the status of the monitored track entry turns to negative and the local device has an LVF whose corresponding AVF is on the specified member device, the LVF immediately becomes active.

display vrrp statistics

Use **display vrrp statistics** to display statistics about VRRP groups.

Syntax

```
display vrrp statistics [ interface interface-type interface-number [ vrid virtual-router-id ] ] [ |  
{ begin | exclude | include } regular-expression ]
```

Views

Any view

Default command level

1: Monitor level

Parameters

interface *interface-type interface-number*: Displays VRRP group statistics of the specified interface. *interface-type interface-number* specifies an interface by its type and number.

vrid *virtual-router-id*: Displays statistics of the specified VRRP group. The *virtual-router-id* argument specifies a VRRP group by its group number in the range of 1 to 255.

|: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, a case-sensitive string of 1 to 256 characters.

Usage guidelines

If you specify both an interface and a VRRP group, only the statistics about the specified VRRP group on the interface are displayed. If you only specify an interface, the statistics about all the VRRP groups on the interface are displayed. If you specify neither, the statistics about all the VRRP groups on the router are displayed.

To clear the VRRP group statistics, use the **reset vrrp statistics** command.

Examples

When VRRP operates in standard mode, display the statistics about all VRRP groups.

```
<Sysname> display vrrp statistics
Interface                : Ethernet1/1
VRID                     : 1
Checksum Errors          : 0          Version Errors                : 0
Invalid Type Pkts Rcvd  : 0          Advertisement Interval Errors : 0
IP TTL Errors            : 0          Auth Failures                  : 0
Invalid Auth Type       : 0          Auth Type Mismatch             : 0
Packet Length Errors    : 0          Address List Errors            : 0
Become Master           : 1          Priority Zero Pkts Rcvd        : 0
Adver Rcvd              : 0          Priority Zero Pkts Sent        : 0
Adver Sent               : 807
Global statistics
Checksum Errors          : 0
Version Errors          : 0
VRID Errors              : 0
```

When VRRP operates in load balancing mode, display the statistics about all VRRP groups.

```
<Sysname> display vrrp statistics
Interface          : Ethernet1/1
VRID               : 1
Checksum Errors   : 0          Version Errors           : 0
Invalid Type Pkts Rcvd : 0          Advertisement Interval Errors : 0
IP TTL Errors     : 0          Auth Failures             : 0
Invalid Auth Type : 0          Auth Type Mismatch        : 0
Packet Length Errors : 0          Address List Errors        : 0
Become Master     : 2          Redirect Timer Expires     : 0
Become AVF       : 1          Time-out Timer Expires     : 0
Adver Rcvd       : 0          Request Rcvd               : 0
Adver Sent        : 1460       Request Sent                : 1
Reply Rcvd        : 0          Release Rcvd               : 0
Reply Sent        : 0          Release Sent                : 0
Priority Zero Pkts Rcvd : 0          VF Priority Zero Pkts Rcvd  : 0
Priority Zero Pkts Sent : 1          VF Priority Zero Pkts Sent  : 0
Status Option Errors : 0

Global statistics
Checksum Errors   : 0
Version Errors    : 0
VRID Errors       : 0
```

Table 14 Command output (standard mode)

Field	Description
Interface	Interface to which the VRRP group belongs.
VRID	Serial number of the VRRP group.
Checksum Errors	Number of packets with checksum errors.
Version Errors	Number of packets with version errors.
Invalid Type Pkts Rcvd	Number of packets with incorrect packet type.
Advertisement Interval Errors	Number of packets with advertisement interval errors.
IP TTL Errors	Number of packets with TTL errors.
Auth Failures	Number of packets with authentication failures.
Invalid Auth Type	Number of packets with authentication failures due to invalid authentication types.
Auth Type Mismatch	Number of packets with authentication failures due to mismatching authentication types.
Packet Length Errors	Number of packets with VRRP packet length errors.
Address List Errors	Number of packets with virtual IP address list errors.
Become Master	Number of times that the router worked as the master.
Priority Zero Pkts Rcvd	Number of received advertisements with the priority of 0.
Adver Rcvd	Number of received advertisements.
Priority Zero Pkts Sent	Number of sent advertisements with the priority of 0.

Field	Description
Adver Sent	Number of advertisements sent.
Global statistics	Global statistics about all VRRP groups.
Checksum Errors	Total number of packets with checksum errors.
Version Errors	Total number of packets with version errors.
VRID Errors	Total number of packets with VRID errors.

Table 15 Command output (load balancing mode)

Field	Description
Interface	Interface to which the VRRP group belongs.
VRID	Serial number of the VRRP group.
Checksum Errors	Number of packets with checksum errors.
Version Errors	Number of packets with version errors.
Invalid Type Pkts Rcvd	Number of packets with incorrect packet type.
Advertisement Interval Errors	Number of packets with advertisement interval errors.
IP TTL Errors	Number of packets with TTL errors.
Auth Failures	Number of packets with authentication failures.
Invalid Auth Type	Number of packets with authentication failures due to invalid authentication types.
Auth Type Mismatch	Number of packets with authentication failures due to mismatching authentication types.
Packet Length Errors	Number of packets with VRRP packet length errors.
Address List Errors	Number of packets with virtual IP address list errors.
Become Master	Number of times that the router worked as the master.
Redirect Timer Expires	Number of times that the redirect timer expires.
Become AVF	Number of times that the VF worked as the AVF.
Time-out Timer Expires	Number of times that the timeout timer expires.
Adver Rcvd	Number of received advertisements.
Request Rcvd	Number of received requests.
Adver Sent	Number of advertisements sent.
Request Sent	Number of requests sent.
Reply Rcvd	Number of received replies.
Release Rcvd	Number of received releases.
Reply Sent	Number of replies sent.
Release Sent	Number of releases sent.
Priority Zero Pkts Rcvd	Number of received advertisements with the priority of 0.
VF Priority Zero Pkts Rcvd	Number of received advertisements with the VF priority of 0.
Priority Zero Pkts Sent	Number of sent advertisements with the priority of 0.
VF Priority Zero Pkts Sent	Number of sent advertisements with the VF priority of 0.

Field	Description
Status Option Errors	Number of times that the status option errors.
Global statistics	Global statistics about all VRRP groups.
Checksum Errors	Total number of packets with checksum errors.
Version Errors	Total number of packets with version errors.
VRID Errors	Total number of packets with VRID errors.

Related commands

reset vrrp statistics

reset vrrp statistics

Use **reset vrrp statistics** to clear VRRP group statistics.

Syntax

reset vrrp statistics [**interface** *interface-type interface-number* [**vrid** *virtual-router-id*]]

Views

User view

Default command level

1: Monitor level

Parameters

interface *interface-type interface-number*: Clears VRRP group statistics of a specified interface. *interface-type interface-number* specifies an interface by its type and number.

vrid *virtual-router-id*: Clears VRRP statistics of the specified VRRP group. The *virtual-router-id* argument specifies a VRRP group by its group number in the range of 1 to 255.

Usage guidelines

If you specify both an interface and a VRRP group, the statistics about the specified VRRP group on the specified interface are cleared. If you specify only the interface, the statistics about all the VRRP groups on the interface are cleared. If you specify neither, the statistics about all the VRRP groups on the router are cleared.

Examples

Clear the statistics about all the VRRP groups on the router.

```
<Sysname> reset vrrp statistics
```

Related commands

display vrrp statistics

vrrp method

Use **vrrp method** to specify the type of the MAC addresses mapped to the virtual IP addresses of the VRRP groups.

Use **undo vrrp method** to restore the default.

Syntax

vrrp method { **real-mac** | **virtual-mac** }

undo vrrp method

Default

The virtual MAC addresses are mapped to the virtual IP addresses of the VRRP groups.

Views

System view

Default command level

2: System level

Parameters

real-mac: Maps the real MAC address of the interface to the virtual IP address of the VRRP group.

virtual-mac: Maps the virtual MAC address to the virtual IP address of the VRRP group.

Usage guidelines

Specify the type of the MAC addresses mapped to the virtual IP address before creating a VRRP group. Otherwise, you cannot change the type of the MAC address by using this command.

When VRRP operates in load balancing mode, a virtual IP address is always mapped to a virtual MAC address regardless of which type of the MAC addresses to be mapped to the virtual IP address is specified.

Examples

Map the virtual IP address of a VRRP group to the real MAC address of the interface.

```
<Sysname> system-view  
[Sysname] vrrp method real-mac
```

Related commands

display vrrp

vrrp un-check ttl

Use **vrrp un-check ttl** to disable TTL check on VRRP packets.

Use **undo vrrp un-check ttl** to enable TTL check on VRRP packets.

Syntax

vrrp un-check ttl

undo vrrp un-check ttl

Default

TTL check on VRRP packets is enabled.

Views

Interface view

Default command level

2: System level

Usage guidelines

The master of a VRRP group periodically sends VRRP advertisements to indicate its existence. The VRRP advertisements are multicast onto the local network segment and not forwarded by a router, and therefore the packet TTL value will not be changed. When the master of a VRRP group advertises VRRP packets, it sets the packet TTL to 255. After you configure to check the VRRP packet TTL. When the backups of the VRRP group receive VRRP packets, they check the packet TTL and drop the VRRP packets whose TTL is smaller than 255 to prevent attacks from other network segments.

Because devices from different vendors might implement VRRP in a different way, when the device is interoperating with devices of other vendors, VRRP packet TTL check might result in dropping packets that should not be dropped. In this situation, use the **vrrp un-check ttl** command to disable TTL check on VRRP packets.

Examples

```
# Disable TTL check on VRRP packets.  
<Sysname> system-view  
[Sysname] interface ethernet 1/1  
[Sysname-Ethernet1/1] vrrp un-check ttl
```

vrrp vrid authentication-mode

Use **vrrp vrid authentication-mode** to configure authentication mode and authentication key for a VRRP group to send and receive VRRP packets.

Use **undo vrrp vrid authentication-mode** to restore the default.

Syntax

```
vrrp vrid virtual-router-id authentication-mode { md5 | simple } [ cipher ] key  
undo vrrp vrid virtual-router-id authentication-mode
```

Default

Authentication is disabled.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

md5: Specifies the MD5 authentication mode.

simple: Specifies the simple authentication mode.

cipher: Sets a ciphertext authentication key.

key: Sets the authentication key. This argument is case sensitive.

- When **md5** authentication applies, it must be a plaintext string of 1 to 8 characters or a ciphertext string of 24 characters if the **cipher** keyword is not specified, or a ciphertext string of 1 to 41 characters if the **cipher** keyword is specified.
- When **simple** authentication applies, it must be a plaintext string of 1 to 8 characters if the **cipher** keyword is not specified, or a ciphertext string of 1 to 41 characters if the **cipher** keyword is specified.

Usage guidelines

For security purposes, all keys, including keys configured in plain text, are saved in cipher text.

Before executing the command, create a VRRP group on an interface and configure the virtual IP address of the VRRP group.

You might configure different authentication keys for the VRRP groups on an interface. However, the members of the same VRRP group must use the same authentication key.

Examples

Set the authentication mode to **simple** and authentication key to **Sysname** for VRRP group 1 on interface Ethernet 1/1 to send and receive VRRP packets.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] vrrp vrid 1 virtual-ip 10.1.1.1
[Sysname-Ethernet1/1] vrrp vrid 1 authentication-mode simple Sysname
```

Related commands

display vrrp

vrrp vrid preempt-mode

Use **vrrp vrid preempt-mode** to enable preemption on the router and configure its preemption delay in a specific VRRP group.

Use **undo vrrp vrid preempt-mode** to disable preemption on the router in a specific VRRP group. As a result, the router operates in non-preemptive mode.

Use **undo vrrp vrid preempt-mode timer delay** to restore the default preemption delay.

Syntax

vrrp vrid *virtual-router-id* **preempt-mode** [**timer delay** *delay-value*]

undo vrrp vrid *virtual-router-id* **preempt-mode** [**timer delay**]

Default

The router operates in preemptive mode and the preemption delay is 0 seconds.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a virtual router ID or VRRP group number in the range of 1 to 255.

timer delay *delay-value*: Sets a preemption delay in the range of 0 to 255 seconds. The default is 0 seconds.

Usage guidelines

To avoid frequent member state changes in a VRRP group and make the backups have enough time to collect information (such as routing information), each backup waits for a period of time (the preemption delay time) after it receives an advertisement with the priority lower than the local priority, and then sends VRRP advertisements to start a new master election in the VRRP group and becomes the master.

Before executing the command, create a VRRP group on an interface and configure the virtual IP address of the VRRP group.

Examples

Enable preemption on the router in VRRP group 1, and set the preemption delay to 5 seconds.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] vrrp vrid 1 virtual-ip 10.1.1.1
[Sysname-Ethernet1/1] vrrp vrid 1 preempt-mode timer delay 5
```

Related commands

display vrrp

vrrp vrid priority

Use **vrrp vrid priority** to configure the priority of the router in the specified VRRP group.

Use **undo vrrp vrid priority** to restore the default.

Syntax

vrrp vrid *virtual-router-id* **priority** *priority-value*

undo vrrp vrid *virtual-router-id* **priority**

Default

The priority of a router in a VRRP group is 100.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

priority-value: Specifies the priority value of the router in the specified VRRP group in the range of 1 to 254. A higher number indicates a higher priority.

Usage guidelines

Before you execute the command, create a VRRP group on an interface and configure the virtual IP address of the VRRP group.

The role that a router plays in a VRRP group depends on its priority. A higher priority means that the router is more likely to become the master. Priority 0 is reserved for special use and 255 for the IP address owner.

If the router is the IP address owner, its priority is always 255. Therefore, it remains as the master so long as it is functioning correctly.

Examples

```
# Set the priority of the router in VRRP group 1 to 150.
```

```
<Sysname> system-view
```

```
[Sysname] interface ethernet 1/1
```

```
[Sysname-Ethernet1/1] vrrp vrid 1 virtual-ip 10.1.1.1
```

```
[Sysname-Ethernet1/1] vrrp vrid 1 priority 150
```

Related commands

display vrrp

vrrp vrid timer advertise

Use **vrrp vrid timer advertise** to configure the Adver_Timer of the specified VRRP group.

Use **undo vrrp vrid timer advertise** to restore the default.

Syntax

vrrp vrid *virtual-router-id* **timer advertise** *adver-interval*

undo vrrp vrid *virtual-router-id* **timer advertise**

Default

The Adver_Timer is 1 second.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

adver-interval: Specifies the interval at which the master in the specified VRRP group sends VRRP advertisements, in the range of 1 to 40 seconds.

Usage guidelines

The Adver_Timer controls the interval at which the master sends VRRP packets.

Before executing the command, create a VRRP group on an interface and configure the virtual IP address of the VRRP group.

Routers in the same VRRP group must use the same Adver_Timer setting.

Examples

Set the master in VRRP group 1 to send VRRP advertisements at intervals of 5 seconds.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] vrrp vrid 1 virtual-ip 10.1.1.1
[Sysname-Ethernet1/1] vrrp vrid 1 timer advertise 5
```

Related commands

display vrrp

vrrp vrid track

Use **vrrp vrid track** to associate a VRRP group with a track entry and control master switchover or AVF switchover in the VRRP group in response to changes (such as uplink state changes) detected by the track entry.

Use **undo vrrp vrid track** to remove the association between a VRRP group and a track entry. If no track entry is specified, the association between the VRRP group and any track entry is removed.

Syntax

vrrp vrid *virtual-router-id* **track** *track-entry-number* [**forwarder-switchover** **member-ip** *ip-address* | **reduced** *priority-reduced* | **switchover**]

undo vrrp vrid *virtual-router-id* **track** [*track-entry-number*]

Default

A VRRP group is not associated with any track entry.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group number in the range of 1 to 255.

track *track-entry-number*: Specifies a track entry by its number in the range of 1 to 1024.

forwarder-switchover member-ip *ip-address*: Enables the LVF on the router to take over the role of the AVF at the specified IP address immediately after the specified track entry changes to the negative state. You can use the **display vrrp verbose** command to view the IP addresses of VFs.

reduced *priority-reduced*: Reduces the priority of the router in the VRRP group by a specific value when the state of the specified track entry changes to the negative state. The value range for the *priority-reduced* argument is 1 to 255.

switchover: Enables the router in backup state to take over as the master immediately after the specified track entry changes to the negative state.

Usage guidelines

When the associated track entry changes to the negative state, the priority of the router in the VRRP group decreases by a specified value, or the router immediately takes over as the master if it is a backup router, or the LVF on the router immediately takes over the role of the AVF at the specified IP address, depending on your configuration.

If **forwarder-switchover member-ip** *ip-address*, **reduced** *priority-reduced*, and **switchover** are not specified, the priority of the router in the VRRP group decreases by 10 when the track entry changes to **negative**.

When the track entry changes from negative to positive or invalid, the router automatically restores its priority.

You must create the VRRP group and assign a virtual IP address to it before you can associate it with any track entry.

The **vrrp vrid track** command cannot take effect on an IP address owner. If you have configured the command on an IP address owner, the configuration takes effect after the router changes to be a non IP address owner.

You can create a track entry with the **track** command before or after you associate it with a VRRP group. For more information about configuring track entries, see *High Availability Configuration Guide*.

Examples

Associate VRRP group 1 on Ethernet 1/1 with track entry 1 and decrease the priority of the device in the VRRP group by 50 when the state of track entry 1 changes to negative.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] vrrp vrid 1 virtual-ip 10.1.1.1
[Sysname-Ethernet1/1] vrrp vrid 1 track 1 reduced 50
```

Associate VRRP group 1 on Ethernet 1/1 with track entry 2 and enable the LVF to take over the role of the AVF at the IP address of 10.1.1.3 immediately after the specified track entry changes to the negative state.

```
[Sysname-Ethernet1/1] vrrp vrid 1 track 2 forwarder-switchover member-ip 10.1.1.3
```

Related commands

- **display vrrp**
- **vrrp vrid track interface**

vrrp vrid track interface

Use **vrrp vrid track interface** to configure to track the specified interface.

Use **undo vrrp vrid track interface** to disable tracking the specified interface.

Syntax

```
vrrp vrid virtual-router-id track interface interface-type interface-number [ reduced  
priority-reduced ]
```

```
undo vrrp vrid virtual-router-id track [ interface interface-type interface-number ]
```

Default

No interface is tracked.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

interface *interface-type interface-number*: Specifies an interface to be tracked by its type and number.

reduced *priority-reduced*: Specifies the value by which the priority decrements, in the range of 1 to 255. The default is 10.

Usage guidelines

When the uplink interface of a router in a VRRP group fails, usually the VRRP group cannot be aware of the uplink interface failure. If the router is the master of the VRRP group, hosts on the LAN are not able to access external networks because of the uplink failure. This problem can be solved through tracking a specified uplink interface. After you configure to monitor the uplink interface, when the uplink interface is down or removed, the priority of the master is automatically decreased by a specified value, allowing a higher priority router in the VRRP group to become the master.

Before executing the command, create a VRRP group on an interface and configure the virtual IP address of the VRRP group.

If no interface is specified, the **undo vrrp vrid track interface** command removes the association between the VRRP group and any interface.

If you configure an interface to be tracked on a router that is the IP address owner in a VRRP group, the configuration does not take effect. If the router is not the IP address owner in the VRRP group later, the configuration takes effect.

When the status of the tracked interface turns from down or removed to up, the corresponding router automatically restores its priority.

The interface specified in this command can be a Layer 3 Ethernet interface, a VLAN interface, a synchronous/asynchronous serial interface, a POS interface, an MP-group interface, a dialer interface, a BRI interface, or an HDLC link bundle interface. The Layer 2 protocol used by the tracked synchronous/asynchronous serial interfaces can be PPP only, and the tracked synchronous/asynchronous serial interfaces cannot be added to a virtual template or MP-group; the dialer interface should function as the PPPoE client and operate in the permanent online mode; the BRI interface should operate in the dedicated line mode.

Examples

```
# On interface Ethernet 1/1, set the interface to be tracked as Serial 2/0, making the priority of VRRP  
group 1 on interface Ethernet 1/1 decrement by 50 when Serial 2/0 is down or removed.
```

```
<Sysname> system-view
```

```
[Sysname] interface ethernet 1/1
```

```
[Sysname-Ethernet1/1] vrrp vrid 1 virtual-ip 10.1.1.1
```

```
[Sysname-Ethernet1/1] vrrp vrid 1 track interface serial 2/0 reduced 50
```

Related commands

- **display vrrp**
- **vrrp vrid track**

vrrp vrid virtual-ip

Use **vrrp vrid virtual-ip** to create a VRRP group and configure a virtual IP address for it or add another virtual IP address for an existing VRRP group.

Use **undo vrrp vrid virtual-ip** to remove an existing VRRP group or the virtual IP address of the VRRP group.

Syntax

```
vrrp vrid virtual-router-id virtual-ip virtual-address
```

```
undo vrrp vrid virtual-router-id [virtual-ip virtual-address ]
```

Default

No VRRP group is created.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

virtual-address: Specifies a virtual IP address.

Usage guidelines

The system removes a VRRP group after you delete all the virtual IP addresses in it.

The virtual IP address of a VRRP group cannot be 0.0.0.0, 255.255.255.255, loopback address, non A/B/C address and other illegal IP addresses such as 0.0.0.1.

A VRRP group operates correctly only when the configured virtual IP address and the interface IP address belong to the same segment and are legal host addresses. If they are not in the same network segment, or the configured IP address is the network address or network broadcast address of the network segment to which the interface IP address belongs, though you can perform the configuration successfully, the state of the VRRP group is always **Initialize**, which means VRRP does not take effect .

Examples

```
# Create VRRP group 1 and set its virtual IP address to 10.10.10.10.
```

```
<Sysname> system-view
```

```
[Sysname] interface ethernet 1/1
```

```
[Sysname-Ethernet1/1] vrrp vrid 1 virtual-ip 10.10.10.10
```

```
# Add virtual IP address 10.10.10.11 to VRRP group 1.
```

```
[Sysname-Ethernet1/1] vrrp vrid 1 virtual-ip 10.10.10.11
```

Related commands

display vrrp

vrrp vrid weight track

Use **vrrp vrid weight track** to specify the track entry to be monitored by VFs when VRRP operates in load balancing mode. If the status of the monitored track entry changes to **negative**, the weights of all VFs in the VRRP group to which the current router belongs decrease by a specified value.

Use **undo vrrp vrid weight track** to remove the specified track entry.

Syntax

```
vrrp vrid virtual-router-id weight track track-entry-number [ reduced weight-reduced ]
```

```
undo vrrp vrid virtual-router-id weight track [ track-entry-number ]
```

Default

No track entry is specified to be monitored.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

track *track-entry-number*: Specifies a track entry to be monitored by its number in the range of 1 to 1024.

reduced *weight-reduced*: Specifies the value by which the weight decreases, in the range of 1 to 255. The default is 30.

Usage guidelines

The command is effective only when VRRP operates in load balancing mode.

Before executing the command, create a VRRP group on an interface and configure the virtual IP address of the VRRP group.

When the status of the monitored track entry turns from negative to positive or invalid, the corresponding VFs automatically restore their weights.

If the track entry specified in this command does not exist, you can use the **vrrp vrid weight track** command to specify a track entry, and then create the track entry using the **track** command.

The weight of a VF is 255, and the lower limit of failure is 10. When the weight of a VF owner is no less than the lower limit of failure, the priority of the VF owner is always 255. To enable other VFs to take over the role of the VF owner as the AVF when the uplink interface fails, you must set a value larger than 245 for the **reduced** *weight-reduced* option.

For more information about track entries, see *High Availability Configuration Guide*.

Examples

```
# Configure to monitor track entry 1, making the weights of VFs belonging to VRRP group 1 on Ethernet 1/1 decrease by 50 when track entry 1 turns to negative.
```

```
<Sysname> system-view
```

```
[Sysname] interface ethernet 1/1
```

```
[Sysname-Ethernet1/1] vrrp vrid 1 virtual-ip 10.1.1.1
```

```
[Sysname-Ethernet1/1] vrrp vrid 1 weight track 1 reduced 50
```

Related commands

display vrrp

IPv6-based VRRP configuration commands

display vrrp ipv6

Use **display vrrp ipv6** to display the state information of VRRP groups for IPv6.

Syntax

```
display vrrp ipv6 [ verbose ] [ interface interface-type interface-number [ vrid virtual-router-id ] ] [ { begin | exclude | include } regular-expression ]
```

Views

Any view

Default command level

1: Monitor level

Parameters

verbose: Displays detailed state information of VRRP groups.

interface *interface-type interface-number*: Displays VRRP group state information of the specified interface. *interface-type interface-number* specifies an interface by its type and number.

vrid *virtual-router-id*: Displays state information of the specified VRRP group. The *virtual-router-id* argument specifies a VRRP group by its group number in the range of 1 to 255.

]: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, a case-sensitive string of 1 to 256 characters.

Usage guidelines

If you do not specify the **verbose** keyword, only the brief state information of VRRP groups is displayed.

If you specify both an interface and a VRRP group, only the state information of the specified VRRP group on the interface is displayed. If you only specify an interface, the state information of all the VRRP groups on the interface is displayed. If you specify neither, the state information of all the VRRP groups on the router is displayed.

Examples

When VRRP operates in standard mode, display brief information about all VRRP groups on the device.

```
<Sysname> display vrrp ipv6
```

```
IPv6 Standby Information:
```

```
Run Mode      : Standard
```

```
Run Method    : Virtual MAC
```

```
Total number of virtual routers : 1
```

Interface	VRID	State	Run Pri	Adver Timer	Auth Type	Virtual IP
-----------	------	-------	---------	-------------	-----------	------------

```
-----  
Eth1/1          1      Master    140    100    Simple  FE80::1
```

Table 16 Command output (standard mode)

Field	Description
Run Mode	Current VRRP working mode: <ul style="list-style-type: none"> • Standard—Standard mode. • Load Balance—Load balancing mode.
Run Method	Current VRRP running mode: <ul style="list-style-type: none"> • Real MAC—Real MAC mode, which means the virtual IP address of the VRRP group is mapped to the real MAC address of the interface. • Virtual MAC—Virtual MAC mode, which means the virtual IP address of the VRRP group is mapped to the virtual MAC address.
Total number of virtual routers	Number of VRRP groups.
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group.
State	Status of the router in the VRRP group: <ul style="list-style-type: none"> • Master. • Backup. • Initialize.
Run Pri	Running priority of the router, or in other words, the current priority of the router. With VRRP tracking configured, when the state of the monitored interface or track entry changes, the priority of the router changes.
Adver Timer	VRRP advertisement interval in centiseconds.
Auth Type	Authentication type: <ul style="list-style-type: none"> • None—No authentication. • Simple—Simple authentication.
Virtual IP	Virtual IPv6 addresses of the VRRP group.

When VRRP operates in standard mode, display detailed information about all VRRP groups on the router.

```
<Sysname> display vrrp ipv6 verbose
```

```
IPv6 Standby Information:
```

```
Run Mode      : Standard
```

```
Run Method    : Virtual MAC
```

```
Total number of virtual routers : 1
```

```
Interface Ethernet1/1
```

```
VRID          : 1                Adver Timer   : 100
```

```
Admin Status  : Up                State         : Master
```

```
Config Pri    : 150              Running Pri   : 140
```

```
Preempt Mode  : Yes              Delay Time    : 10
```

```
Auth Type     : Simple            Key           : hello
```

```
Virtual IP    : FE80::1
```

```
Virtual MAC   : 0000-5e00-0201
```

```
Master IP     : FE80::2
```

```
VRRP Track Information:
```

```
Track Interface: Eth1/2          State : Down          Pri Reduced : 10
```

```
Track Object   : 1              State : Positive      Pri Reduced : 50
```

Table 17 Command output (standard mode)

Field	Description
Run Mode	Current VRRP working mode: <ul style="list-style-type: none"> • Standard—Standard mode. • Load Balance—Load balancing mode.
Run Method	Current VRRP running mode: <ul style="list-style-type: none"> • Real MAC—Real MAC mode, which means the virtual IP address of the VRRP group is mapped to the real MAC address of the interface. • Virtual MAC—Virtual MAC mode, which means the virtual IP address of the VRRP group is mapped to the virtual MAC address.
Total number of virtual routers	Number of VRRP groups.
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group.
Adver Timer	VRRP advertisement interval in centiseconds.
Admin Status	Administrative state: <ul style="list-style-type: none"> • UP. • DOWN.
State	Status of the router in the VRRP group: <ul style="list-style-type: none"> • Master. • Backup. • Initialize.
Config Pri	Configured priority of the router, or in other words, the priority value specified by using the vrrp ipv6 vrid priority command.
Running Pri	Running priority of the router; the current priority of the router. With VRRP tracking configured, when the state of the monitored interface or track entry changes, the priority of the router changes.
Preempt Mode	Preemptive mode: <ul style="list-style-type: none"> • Yes—The router in the VRRP group operates in preemptive mode. • No—The router in the VRRP group operates in non-preemptive mode.
Delay Time	Preemption delay, in seconds.
Become Master	Time to wait before the router becomes the master. The unit is milliseconds. Only routers in backup mode have such information.
Auth Type	Authentication type: <ul style="list-style-type: none"> • None—No authentication. • Simple—Simple authentication.
Key	Authentication key.
Virtual IP	Virtual IPv6 addresses of the VRRP group.
Virtual MAC	Virtual MAC address that corresponds to the virtual IPv6 address of the VRRP group. It is displayed only when the router is in the state of master.
Master IP	Primary IP address of the interface where the router in the state of master resides.
VRRP Track Information	Information of the tracked interface or track entry. It is displayed only when the vrrp ipv6 vrid track or vrrp ipv6 vrid track interface command is executed.
Track Interface	Interface to be tracked. It is displayed only when the vrrp ipv6 vrid track

Field	Description
	interface command is executed.
Track Object	Track entry to be tracked. It is displayed only when the vrrp ipv6 vrid track command is executed.
State	State of the tracked interface or track entry. State of a tracked interface: <ul style="list-style-type: none"> Up. Down. Removed. State of a track entry: <ul style="list-style-type: none"> Invalid. Negative. Positive. Not existing.
Pri Reduced	Priority value that is reduced when the monitored interface is down or removed, or when the status of the monitored track entry turns to negative . It is displayed only when the vrrp ipv6 vrid track interface or vrrp ipv6 vrid track command is executed.

When VRRP operates in load balancing mode, display brief information about all VRRP groups on the device.

```
<Sysname> display vrrp ipv6
IPv6 Standby Information:
    Run Mode      : Load Balance
    Run Method    : Virtual MAC
Total number of virtual routers : 2
Interface        VRID  State      Run   Address      Active
                  Pri
-----
Eth1/1           1    Master     140   FE80::1      Local
-----
-----
VF 1             VF 1  Active     255   000f-e2ff-4011  Local
```

- On a switch:

Table 18 Command output (load balancing mode)

Field	Description
Run Mode	Current VRRP working mode: <ul style="list-style-type: none"> Standard—Standard mode. Load Balance—Load balancing mode.
Run Method	Current VRRP running mode: <ul style="list-style-type: none"> Real MAC—Real MAC mode, which means the virtual IP address of the VRRP group is mapped to the real MAC address of the interface. Virtual MAC—Virtual MAC mode, which means the virtual IP address of the VRRP group is mapped to the virtual MAC address.
Total number of virtual routers	Number of VRRP groups.
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group <i>number</i> or ID of the VF <i>VF number</i> .
State	<ul style="list-style-type: none"> If VRID is <i>number</i>, this field indicates the status of the router in the VRRP group, including Master, Backup, and Initialize.

Field	Description
	<ul style="list-style-type: none"> If VRID is <i>VF number</i>, this field indicates the status of the VF in the VRRP group, including Active, Listening, and Initialize.
Run Pri	<ul style="list-style-type: none"> If VRID is <i>number</i>, this field indicates the running priority of the router, that is, the current priority of the router. With VRRP tracking configured, when the state of the monitored interface or track entry changes, the priority of the router changes. If VRID is <i>VF number</i>, this field indicates the running priority of the VF. With VF tracking configured, when the state of the monitored track entry changes, the priority of the VF changes.
Address	<ul style="list-style-type: none"> If VRID is <i>number</i>, this field indicates the virtual IP address of the VRRP group. If VRID is <i>VF number</i>, this field indicates the virtual MAC address of the VF.
Active	<ul style="list-style-type: none"> If VRID is <i>number</i>, this field indicates the IP address of the interface of the master. If the current router is the master, it is displayed as local. If VRID is <i>VF number</i>, this field indicates the IP address of the interface of the active virtual forwarder (AVF). If the current VF is the AVF, it is displayed as local.

When VRRP operates in load balancing mode, display detailed information about all VRRP groups on the device.

```
<Sysname> display vrrp ipv6 verbose
IPv6 Standby Information:
  Run Mode       : Load Balance
  Run Method     : Virtual MAC
Total number of virtual routers : 1
Interface Ethernet1/1
  VRID           : 1                Adver Timer   : 100
  Admin Status   : Up              State          : Master
  Config Pri     : 120             Running Pri    : 110
  Preempt Mode   : Yes             Delay Time     : 5
  Auth Type      : None
  Virtual IP     : FE80::10
  Member IP List : FE80::1 (Local, Master)
                  FE80::2 (Backup)
VRRP Track Information:
  Track Interface: Eth1/2          State : Down           Pri Reduced : 10
  Track Object   : 1              State : Positive       Pri Reduced : 50
Forwarder Information: 2 Forwarders 1 Active
  Config Weight  : 255
  Running Weight : 255
Forwarder 01
  State          : Active
  Virtual MAC    : 000f-e2ff-4011 (Owner)
  Owner ID       : 0000-5e01-1101
  Priority        : 255
  Active         : local
Forwarder 02
  State          : Listening
  Virtual MAC    : 000f-e2ff-4012 (Learnt)
  Owner ID       : 0000-5e01-1103
```

```

Priority      : 127
Active       : FE80::2
Forwarder Weight Track Information:
Track Object  : 1                State : Positive        Weight Reduced : 250
Forwarder Switchover Track Information:
Track Object  : 2                State : Positive
Member IP    : FE80::2

```

Table 19 Command output (load balancing mode)

Field	Description
Run Mode	Current VRRP working mode: <ul style="list-style-type: none"> • Standard—Standard mode. • Load Balance—Load balancing mode.
Run Method	Current VRRP running mode: <ul style="list-style-type: none"> • Real MAC—Real MAC mode, which means the virtual IP address of the VRRP group is mapped to the real MAC address of the interface. • Virtual MAC—Virtual MAC mode, which means the virtual IP address of the VRRP group is mapped to the virtual MAC address.
Total number of virtual routers	Number of VRRP groups.
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group.
Adver Timer	VRRP advertisement interval, in centiseconds.
Admin Status	Administrative state: <ul style="list-style-type: none"> • UP. • DOWN.
State	Status of the router in the VRRP group: <ul style="list-style-type: none"> • Master. • Backup. • Initialize.
Config Pri	Configured priority of the router, or in other words, the priority value specified by using the vrrp ipv6 vrid priority command.
Running Pri	Running priority of the router, or in other words, the current priority of the router. With VRRP tracking configured, if the state of the monitored interface or track entry changes, the priority of the router changes.
Preempt Mode	Preemptive mode: <ul style="list-style-type: none"> • Yes—The router in the VRRP group operates in preemptive mode. • No—The router in the VRRP group operates in non-preemptive mode.
Delay Time	Preemption delay, in seconds.
Become Master	Time to wait before the router becomes the master. The unit is milliseconds. Only routers in backup mode have such information.
Auth Type	Authentication type: <ul style="list-style-type: none"> • None—No authentication. • Simple—Simple authentication.
Key	Authentication key.
Virtual IP	Virtual IP addresses of the VRRP group.

Field	Description
Member IP List	List of IP addresses of members in the VRRP group. This address list is displayed only when the VRRP group operates in load balancing mode. <ul style="list-style-type: none"> • Local—IP address of the local device. • Master—IP address of the master. • Backup—IP address of the backup.
VRRP Track Information	Information of the tracked interface or object.
Track Interface	Interface to be tracked. It is displayed only when the vrrp ipv6 vrid track interface command is executed.
Track Object	Track entry to be tracked. It is displayed only when the vrrp ipv6 vrid track command is executed.
State	State of the tracked interface or track entry. State of a tracked interface: <ul style="list-style-type: none"> • Up. • Down. • Removed. State of a track entry: <ul style="list-style-type: none"> • Invalid. • Negative. • Positive. • Not existing.
Pri Reduced	Priority value that is reduced when the monitored interface is down or removed, or when the status of the monitored track entry turns to negative . It is displayed only when the vrrp ipv6 vrid track interface command or the vrrp ipv6 vrid track command is executed.
Switchover	Switchover mode. When the status of the monitored track entry turns to negative , the backup immediately switches to the master.
Forwarder Information: 2 Forwarders 1 Active	VF Information: The number of VFs of the router is 2, and the number of AVFs is 1.
Config Weight	Configured weight of the VF, the value is 255.
Running Weight	Running weight of the VF, or in other words, the current weight of the VF. With VF tracking configured, if the state of the monitored track entry changes, the weight of the VF changes.
Forwarder 01	Information about VF 01.
State	State of a VF: <ul style="list-style-type: none"> • Active. • Listening. • Initialize.
Virtual MAC	Virtual MAC address of the VF.
Owner ID	Real MAC address of the interface of the VF owner.
Priority	VF priority.
Active	IP address of the interface of the AVF. If the current VF is the AVF, it is displayed as local .
Forwarder Weight Track Configuration	Weight track configuration of the VF. It is displayed only when the vrrp ipv6 vrid weight track command is executed.
Track Object	Weight track entry. It is displayed only when the vrrp ipv6 vrid weight track command is executed.

Field	Description
State	State of a track entry: <ul style="list-style-type: none"> • Invalid. • Negative. • Positive. • Not existing.
Weight Reduced	Weight value that is reduced when the status of the monitored track entry turns to negative . It is displayed only when the vrpp ipv6 vrid weight track command is executed.
Forwarder Switchover Track Information	VF switchover information. The information is displayed only after the vrpp ipv6 vrid track forwarder-switchover command is executed.
Track Object	Track entry monitored by the VF switchover feature. The information is displayed only after the vrpp ipv6 vrid track forwarder-switchover command is executed.
State	State of a track entry: <ul style="list-style-type: none"> • Invalid. • Negative. • Positive. • Not existing.
Member IP	IP address of the member device. If the status of the monitored track entry turns to negative and the local device has an LVF whose corresponding AVF is on the specified member device, the LVF immediately becomes active.

display vrpp ipv6 statistics

Use **display vrpp ipv6 statistics** to display statistics about VRRP groups for IPv6.

Syntax

```
display vrpp ipv6 statistics [ interface interface-type interface-number [ vrid virtual-router-id ] ] [ { begin | exclude | include } regular-expression ]
```

Views

Any view

Default command level

1: Monitor level

Parameters

interface *interface-type interface-number*: Displays VRRP group statistics information of the specified interface. *interface-type interface-number* specifies an interface by its type and number.

vrid *virtual-router-id*: Displays statistics information of the specified VRRP group. The *virtual-router-id* argument specifies a VRRP group by its group number in the range of 1 to 255.

]: Filters command output by specifying a regular expression. For more information about regular expressions, see *Fundamentals Configuration Guide*.

begin: Displays the first line that matches the specified regular expression and all lines that follow.

exclude: Displays all lines that do not match the specified regular expression.

include: Displays all lines that match the specified regular expression.

regular-expression: Specifies a regular expression, a case-sensitive string of 1 to 256 characters.

Usage guidelines

If you specify both an interface and a VRRP group, only the statistics about the specified VRRP group on the interface are displayed. If you only specify an interface, the statistics about all the VRRP groups on the interface are displayed. If you specify neither, the statistics about all the VRRP groups on the router are displayed.

To clear the VRRP group statistics, use the **reset vrrp ipv6 statistics** command.

Examples

When VRRP operates in standard mode, display the statistics about all VRRP groups.

```
<Sysname> display vrrp ipv6 statistics
Interface                : Ethernet1/1
VRID                     : 1
Checksum Errors          : 0          Version Errors              : 0
Invalid Type Pkts Rcvd   : 0          Advertisement Interval Errors : 0
Hop Limit Errors         : 0          Auth Failures                : 0
Invalid Auth Type        : 0          Auth Type Mismatch           : 0
Packet Length Errors     : 0          Address List Errors          : 0
Become Master            : 1          Priority Zero Pkts Rcvd      : 0
Adver Rcvd               : 0          Priority Zero Pkts Sent      : 0
Adver Sent                : 425
Global statistics
Checksum Errors          : 0
Version Errors           : 0
VRID Errors              : 0
```

When VRRP operates in load balancing mode, display the statistics about all VRRP groups.

```
<Sysname> display vrrp ipv6 statistics
Interface                : Ethernet1/1
VRID                     : 1
Checksum Errors          : 0          Version Errors              : 0
Invalid Type Pkts Rcvd   : 0          Advertisement Interval Errors : 0
Hop Limit Errors         : 0          Auth Failures                : 0
Invalid Auth Type        : 0          Auth Type Mismatch           : 0
Packet Length Errors     : 0          Address List Errors          : 0
Become Master            : 2          Redirect Timer Expires       : 0
Become AVF               : 1          Time-out Timer Expires       : 0
Adver Rcvd               : 0          Request Rcvd                 : 0
Adver Sent                : 1952       Request Sent                  : 2
Reply Rcvd               : 0          Release Rcvd                  : 0
Reply Sent                : 0          Release Sent                  : 0
Priority Zero Pkts Rcvd   : 0          VF Priority Zero Pkts Rcvd   : 0
Priority Zero Pkts Sent   : 1          VF Priority Zero Pkts Sent   : 0
Status Option Errors     : 0
Global statistics
Checksum Errors          : 0
Version Errors           : 0
VRID Errors              : 0
```

Table 20 Command output (standard mode)

Field	Description
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group.
Checksum Errors	Number of packets with checksum errors.
Version Errors	Number of packets with version errors.
Invalid Type Pkts Rcvd	Number of packets with incorrect packet type.
Advertisement Interval Errors	Number of packets with advertisement interval errors.
Hop Limit Errors	Number of packets with hop limit errors.
Auth Failures	Number of packets with authentication failures.
Invalid Auth Type	Number of packets with authentication failures due to invalid authentication types.
Auth Type Mismatch	Number of packets with authentication failures due to mismatching authentication types.
Packet Length Errors	Number of packets with VRRP packet length errors.
Address List Errors	Number of packets with virtual IP address list errors.
Become Master	Number of times that the router worked as the master.
Priority Zero Pkts Rcvd	Number of received advertisements with the priority of 0.
Adver Rcvd	Number of received advertisements.
Priority Zero Pkts Sent	Number of advertisements with the priority of 0 sent.
Adver Sent	Number of advertisements sent.
Global statistics	Global statistics about all VRRP groups.
Checksum Errors	Total number of packets with checksum errors.
Version Errors	Total number of packets with version errors.
VRID Errors	Total number of packets with VRID errors.

Table 21 Command output (load balancing mode)

Field	Description
Interface	Interface to which the VRRP group belongs.
VRID	ID of the VRRP group.
Checksum Errors	Number of packets with checksum errors.
Version Errors	Number of packets with version errors.
Invalid Type Pkts Rcvd	Number of packets with incorrect packet type.
Advertisement Interval Errors	Number of packets with advertisement interval errors.
Hop Limit Errors	Number of packets with hop limit errors.
Auth Failures	Number of packets with authentication failures.
Invalid Auth Type	Number of packets with authentication failures due to invalid authentication types.
Auth Type Mismatch	Number of packets with authentication failures due to mismatching authentication types.

Field	Description
Packet Length Errors	Number of packets with VRRP packet length errors.
Address List Errors	Number of packets with virtual IP address list errors.
Become Master	Number of times that the router worked as the master.
Redirect Timer Expires	Number of times that the redirect timer expires.
Become AVF	Number of times that the VF worked as the AVF.
Time-out Timer Expires	Number of times that the timeout timer expires.
Adver Rcvd	Number of received advertisements.
Request Rcvd	Number of received requests.
Adver Sent	Number of advertisements sent.
Request Sent	Number of requests sent.
Reply Rcvd	Number of received replies.
Release Rcvd	Number of received releases.
Reply Sent	Number of replies sent.
Release Sent	Number of releases sent.
Priority Zero Pkts Rcvd	Number of received advertisements with the priority of 0.
VF Priority Zero Pkts Rcvd	Number of received advertisements with the VF priority of 0.
Priority Zero Pkts Sent	Number of sent advertisements with the priority of 0.
VF Priority Zero Pkts Sent	Number of sent advertisements with the VF priority of 0.
Status Option Errors	Number of times that the status option errors.
Global statistics	Global statistics about all VRRP groups.
Checksum Errors	Total number of packets with checksum errors.
Version Errors	Total number of packets with version errors.
VRID Errors	Total number of packets with VRID errors.

Related commands

reset vrrp ipv6 statistics

reset vrrp ipv6 statistics

Use **reset vrrp ipv6 statistics** to clear VRRP group statistics.

Syntax

reset vrrp ipv6 statistics [**interface** *interface-type interface-number* [**vrid** *virtual-router-id*]]

Views

User view

Default command level

1: Monitor level

Parameters

interface *interface-type interface-number*. Clears VRRP group statistics of a specific interface. *interface-type interface-number* specifies an interface by its type and number.

vrid *virtual-router-id*: Clears VRRP statistics of the specified VRRP group. The *virtual-router-id* argument specifies a VRRP group by its group number in the range of 1 to 255.

Usage guidelines

If you specify both an interface and a VRRP group, the statistics about the specified VRRP group on the specified interface are cleared. If you specify only an interface, the statistics about all the VRRP groups on the interface are cleared. If you specify neither, the statistics about all the VRRP groups on the router are cleared.

Examples

```
# Clear the statistics about all the VRRP groups on the router.  
<Sysname> reset vrrp ipv6 statistics
```

Related commands

display vrrp ipv6 statistics

vrrp ipv6 method

Use **vrrp ipv6 method** to specify the type of the MAC addresses mapped to the virtual IPv6 addresses of the VRRP groups.

Use **undo vrrp ipv6 method** to restore the default.

Syntax

```
vrrp ipv6 method { real-mac | virtual-mac }  
undo vrrp ipv6 method
```

Default

The virtual MAC addresses are mapped to the virtual IP addresses of the VRRP groups.

Views

System view

Default command level

2: System level

Parameters

real-mac: Maps the real MAC address of the interface to the virtual IPv6 addresses of VRRP groups.

virtual-mac: Maps the virtual MAC addresses to the virtual IPv6 addresses of VRRP groups.

Usage guidelines

Specify the type of the MAC addresses mapped to the virtual IPv6 addresses before creating a VRRP group. Otherwise, you cannot change the type of the MAC address by using this command.

When VRRP operates in load balancing mode, a virtual IPv6 address is always mapped to a virtual MAC address regardless of which type of the MAC addresses to be mapped to the virtual IP addresses is specified.

Examples

```
# Map the virtual IPv6 address of the current VRRP group to the real MAC address of the interface.  
<Sysname> system-view  
[Sysname] vrrp ipv6 method real-mac
```

Related commands

display vrrp ipv6

vrrp ipv6 vrid authentication-mode

Use **vrrp ipv6 vrid authentication-mode** to configure authentication mode and authentication key for the VRRP groups to send and receive VRRP packets.

Use **undo vrrp ipv6 vrid authentication-mode** to restore the default.

Syntax

```
vrrp ipv6 vrid virtual-router-id authentication-mode simple [ cipher ] key  
undo vrrp ipv6 vrid virtual-router-id authentication-mode
```

Default

Authentication is disabled.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

simple: Specifies the simple authentication mode.

cipher: Sets a ciphertext authentication key.

key: Sets the authentication key. This argument is case sensitive. If **cipher** is not specified, it must be a plaintext string of 1 to 8 characters. If **cipher** is specified, it must be a ciphertext string of 1 to 41 characters.

Usage guidelines

For security purposes, all keys, including keys configured in plain text, are saved in cipher text.

Before executing the command, create a VRRP group on an interface and configure the virtual IP address of the VRRP group.

You might configure different authentication types and authentication keys for the VRRP groups on an interface. However, the members of the same VRRP group must use the same authentication mode and authentication key.

Examples

```
# Set the authentication mode to simple and authentication key to Sysname for VRRP group 10 on interface Ethernet 1/1 to send and receive VRRP packets.
```

```
<Sysname> system-view  
[Sysname] interface ethernet 1/1  
[Sysname-Ethernet1/1] vrrp ipv6 vrid 10 virtual-ip fe80::2 link-local  
[Sysname-Ethernet1/1] vrrp ipv6 vrid 10 authentication-mode simple Sysname
```

Related commands

```
display vrrp ipv6
```

vrrp ipv6 vrid preempt-mode

Use **vrrp ipv6 vrid preempt-mode** to configure preemption on the router and configure its preemption delay in a specific VRRP group.

Use **undo vrrp ipv6 vrid preempt-mode** to disable preemption on the router in a specific VRRP group. As a result, the router operates in non-preemptive mode.

Use **undo vrrp ipv6 vrid preempt-mode timer delay** to restore the default preemption delay.

Syntax

vrrp ipv6 vrid *virtual-router-id* **preempt-mode** [**timer delay** *delay-value*]

undo vrrp ipv6 vrid *virtual-router-id* **preempt-mode** [**timer delay**]

Default

The router operates in preemptive mode and the preemption delay is 0 seconds.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a virtual router ID or VRRP group number in the range of 1 to 255.

timer delay *delay-value*: Sets preemption delay in the range of 0 to 255 seconds. The default is 0 seconds.

Usage guidelines

If you set the router in the VRRP group to operate in non-preemptive mode, the delay period automatically changes to 0 seconds.

To avoid frequent member state changes in a VRRP group and make the backups have enough time to collect information (such as routing information), each backup waits for a period of time (the preemption delay time) after it receives an advertisement with the priority lower than the local priority, then sends VRRP advertisements to start a new master election in the VRRP group and becomes the master.

Before executing the command, create a VRRP group on an interface and configure the virtual IPv6 address of the VRRP group.

Examples

```
# Enable preemption on the device in VRRP group 80 and set the preemption delay to 5 seconds.
```

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] vrrp ipv6 vrid 10 virtual-ip fe80::2 link-local
[Sysname-Ethernet1/1] vrrp ipv6 vrid 10 preempt-mode timer delay 5
```

Related commands

display vrrp ipv6

vrrp ipv6 vrid priority

Use **vrrp ipv6 vrid priority** to configure the priority of the router in the specified VRRP group.

Use **undo vrrp ipv6 vrid priority** to restore the default.

Syntax

vrrp ipv6 vrid *virtual-router-id* **priority** *priority-value*

undo vrrp ipv6 vrid *virtual-router-id* **priority**

Default

The priority of a router in a VRRP group is 100.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

priority-value: Specifies the priority value of the router in the specified VRRP group, in the range of 1 to 254. A higher number indicates a higher priority.

Usage guidelines

Before executing the command, create a VRRP group on an interface and configure the virtual IPv6 address of the VRRP group.

The role that a router plays in a VRRP group depends on its priority. A higher priority means that the router is more likely to become the master. Priority 0 is reserved for special use and 255 for the IP address owner.

If the router is the IP address owner, its priority is always 255. Therefore, it remains as the master as long as it is functioning correctly.

Examples

```
# Set the priority of the router in VRRP group 1 to 150.
```

```
<Sysname> system-view
```

```
[Sysname] interface ethernet 1/1
```

```
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 virtual-ip fe80::2 link-local
```

```
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 priority 150
```

Related commands

display vrrp ipv6

vrrp ipv6 vrid timer advertise

Use **vrrp ipv6 vrid timer advertise** to configure the Adver_Timer of the specified VRRP group.

Use **undo vrrp ipv6 vrid timer advertise** to restore the default.

Syntax

vrrp ipv6 vrid *virtual-router-id* **timer advertise** *adver-interval*

undo vrrp ipv6 vrid *virtual-router-id* **timer advertise**

Default

The Adver_Timer is 100 centiseconds.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

adver-interval: Specifies the interval at which the master in the specified VRRP group sends VRRP advertisements, in the range of 100 to 4095 centiseconds.

Usage guidelines

The Adver_Timer controls the interval at which the master sends VRRP packets.

Before executing the command, create a VRRP group on an interface and configure the virtual IPv6 address of the VRRP group.

Routers in the same VRRP group must use the same Adver_Timer setting.

Examples

Set the master in VRRP group 1 to send VRRP advertisements at intervals of 500 centiseconds.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 virtual-ip fe80::2 link-local
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 timer advertise 500
```

Related commands

display vrrp ipv6

vrrp ipv6 vrid track

Use **vrrp ipv6 vrid track** to associate an IPv6 VRRP group with a track entry and control master switchover or AVF switchover in the VRRP group in response to changes (such as uplink state changes) detected by the track entry.

Use **undo vrrp ipv6 vrid track** to remove the association between an IPv6 VRRP group and a track entry. If no track entry is specified, the association between the VRRP group and any track entry is removed.

Syntax

vrrp ipv6 vrid *virtual-router-id* **track** *track-entry-number* [**forwarder-switchover** **member-ip** *ipv6-address* | **reduced** *priority-reduced* | **switchover**]

undo vrrp ipv6 vrid *virtual-router-id* **track** [*track-entry-number*]

Default

An IPv6 VRRP group is not associated with any track entry.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

track *track-entry-number*: Specifies a track entry by its number in the range of 1 to 1024.

forwarder-switchover member-ip *ipv6-address*: Enables the LVF on the router to take over the role of the AVF at the specified IPv6 address immediately after the specified track entry changes to the negative state. You can use the **display vrrp verbose** command to view the IPv6 addresses of VFs.

reduced *priority-reduced*: Reduces the priority of the router in the VRRP group by a specific value when the state of the specified track entry changes to the negative state. The value range for the *priority-reduced* argument is 1 to 255.

switchover: Enables the router in backup state to take over as the master immediately after the specified track entry changes to the negative state.

Usage guidelines

When the associated track entry changes to the negative state, the priority of the router in the VRRP group decreases by a specified value, or the router immediately takes over as the master if it is a backup router, or the LVF on the router immediately takes over the role of the AVF at the specified IPv6 address, depending on your configuration.

If **forwarder-switchover member-ip** *ipv6-address*, **reduced** *priority-reduced*, and **switchover** are not specified, the priority of the router in the VRRP group decreases by 10 when the track entry changes to **negative**.

When the track entry changes from negative to positive or invalid, the router automatically restores its priority.

You must create the VRRP group and assign a virtual IP address to it before you can associate it with any track entry.

The **vrrp ipv6 vrid track** command cannot take effect on an IP address owner. If you have configured the command on an IP address owner, the configuration takes effect after the router changes to be a non IP address owner.

You can create a track entry with the **track** command before or after you associate it with an IPv6 VRRP group. For more information about configuring track entries, see *High Availability Configuration Guide*.

Examples

Associate IPv6 VRRP group 1 on Ethernet 1/1 with track entry 1 and decrease the priority of the device in the VRRP group by 50 when the state of track entry 1 changes to negative.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 virtual-ip fe80::2 link-local
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 track 1 reduced 50
```

Associate VRRP group 1 on Ethernet 1/1 with track entry 2 and enable the LVF on the device to take over the role of the AVF at the IP address of FE80::10 immediately after the specified track entry changes to the negative state.

```
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 track 2 forwarder-switchover member-ip fe80::10
```

Related commands

- **display vrrp ipv6**
- **vrrp ipv6 vrid track interface**

vrrp ipv6 vrid track interface

Use **vrrp ipv6 vrid track interface** to configure to track the specified interface.

Use **undo vrrp ipv6 vrid track interface** to disable tracking the specified interface.

Syntax

```
vrrp ipv6 vrid virtual-router-id track interface interface-type interface-number [ reduced priority-reduced ]
```

```
undo vrrp ipv6 vrid virtual-router-id track [ interface interface-type interface-number ]
```

Default

No interface is being tracked.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

interface *interface-type interface-number*: Specifies an interface by its type and number.

reduced priority-reduced: Specifies the value by which the priority decrements, in the range of 1 to 255. The default is 10.

Usage guidelines

When the uplink interface of a router in a VRRP group fails, the VRRP group usually cannot be aware of the uplink interface failure. If the router is the master of the VRRP group, hosts on the LAN are not able to access external networks because of the uplink failure. This problem can be solved by tracking a specified uplink interface. When the uplink interface is down or removed, the priority of the master is automatically decreased by a specified value, allowing a higher priority router in the VRRP group to become the master.

Before executing the command, create a VRRP group on an interface and configure the virtual IPv6 address of the VRRP group.

If no interface is specified, the **undo vrrp ipv6 vrid track interface** command removes the association between the VRRP group and any interface.

If you configure an interface to be tracked on a router that is the IP address owner in a VRRP group, the configuration does not take effect. If the router is not the IP address owner in the VRRP group later, the configuration takes effect.

When the status of the tracked interface turns from down or removed to up, the corresponding router restores its priority automatically.

The interface specified in this command can be a Layer 3 Ethernet interface, a VLAN interface, a synchronous/asynchronous serial interface, a POS interface, an MP-group interface, or an HDLC link bundle interface. The layer 2 protocol used by the tracked synchronous/asynchronous serial interfaces can only be PPP protocol, and the tracked synchronous/asynchronous serial interfaces cannot be added to a virtual template or MP-group.

Examples

On interface Ethernet 1/1, set the interface to be tracked to Serial 2/0, making the priority of VRRP group 1 on interface Ethernet 1/1 decrement by 50 when Serial 2/0 is down or removed.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 virtual-ip fe80::2 link-local
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 track interface serial 2/0 reduced 50
```

Related commands

- **display vrrp ipv6**
- **vrrp ipv6 vrid track**

vrrp ipv6 vrid virtual-ip

Use **vrrp ipv6 vrid virtual-ip** to create a VRRP group and configure a virtual IPv6 address for it or add another virtual IPv6 address for an existing VRRP group.

Use **undo vrrp ipv6 vrid virtual-ip** to remove an existing VRRP group or the virtual IPv6 address of the VRRP group.

Syntax

```
vrp ipv6 vrid virtual-router-id virtual-ip virtual-address [ link-local ]  
undo vrrp ipv6 vrid virtual-router-id [ virtual-ip virtual-address [ link-local ] ]
```

Default

No VRRP group is created.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

virtual-address: Specifies a virtual IPv6 address.

link-local: Indicates that the virtual IPv6 address of the VRRP group is a link local address.

Usage guidelines

The first virtual IPv6 address assigned to a VRRP group must be a link local address and only one such address is allowed in a VRRP group.

After you remove all virtual IPv6 addresses, the VRRP group is automatically removed. The first address assigned to the group must be removed the last.

Examples

```
# Create VRRP group 1, and configure its virtual IPv6 address as fe80::10.  
<Sysname> system-view  
[Sysname] interface ethernet 1/1  
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 virtual-ip fe80::10 link-local  
# Configure the virtual IPv6 address of VRRP group 1 as 1::10.  
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 virtual-ip 1::10
```

Related commands

```
display vrrp ipv6
```

vrrp ipv6 vrid weight track

Use **vrrp ipv6 vrid weight track** to specify the track entry to be monitored by VFs when VRRP operates in the load balancing mode. If the status of the monitored track entry changes to **negative**, the weights of the all VFs in the VRRP group to which the current router belongs decrease by a specified value.

Use **undo vrrp ipv6 vrid weight track** to remove the specified track entry.

Syntax

```
vrrp ipv6 vrid virtual-router-id weight track track-entry-number [ reduced weight-reduced ]  
undo vrrp ipv6 vrid virtual-router-id weight track [ track-entry-number ]
```

Default

No track entry is specified to be monitored.

Default

The weight of a VF is 255, and its lower limit of failure is 10.

Views

Interface view

Default command level

2: System level

Parameters

virtual-router-id: Specifies a VRRP group by its number in the range of 1 to 255.

track track-entry-number: Specifies a track entry to be monitored by its number. The *track-entry-number* argument ranges from 1 to 1024.

reduced weight-reduced: Specifies the value by which the weight decreases. The *priority-reduced* argument ranges from 1 to 255 and defaults to 30.

Usage guidelines

The command is effective only when VRRP operates in load balancing mode.

Before executing the command, create a VRRP group on an interface and configure the virtual IPv6 address of the VRRP group.

When the status of the monitored track entry turns from negative to positive or invalid, the corresponding VFs automatically restore their weights.

The track entry specified in this command can be nonexistent. You can use the **vrrp ipv6 vrid weight track** command to specify a track entry, and then create the track entry with the **track** command.

If the weight of a VF owner is higher than or equal to the lower limit of failure, the priority of the VF owner is always 255 and does not change with the weight value. Therefore, when an uplink fails, another VF takes over the VF owner and becomes the AVF only when the weight of the VF owner decreases by a correctly specified value and becomes lower than the lower limit of failure, which means the weight of the VF owner decreases by more than 245.

For more information about track entries, see *High Availability Configuration Guide*.

Examples

Configure to monitor track entry 1, making the weights of VFs that belong to VRRP group 1 on Ethernet 1/1 decrease by 50 when track entry 1 turns to negative.

```
<Sysname> system-view
[Sysname] interface ethernet 1/1
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 virtual-ip fe80::2 link-local
[Sysname-Ethernet1/1] vrrp ipv6 vrid 1 weight track 1 reduced 50
```

Related commands

display vrrp ipv6

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