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Chapter 1 VRRP Configuration

1.1 VRRP Overview

Virtual router redundancy protocol (VRRP) is a fault-tolerant protocol.

As shown in Figure 1-1, in general,

- A default route (for example, the next hop address of the default route is 10.100.10.1, as shown in the following figure) is configured for every host on a network.
- The packets destined to the external network segments and sourced from these hosts go through the default routes to the Layer 3 Switch, implementing communication between these hosts and the external network.
- If Switch fails, all the hosts on this segment taking Switch as the next-hop through the default routes are cut off from the external network.

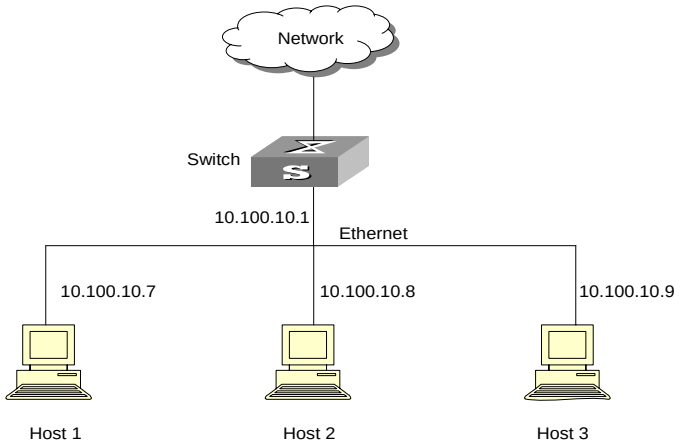

Figure 1-1 LAN Networking

VRRP, which is designed for LANs with multicast and broadcast capabilities (such as Ethernet) settles the problem caused by switch failures.

VRRP combines a group of LAN switches, including a master switch and several backup switches, into a virtual router, or a backup group.

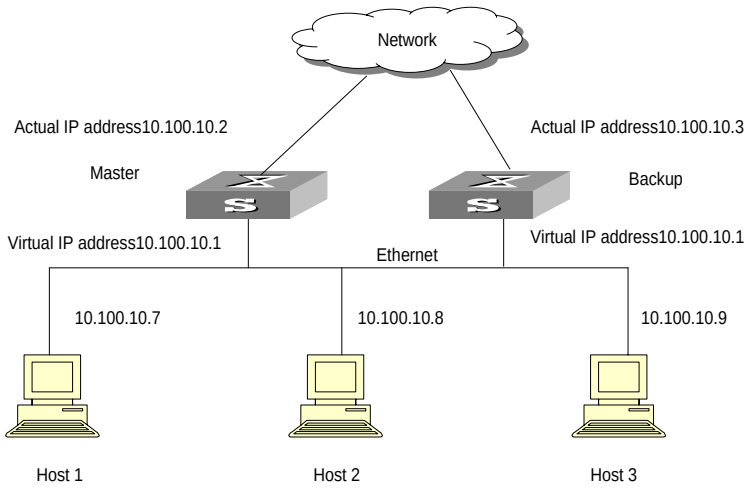

Figure 1-2 Virtual router

The switches in the backup group have the following features:

- This virtual router has its own IP address: 10.100.10.1 (which can be the interface address of a switch within the backup group).
- The switches within the backup group have their own IP addresses (such as 10.100.10.2 for the master switch and 10.100.10.3 for the backup switch).
- Hosts on the LAN only know the IP address of this virtual router, that is, 10.100.10.1, but not the specific IP addresses 10.100.10.2 of the master switch and 10.100.10.3 of the backup switch.
- Hosts in the LAN use the IP address of the virtual router (that is, 10.100.10.1) as their default next-hop IP addresses.

Therefore, hosts within the network will communicate with the other networks through this virtual router.

If the master switch in the backup group goes down, the backup switch with the highest priority will function as the new master switch to guarantee normal communication between the hosts and the external networks. This ensures the communications between the hosts and the external networks.

1.1.1 Virtual Router Overview

After you enable VRRP on the switches of a backup group, a virtual router is formed. You can perform related configuration on the virtual router.

I. Configuring a virtual router IP address

The IP address of the virtual router can be an unassigned IP address of the network segment where the backup group is located or the interface IP address of a member switch in the backup group. The virtual router IP address has the following features:

- You can specify the virtual router IP address as the IP address used by a member switch in the backup group. In this case, the switch is called an IP address owner.

- A backup group is established if it is assigned an IP address for the first time. If you then add other IP addresses to the backup group, the IP addresses are added to the virtual router IP address list of the backup group.
- The virtual router IP addresses and the real IP addresses used by the member switches in the backup group must belong to the same network segment. If they are not in the same network segment, the backup group will be in initial state.
- A backup group is removed if its last virtual router IP address is removed from the backup group. If a backup group is removed, all its configurations get ruined.

According to the standard VRRP, you will fail to use the **ping** command to ping the IP address of a virtual router. So the hosts connected to a switch in a backup group cannot judge with **ping** command whether an IP address is used by the backup group. In this case, if the IP address of a host is also used by the virtual router, all packets destined for the network segment will be forwarded to the host.

Before enabling VRRP feature on an S5600 series switch, you can enable the switches in a backup group to respond the **ping** operations destined for the virtual router IP addresses. Therefore the above incident can be avoided. If VRRP is already enabled, the system does not support this configuration.

II. Mapping Virtual IP Addresses to MAC Addresses

You can map MAC addresses to virtual router IP addresses as needed. The MAC address can be a virtual MAC address or the real MAC address of a Layer 3 switch routing interface.

You need to map the IP addresses of the backup group to the MAC addresses before enabling VRRP feature on an S5600 series switch. If VRRP is already enabled, the system does not support this configuration.

By default, virtual router IP addresses are mapped to the virtual MAC address of a backup group.

Note:

- Due to the chips installed, you can configure only one backup group on a VLAN interface of some switches when mapping the virtual IP addresses to the virtual MAC addresses.
- Due to the chips installed, you can configure up to 14 backup groups on a VLAN interface of some switches if you map the virtual IP addresses to the real MAC address of a switch.
- You can configure on some switches 14 backup groups under both of the above mentioned circumstances.

1.1.2 Introduction to Backup Group

VRRP can group switches in a LAN into a virtual router, which is also known as a backup group.

You can perform the following configuration on an S5600 series switch that belongs to a backup group.

- Configuring switch priority
- Configuring preemptive mode for a switch in a backup group
- Configuring authentication type and authentication key for a switch in a backup group
- Configuring VRRP timer
- Configuring the VLAN interfaces to be tracked for a backup group

I. Configuring switch priority

The status of each switch in a backup group is determined by its priority. The master switch in a backup group is the one currently with the highest priority.

Switch priority ranges from 0 to 255 (a larger number indicates a higher switch priority) and defaults to 100. Note that only 1 through 254 are available to users. Switch priority of 255 is reserved for IP address owners.

Note:

The switch priority of an IP address owner is fixed to 255.

II. Configuring preemptive mode for a switch in a backup group

As long as a switch in the backup group becomes the master switch, other switches, even if they are configured with a higher priority later, do not preempt the master switch unless they operate in preemptive mode. The switch operating in preemptive mode will become the master switch when it finds its priority is higher than that of the current master switch, and the former master switch becomes a backup switch accordingly.

You can configure an S5600 series switch to operate in preemptive mode. You can also set the delay period. A backup switch waits for a period of time (the delay period) before becoming a master switch. Setting a delay period aims at:

- In an unstable network, backup switches in a backup group possibly cannot receive packets from the master in time due to network congestions even if the master operates properly. This causes the master of the backup group being determined frequently.
- With the configuration of delay period, the backup switch will wait for a while if it does not receive packets from the master switch in time. The master is

redetermined only after the backup switches do not receive packets from the master switch after the specified delay time.

III. Configuring authentication type and authentication key for a switch in a backup group

VRRP provides following authentication types:

- **simple**: Simple character authentication
- **md5**: MD5 authentication

In a network under possible security threat, the authentication type can be set to **simple**. Then the switch adds the authentication key into the VRRP packets before transmitting them. The receiver will compare the authentication key of the packet with the locally configured one. If they are the same, the packet will be taken as a true and legal one. Otherwise it will be regarded as an illegal packet and be discarded. In this case, a simple authentication key should not exceed eight characters.

In a vulnerable network, the authentication type can be set to **md5**. The switch will use the authentication type and MD5 algorithm provided by the Authentication Header to authenticate the VRRP packets. In this case, you need to set an authentication key comprising up to eight characters or a 24-character encrypted string.

A switch discards the packets that fail to pass the authentication and then sends trap packets to the network management system.

IV. Configuring VRRP timer

The master switch advertises its normal operation state to the switches within the VRRP backup group by sending VRRP packets once in each specified interval (determined by the *adver-interval* argument). If the backup switches do not receive VRRP packets from the master after a specific period (determined by the *master-down-interval* argument), they consider the master is down and initiates the process to determine the master switch.

You can adjust the frequency in which a master sends VRRP packets by setting the corresponding VRRP timers (that is, the *adver-interval* argument). The *master-down-interval* argument is usually three times of the *adver-interval* argument. Excessive network traffic or differences between the timers of different switches will result in *master-down-interval* timing out and state changing abnormally. Such problems can be solved through prolonging the *adver-interval* and setting delay time. If you configure the preemption delay for a backup switch, the switch preempts the master after the period specified by the preemption delay if it does not receive a VRRP packet from the master for the period specified by the *master-down-interval* argument.

V. Configuring the VLAN interfaces to be tracked for a backup group

The VLAN interface tracking function expands the backup group function. With this function enabled, the backup group function is provided not only when the interface

where the backup group resides fails, but also when other interfaces are unavailable. By executing the related command you can track an interface.

When a tracked VLAN interface goes down, the priority of the switch owning the interface will reduce automatically by a specified value (the *value-reduced* argument). If the switches with their priorities higher than that of the current master switch exist in the backup group, a new master switch will be then determined.

1.2 VRRP Configuration

The following sections describe the VRRP configuration tasks:

- Configuring a Virtual Router IP address
- Configuring Backup Group-Related Parameters

1.2.1 Configuring a Virtual Router IP address

Table 1-1 lists the operations to configure a virtual router IP address (suppose you have correctly configured the relation between the port and VLAN):

Table 1-1 Configure a virtual router IP address

Operation	Command	Description
Enter system view	**system-view**	—
Configure that the virtual IP address can be pinged	**Vrrp ping-enable**	Optional By default, the virtual IP address cannot be pinged.
Map the virtual router IP address to a MAC address	**Vrrp method** { **real-mac** | **virtual-mac** }	Optional By default, the virtual IP address of a backup group is mapped to a virtual router IP address.
Create a VLAN	**vlan** *vlan-id*	—
Quit to system view	**quit**	—
Enter VLAN interface view	**interface vlan-interface** *vlan-id*	—
Configure a virtual router IP address	**vrrp vrid** *virtual-router-ID* **virtual-ip** *virtual-address*	Optional *virtual-router-ID*: VRRP backup group ID. *virtual-address*: Virtual router IP address to be configured.

1.2.2 Configuring Backup Group-Related Parameters

Table 1-2 lists the operations to configure a switch in a backup group.

Table 1-2 Configure backup group-related parameters

Operation	Command	Description
Enter system view	**system-view**	—
Create a VLAN	**vlan** *vlan-id*	—
Quit to system view	**quit**	—
Enter VLAN interface view	**interface vlan-interface** *valn-id*	—
Configure the priority of the backup group	**vrrp vrid** *virtual-router-ID* **priority** *priority*	Optional *virtual-router-ID*: Backup group ID *priority*: Priority value
Configure the preemptive mode and delay period for the backup group	**vrrp vrid** *virtual-router-ID* **preempt-mode** [**timer delay** *delay-value*]	Optional *virtual-router-ID*: Backup group ID *delay-value*: Delay value (in seconds) By default, a backup group operates in the preemptive mode.
Configure the authentication type and authentication key	**vrrp authentication-mode** *authentication-type authentication-key*	Optional The value of the *authentication-type* argument can be: • **simple**: Specifies to authenticate using plain text. • **md5**: Performs AH authentication using MD5 algorithm. *authentication-key*: Authentication key. A string comprising of up to 8 characters or a 24-character encrypted string.
Configure the VRRP timer	**vrrp vrid** *virtual-router-ID* **timer advertise** *adver-interval*	Optional *adver-interval*: Interval (in seconds) for the master switch in a backup group to send VRRP packets.

Operation	Command	Description
Specify the interface to be tracked	**vrrp vrid** *virtual-router-ID* **track vlan-interface** vlan-id [**reduced** *value-reduced*]	Optional *value-reduced*: Value by which the priority is to be reduced.

1.3 Displaying and Clearing VRRP Information

You can execute the **display** command in any view to view VRRP configuration.

Table 1-3 Display and Clear VRRP Information

Operation	Command	Description
Display VRRP state information and statistics information	**display vrrp** [**interface vlan-interface** *vlan-id* | **statistics** [**vlan-interface** *vlan-id*]] [*virtual-router-ID*]	You can execute the **display vrrp** command in any view
Clear VRRP statistics	**reset vrrp statistics** [**vlan-interface** *vlan-id*] [*virtual-router-ID*]	Execute the **reset** command in user view

1.4 VRRP Configuration Example

1.4.1 Single-VRRP Backup Group Configuration Example

I. Network requirements

Host A uses the VRRP virtual router comprising switch A and switch B as its default gateway to visit host B on the Internet.

The information about the VRRP backup group is as follows:

- VRRP backup group ID: 1
- Virtual router IP address: 202.38.160.111
- Master switch: Switch A
- Backup switch: Switch B
- Preemptive mode: enabled

II. Network diagram

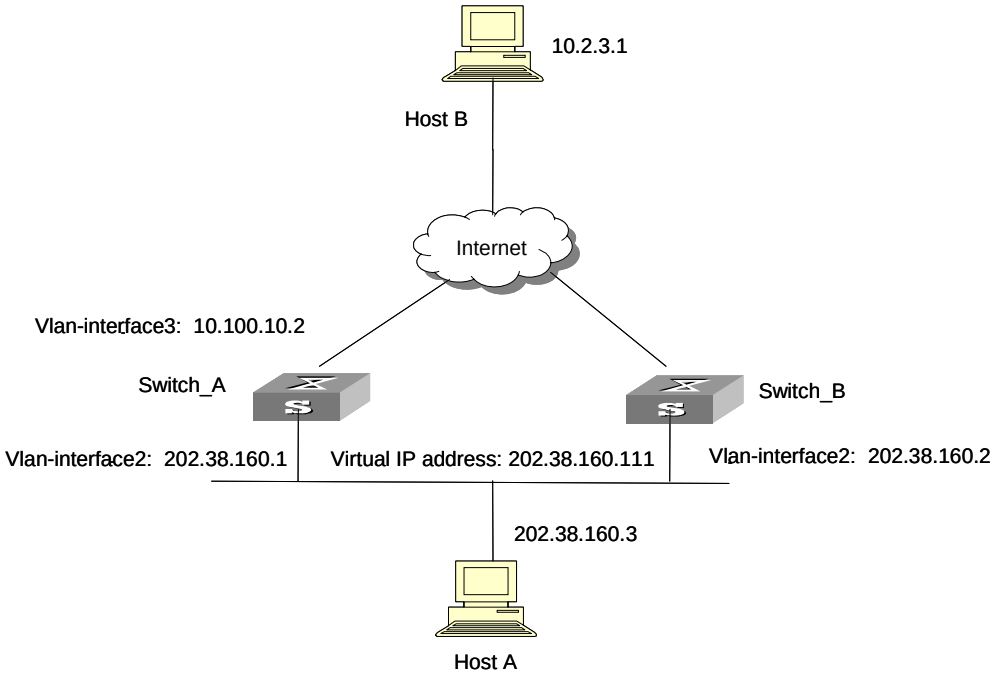

Figure 1-3 Network diagram for single-VRRP backup group configuration

III. Configuration procedure

- Configure Switch A.

Configure VLAN 2.

```
<LSW-A> system-view
System View: return to User View with Ctrl+Z.
[LSW-A] vlan 2
[LSW-A-vlan2] port GigabitEthernet 1/0/6
[LSW-A-vlan2] quit
[LSW-A] interface vlan-interface 2
[LSW-A-Vlan-interface2] ip address 202.38.160.1 255.255.255.0
[LSW-A-Vlan-interface2] quit
```

Configure VRRP.

```
[LSW-A] vrrp ping-enable
[LSW-A] interface vlan 2
[LSW-A-Vlan-interface2] vrrp vrid 1 virtual-ip 202.38.160.111
[LSW-A-Vlan-interface2] vrrp vrid 1 priority 110
[LSW-A-Vlan-interface2] vrrp vrid 1 preempt-mode
```

- Configure Switch B.

Configure VLAN 2.

```
<LSW-B> system-view
```

```
System View: return to User View with Ctrl+Z.
[LSW-B] vlan 2
[LSW-B-Vlan2] port GigabitEthernet 1/0/5
[LSW-B-vlan2] quit
[LSW-B] interface vlan-interface 2
[LSW-B-Vlan-interface2] ip address 202.38.160.2 255.255.255.0
[LSW-B-Vlan-interface2] quit
```

Configure VRRP.

```
[LSW-B] vrrp ping-enable
[LSW-B] interface vlan 2
[LSW-B-Vlan-interface2] vrrp vrid 1 virtual-ip 202.38.160.111
[LSW-B-Vlan-interface2] vrrp vrid 1 preempt-mode
```

The IP address of the default gateway of Host A can be configured to be 202.38.160.111.

Normally, Switch A functions as the gateway, but when Switch A is turned off or malfunctions, Switch B will function as the gateway instead.

Configure Switch A to operate in preemptive mode, so that it can resume its gateway function as the master switch after recovery.

1.4.2 VRRP Tracking Interface Example

I. Network requirements

Even when Switch A is still functioning, Switch B can function as a gateway when the interface on Switch A and connecting to Internet does not function properly. This can be implemented by enabling the VLAN interface tracking function.

The VRRP backup group ID is set to 1, with additional configurations of authorization key and timer.

II. Network diagram

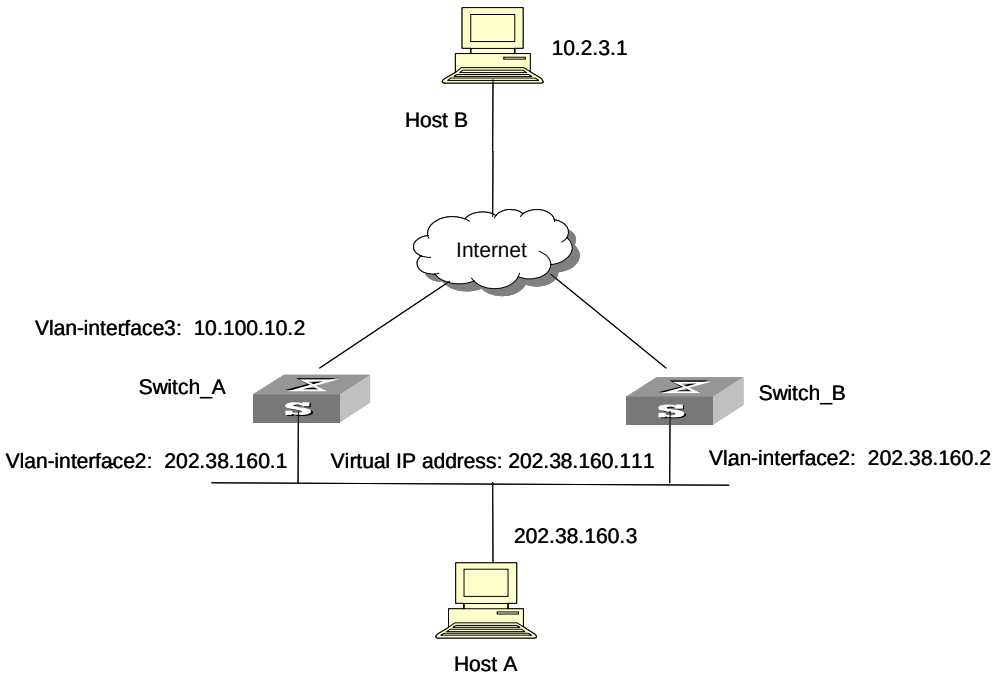

Figure 1-4 Network diagram for interface tracking configuration

III. Configuration procedure

- Configure Switch A.

Configure VLAN 2.

```
<LSW-A> system-view
System View: return to User View with Ctrl+Z.
[LSW-A] vlan 2
[LSW-A-vlan2] port GigabitEthernet 1/0/6
[LSW-A-vlan2] quit
[LSW-A] interface vlan-interface 2
[LSW-A-Vlan-interface2] ip address 202.38.160.1 255.255.255.0
[LSW-A-Vlan-interface2] quit
```

Configure that the virtual router can be pinged.

```
[LSW-A ] vrrp ping-enable
```

Create a backup group.

```
[LSW-A] interface vlan-interface 2
[LSW-A-Vlan-interface2] vrrp vrid 1 virtual-ip 202.38.160.111
```

Set the priority for the backup group.

```
[LSW-A-Vlan-interface2] vrrp vrid 1 priority 110
```

Set the authentication key for the backup group.

```
[LSW-A-Vlan-interface2] vrrp authentication-mode md5 switch
```

Configure that the master switch to send VRRP packets once in every 5 seconds.

```
[LSW-A-Vlan-interface2] vrrp vrid 1 timer advertise 5
```

Set the tracked VLAN interface.

```
[LSW-A-Vlan-interface2] vrrp vrid 1 track vlan-interface 3 reduced 30
```

- Configure Switch B.

Configure VLAN 2.

```
<LSW-B> system-view
System View: return to User View with Ctrl+Z.
[LSW-B] vlan 2
[LSW-B-vlan2] port GigabitEthernet 1/0/5
[LSW-B-vlan2] quit
[LSW-B] interface vlan-interface 2
[LSW-B-Vlan-interface2] ip address 202.38.160.2 255.255.255.0
[LSW-B-Vlan-interface2] quit
```

Configure that the virtual router can be pinged.

```
[LSW-B] vrrp ping-enable
```

Create a backup group.

```
[LSW-B] interface vlan-interface 2
[LSW-B-Vlan-interface2] vrrp vrid 1 virtual-ip 202.38.160.111
```

Set the authentication key for the backup group.

```
[LSW-B-Vlan-interface2] vrrp authentication-mode md5 switch
```

Set the master to send VRRP packets once in every 5 seconds.

```
[LSW-B-Vlan-interface2] vrrp vrid 1 timer advertise 5
```

Normally, Switch A functions as the gateway, but when VLAN 3 interface on Switch A goes down, its priority will be reduced by 30, lower than that of Switch B so that Switch B will preempt the master for gateway services instead.

When VLAN 3 interface recovers, switch A will resume its gateway function as the master.

1.4.3 Multiple-VRRP Backup Group Configuration Example

I. Network requirements

A switch can function as backup switches of multiple backup groups.

Multiple-backup group configuration can implement load balancing. For example, Switch A operates as the master switch of backup group 1 and a backup switch in backup group 2. Similarly, Switch B operates as the master switch of backup group 2 and a backup switch in backup group 1. Some hosts in the network take virtual router 1

as the gateway, while others take virtual router 2 as the gateway. In this way, both load balancing and mutual backup are implemented.

II. Network diagram

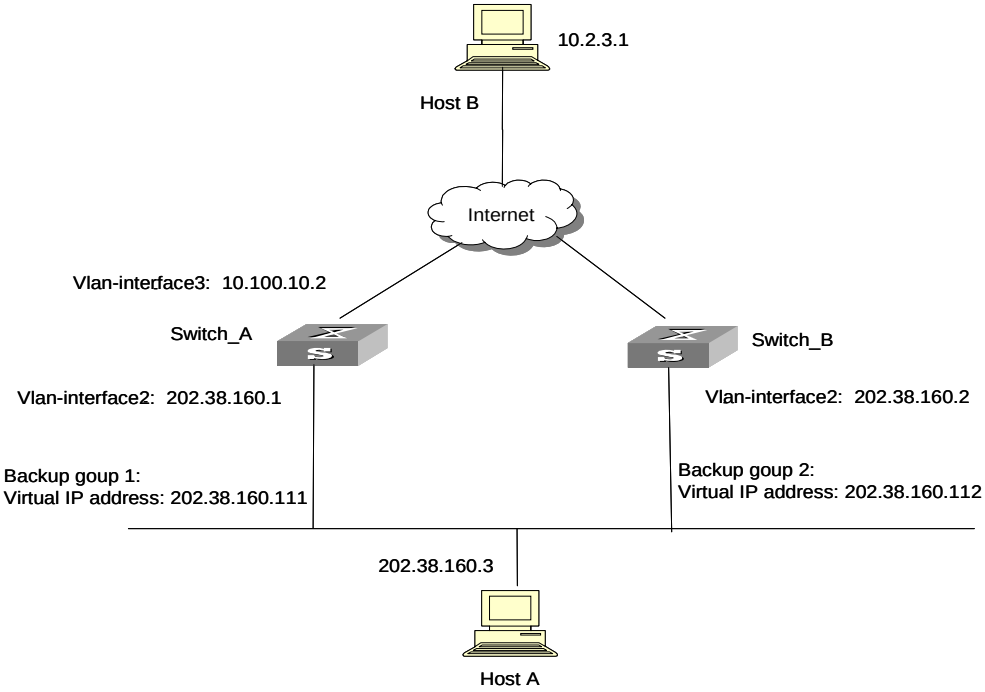

Figure 1-5 Network diagram for multiple-VRRP backup group configuration

III. Configuration procedure

- Configure Switch A.

Configure VLAN 2.

```
<LSW-A> system-view
System View: return to User View with Ctrl+Z.
[LSW-A] vlan 2
[LSW-A-vlan2] port GigabitEthernet 1/0/6
[LSW-A-vlan2] quit
[LSW-A] interface vlan-interface 2
[LSW-A-Vlan-interface2] ip address 202.38.160.1 255.255.255.0
```

Create backup group 1.

```
[LSW-A-Vlan-interface2] vrrp vrid 1 virtual-ip 202.38.160.111
```

Set the priority for backup group 1.

```
[LSW-A-Vlan-interface2] vrrp vrid 1 priority 150
```

Create backup group 2.

```
[LSW-A-Vlan-interface2] vrrp vrid 2 virtual-ip 202.38.160.112
```

- Configure Switch B.

Configure VLAN 2.

```
<LSW-B> system-view
System View: return to User View with Ctrl+Z.
[LSW-B] vlan 2
[LSW-B-vlan2] port GigabitEthernet 1/0/6
[LSW-B-vlan2] quit
[LSW-B] interface vlan-interface 2
[LSW-B-Vlan-interface2] ip address 202.38.160.2 255.255.255.0
```

Create backup group 1.

```
[LSW-B-Vlan-interface2] vrrp vrid 1 virtual-ip 202.38.160.111
```

Create backup group 2.

```
[LSW-B-Vlan-interface2] vrrp vrid 2 virtual-ip 202.38.160.112
```

Set the priority for backup group 2.

```
[LSW-B-Vlan-interface2] vrrp vrid 2 priority 110
```

Note:

Normally, multiple backup groups are used in actual use.

1.5 Troubleshooting VRRP

As the configuration of VRRP is not very complicated, almost all the malfunctions can be located through viewing the configuration and debugging information. Here are some possible failures you might meet and the corresponding troubleshooting methods.

I. Symtom 1: Frequent prompts of configuration errors on the console

This indicates that incorrect VRRP packets are received. It may be because of the inconsistent configuration of the switches within the backup group, or the attempt of other devices sending out illegal VRRP packets. The first possible fault can be solved through modifying the configuration. And as the second possibility is caused by the malicious attempt of some devices, non-technical measures should be resorted to.

II. Symtom 2: More than one master existing within a backup group

There are also 2 reasons. One is short time coexistence of many master switches, which is normal and needs no manual intervention. Another is the long time coexistence of many master switches, which may be because the original master switch and other member switches in a backup group cannot receive VRRP packets from each other, or receive some illegal packets.

To solve such a problem, an attempt should be made to ping among these masters and if such an attempt fails, check the connectivity between related devices. If they can be pinged through, check VRRP configuration. For the configuration of a VRRP backup group, complete consistency for the number of virtual IP addresses, each virtual IP address, timer duration and authentication type configured on each member switch must be guaranteed.

III. Symptom 3: Frequent switchover of VRRP state

Such a problem occurs when the backup group timer duration is too short. So the problem can be solved through prolonging this duration or configuring the preemption delay period.

Chapter 2 Port Tracking Configuration

2.1 Introduction to the Port Tracking Function

With the port tracking function enabled, you can specify to track the link state of the master's uplink port and decrease the priority of the switch when the port fails.

This in turn triggers the new master to be determined in the backup group.

2.2 Port Tracking Configuration

2.2.1 Configuring the Port Tracking Function

Table 2-1 Configure the port tracking function

Operation	Command	Description
Enter system view	system-view	—
Create a VLAN	**vlan** *vlan-id*	This operation creates the VLAN to which the backup group corresponds. The *vlan-id* argument is the ID of the VLAN.
Add an Ethernet port to the VLAN	**port** *interface-type interface-number*	—
Quit to system view	**quit**	—
Enter VLAN interface view	**interface vlan-interface** *vlan-id*	Required
Enable the port monitor function	**vrrp vlan-interface** *vlan-id* **vrid** *virtual-router-ID* **track** [**reduced** *value-reduced*]	*virtual-router-ID:* VRRP backup group ID. *value-reduced*: The value by which the priority of a device is to decrease. This argument defaults to 10. *vlan-id*: ID of the VLAN interface.

Note:

- The port to be tracked can be in the VLAN which the backup group belongs to.
- Up to eight ports can be monitored simultaneously.

2.2.2 Port Tracking Configuration Example

I. Network requirements

- Backup group 1 comprises two switch, which operate as the master switch and a backup switch.
- The IP addresses of the master and the backup switches are 10.100.10.2 and 10.100.10.3.
- The master switch is connected to the upstream network through its GigabitEthernet1/0/1 port. The backup switch is connected to the upstream network through its GigabitEthernet1/0/2 port.
- The virtual router IP address of the backup group is 10.100.10.1.
- Enable the port tracking function on GigabitEthernet1/0/1 port of the master switch and specify that the priority of the master decreases by 50 when Ethernet1/0/1 port fails, which triggers new master switch being determined in the backup group.

II. Network diagram

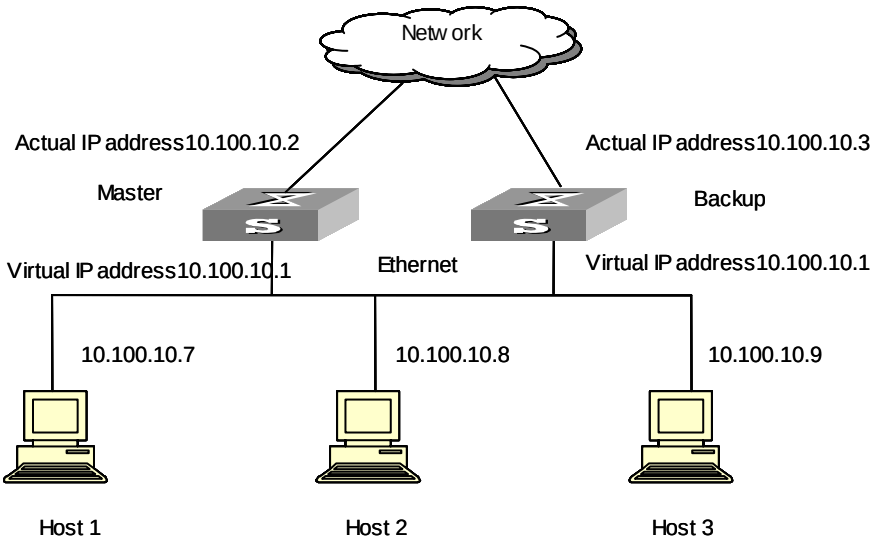

Figure 2-1 Network diagram for port tracking configuration

III. Configuration procedure

- Configure the master switch.

Enter system view.

```
<Quidway> system-view
System View: return to User View with Ctrl+Z.
```

Create VLAN 2.

```
[Quidway] vlan 2
[Quidway-vlan2] port GigabitEthernet1/0/1
```

```
[Quidway-vlan2] quit
```

Enter VLAN 2 interface view and enable the port tracking function.

```
[Quidway] interface vlan-interface2
[Quidway-Vlan-interface2] vrrp vlan-Interface 2 vrid 1 track
```

Chapter 3 VRRP Configuration Commands

3.1 VRRP Configuration Commands

3.1.1 debugging vrrp

Syntax

debugging vrrp { **state** | **packet** }

undo debugging vrrp { **state** | **packet** }

View

User view

Parameter

state: Debugs VRRP state.

packet: Debugs VRRP packets.

Description

Use the **debugging vrrp** command to enable VRRP debugging.

Use the **undo debugging vrrp** command to disable VRRP debugging. By default, VRRP debugging is disabled.

Example

Enable VRRP debugging.

```
<Quidway> debugging vrrp state
```

3.1.2 display vrrp

Syntax

display vrrp [**interface vlan-interface** *valn-id* | **statistics** [**vlan-interface** *vlan-id*]] [*virtual-router-ID*]

View

Any view

Parameter

interface: Displays VRRP information about the specified VLAN interface.

vlan-interface *vlan-id*: Specifies a VLAN interface ID.

statistics: Displays VRRP statistics.

virtual-router-ID: VRRP backup group ID ranging from 1 to 255.

Description

Use the **display vrrp** command to display the information about the VRRP state or VRRP statistics.

When VRRP status information is displayed:

- If the interface index and backup group ID are not specified, the state information about all the backup groups on the switch is displayed.
- If only the interface index is specified, the state information about all the backup groups on the interface is displayed.
- If both the interface index and backup group ID are specified, the state information about the specified backup group on the interface is displayed.

When VRRP statistics information is displayed:

- If the interface index and backup group ID are not specified, the statistics about all the backup groups on the switch is displayed.
- If only the interface index is specified, the statistics about all the backup groups on the interface is displayed.
- If both the interface index and backup group ID are specified, the statistics about the specified backup group on the interface is displayed.

Example

Display the statistics about all the backup groups on the switch.

```
<Quidway> display vrrp statistics
 Interface              : Vlan-interface10
 VRID                   : 1
 CheckSum Errors        : 0          Version Errors                 : 0
 VRID Errors            : 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          Priority Zero Pkts Rcvd        : 0
 Advertise Rcvd         : 0          Priority Zero Pkts Sent        : 1
 Invalid Type Pkts Rcvd : 0
```

Table 3-1 Description on the fields of the **display vrrp** command

Field	Description
Interface	Interface in which the backup group resides
VRID	Backup group ID
CheckSum Errors	Times of checksum error

Field	Description
Version Errors	Times of version error
VRID Errors	Times of backup group ID error
Advertisement Interval Errors	Times of advertisement time interval error
IP TTL Errors	Times of TTL error
Auth Failures	Times of authentication error
Invalid Auth Type	Times of invalid authentication type
Auth Type Mismatch	Mismatched times of authentication type
Packet Length Errors	Times of VRRP packet length error
Address List Errors	Times of the virtual IP address list error
Become Master	Times of becoming a master
Priority Zero Pkts Rcvd	Number of the received advertisement packets with the priority of 0
Advertise Rcvd	Number of the received advertisement packets
Priority Zero Pkts Sent	Number of the sent advertisement packets with the priority of 0
Invalid Type Pkts Rcvd	Times of packet type error

3.1.3 reset vrrp statistics

Syntax

reset vrrp statistics [**vlan-interface** *vlan-id*] [*virtual-router-ID*]

View

User view

Parameter

statistics: Displays VRRP statistics.

vlan-interface *vlan-id*: Specifies a VLAN interface ID.

virtual-router-ID: VRRP virtual router ID ranging from 1 to 255.

Description

Use the **reset vrrp** command to clear the statistics information about VRRP.

When you execute this command,

- If the interface index and backup group ID are not specified, the statistics information about all the backup groups on the switch is cleared.

- If only the interface index is specified, the statistics information about all the backup groups on the interface will be cleared.
- If both the interface index and backup group ID are specified, the statistics information about the specified backup group on the interface is cleared.

Example

Clear the VRRP statistics on the switch.

```
<Quidway> reset vrrp statistics
```

3.1.4 vrrp authentication-mode

Syntax

vrrp authentication-mode *authentication-type authentication-key*

undo vrrp authentication-mode

View

VLAN interface view

Parameter

authentication-type: Authentication type, which can be:

- **simple**: Indicates to perform simple character authentication.
- **md5**: Indicates to perform the AH authentication with MD5 algorithm.

authentication-key: Authentication key. When you specify *authentication-type* to be **simple**, you need to provide a string comprising up to eight characters. When you specify *authentication-type* to be **md5**, you need to provide a string comprising up to eight characters or a 24-character encrypted string.

Description

Use the **vrrp authentication-mode** command to specify the authentication type and the authentication key for a VRRP backup group.

Use the **undo vrrp authentication-mode** command to clear the configured authentication type and authentication key.

If the **simple** or **md5** authentication is configured, the authentication key is required.

This command sets the authentication type and authentication key for all the VRRP backup groups on an interface. As defined in the protocol, all the backup groups on an interface share the same authentication type and authentication key. And all the members joining the same backup group share the same authentication type and authentication key too.

The authentication key is case-sensitive.

Example

Specify the authentication type and authentication key for a VRRP backup group.

```
<Quidway> system-view
System View: return to User View with Ctrl+Z.
[Quidway] interface vlan-interface 2
[Quidway-vlan-interface2] vrrp authentication-mode simple aabbcc
```

3.1.5 vrrp method

Syntax

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

undo vrrp method

View

System view

Parameter

real-mac: Maps the real MAC address of a Layer 3 switch routing interface to virtual router IP addresses.

virtual-mac: Maps the virtual MAC address of a Layer 3 switch routing interface to virtual router IP addresses.

Description

Use the **vrrp method** command to map the MAC address of a backup group to the virtual router IP addresses. You can map the real or virtual MAC address of a Layer 3 switch routing interface to virtual router IP addresses.

Use the **undo vrrp method** command to restore the default map settings.

By default, the virtual MAC address of a backup group is mapped to the IP address of the virtual router.

Note that as the relationship between the MAC addresses of a backup group and a virtual router IP address cannot be configured after the backup group is created, configure the relationship before you create a backup group.

If you map the virtual MAC address of a Layer 3 switch routing interface to virtual router IP addresses, you can create up to 14 backup groups on the VLAN interface.

Example

Map the real MAC address of a routing interface to a virtual router IP address.

```
<Quidway> system-view
System View: return to User View with Ctrl+Z.
[Quidway] vrrp method real-mac
```

3.1.6 vrrp ping-enable

Syntax

vrrp ping-enable

undo vrrp ping-enable

View

System view

Parameter

None

Description

Use the **vrrp ping-enable** command to enable a backup group to respond to ping operations destined for its virtual router IP address.

Use the **undo vrrp ping-enable** command to revert to the default.

By default, a backup group does not respond to ping operations destined for its virtual router IP address.

As these two commands are invalid to switches in backup groups, use them before you create a backup group.

Example

Enable a backup group to respond to ping operations destined for its virtual router IP address.

```
<Quidway> system-view
System View: return to User View with Ctrl+Z.
[Quidway] vrrp ping-enable
```

3.1.7 vrrp vrid preempt-mode

Syntax

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

undo vrrp vrid *virtual-router-ID* **preempt-mode**

View

VLAN interface view

Parameter

virtual-router-ID: VRRP backup group ID ranging from 1 to 255.

delay-value: Delay period (in seconds) ranging from 0 to 255.

Description

Use the **vrrp vrid preempt-mode** command to configure a switch to operate in the preemptive mode and set the delay period.

Use the **undo vrrp vrid preempt-mode** command to cancel the configuration.

By default, switches in a backup group operate in the preemptive mode, with the delay period set to 0 second.

If you want backup switches to preempt the master switch, configure them to operate in the preemptive mode. You can also set the delay period as needed.

Note:

The **undo vrrp vrid preempt-mode** command causes switches in a backup group to operate in non-preemptive mode.

Example

Configure the switches to operate in the preemptive mode.

```
<Quidway> system-view
System View: return to User View with Ctrl+Z.
[Quidway] interface vlan-interface 2
[Quidway-vlan-interface2] vrrp vrid 1 preempt-mode
```

Set the delay period.

```
[Quidway-vlan-interface2] vrrp vrid 1 preempt-mode timer delay 5
```

Configure the switches to operate in non-preemptive mode.

```
[Quidway-vlan-interface2] undo vrrp vrid 1 preempt-mode
```

3.1.8 vrrp vrid priority

Syntax

vrrp vrid *virtual-router-ID* **priority** *priority*

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

View

VLAN interface view

Parameter

virtual-router-ID: VRRP backup group ID ranging from 1 to 255.

priority: Switch priority to be set. This argument ranges from 1 to 254 and defaults to 100.

Description

Use the **vrrp vrid priority** command to set the priority of a switch in a backup group.

Use the **undo vrrp vrid priority** command to revert to the default priority.

Switch priority determines the possibility for the switch to become a master switch. A switch with larger priority is more likely to become a master switch. Note that the priority of 0 is reserved for special use, and the priority of 255 is for IP address owners. That is, the priority of a switch that owns a virtual router IP address is fixed to 255 and cannot be modified.

Example

Set the priority to 120 for the switch in the backup group in VLAN 2 interface view.

```
<Quidway> system-view
System View: return to User View with Ctrl+Z.
[Quidway] interface vlan-interface 2
[Quidway-vlan-interface2] vrrp vrid 1 priority 120
```

3.1.9 vrrp vrid timer advertise

Syntax

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

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

View

VLAN interface view

Parameter

virtual-router-ID: VRRP backup group ID ranging from 1 to 255.

adver-interval: Interval (in seconds) for the master switch of a backup group to send VRRP packets. This argument ranges from 1 to 255 and defaults to 1.

Description

Use the **vrrp vrid timer advertise** command to set the interval for the master switch of a backup group to send VRRP packets.

Use the **undo vrrp vrid timer advertise** command to revert to the default interval.

Note that configuration error occurs if switches of the same backup group are configured with different *adver-interval* values.

As long as a switch in the backup group becomes the master switch, other switches, even if they are configured with a higher priority later, do not preempt the master switch unless they operate in the preemptive mode. The switch operating in preemptive mode will become the master switch when it finds its priority is higher than that of the current master switch, and the former master switch becomes a backup switch accordingly.

You can also set the delay period when configuring switches in a backup group to operate in the preemptive mode to enable a backup switch to undergo a specified period before it becomes the master switch. In an unstable network, backup switches may not receive packets from master switches in time because of network congestions. This causes master switches being determined frequently if the delay period is not configured or is too short. You can avoid this problem by setting the delay period to a proper value.

Example

Set the interval for the master switch to send VRRP packets to 15 seconds.

```
<Quidway> system-view
System View: return to User View with Ctrl+Z.
[Quidway] interface vlan-interface 2
[Quidway-vlan-interface2] vrrp vrid 1 timer advertise 15
```

3.1.10 vrrp vrid track

Syntax

vrrp vrid *virtual-router-ID* **track vlan-interface** *valn-id* [**reduced** *value-reduced*]

undo vrrp vrid *virtual-router-ID* **track vlan-interface** *vlan-id* [**reduced** *value-reduced*]

View

VLAN interface view

Parameter

virtual-router-ID: VRRP backup group ID ranging form 1 to 255.

vlan-interface *vlan-id*: Specifies a VLAN interface ID.

value-reduced: Value by which the priority is to decrease. This argument ranges from 1 to 255 and defaults to 10.

Description

Use the **vrrp vrid track** command to set a VLAN interface to be tracked.

Use the **undo vrrp vrid track** command to disable a VLAN interface from being tracked.

The VLAN interface tracking function extends the use of the backup function. With this function enabled, the backup function is applicable to the VLAN interface that belongs to a backup group and those that do not belong to a backup group. You can utilize the VLAN interface tracking function by specifying monitored VLAN interfaces.

With the VLAN interface tracking function enabled, the priority of a master switch decreases by the value set by the *value-reduced* argument when a tracked VLAN interface on the switch goes down. And other switches in the backup group, whose priorities are higher than the decreased priority of the master switch, may become the master switch.

Note:

- Switches that own IP addresses do not support the VLAN interface tracking function.
- A backup group can track up to eight VLAN interfaces simultaneously.

Example

Configure VLAN 2 interface to track VLAN 1 interface and specify the priority of the master switch of backup group 1 (on VLAN 2 interface) decreases by 50 when VLAN 1 interface goes down.

```
<Quidway> system-view
System View: return to User View with Ctrl+Z.
[Quidway] interface vlan-interface 2
[Quidway-vlan-interface2] vrrp vrid 1 track vlan-interface 1 reduced 50
```

3.1.11 vrrp vrid virtual-ip

Syntax

vrrp vrid *virtual-router-ID* **virtual-ip** *virtual-address*

undo vrrp vrid *virtual-router-ID* **virtual-ip** *virtual-address*

View

VLAN interface view

Parameter

virtual-router-ID: VRRP backup group ID ranging from 1 to 255.

virtual-address: Virtual router IP address to be configured.

Description

Use the **vrrp vrid virtual-ip** command to add a virtual router IP address to an existing backup group.

Use the **undo vrrp vrid virtual-ip** command to remove a virtual router IP address from an existing backup group..

The **vrrp vrid virtual-ip** command can also be used to create a backup group. You can add up to 16 virtual router IP addresses to a backup group. The **undo vrrp vrid virtual-ip** command can also be used to remove an existing backup group. A backup group is removed if all the virtual router IP addresses configured for it are removed.

Example

Create a backup group.

```
<Quidway> system-view
System View: return to User View with Ctrl+Z.
[Quidway] interface vlan-interface 2
[Quidway-vlan-interface2] vrrp vrid 1 virtual-ip 10.10.10.10
```

Add a virtual router IP address to an existing backup group.

```
[Quidway-vlan-interface2] vrrp vrid 1 virtual-ip 10.10.10.11
```

Remove a virtual router IP address from a backup group.

```
[Quidway-vlan-interface2] undo vrrp vrid 1 virtual-ip 10.10.10.10
```

Remove a backup group.

```
[Quidway-vlan-interface2] undo vrrp vrid 1
```

Chapter 4 Port Tracking Configuration Commands

4.1 Port Tracking Configuration Commands

4.1.1 vrrp vlan-interface vrid track

Syntax

vrrp vlan-interface *vlan-id* **vrid** *virtual-router-ID* **track** [**reduced** *value-reduced*]

undo vrrp vlan-interface *vlan-id* **vrid** *virtual-router-ID* **track**

View

VLAN interface view

Parameter

virtual-router-ID: VRRP backup group ID ranging from 1 to 255.

vlan-id: VLAN ID.

value-reduced: Value by which the priority of a switch is to decrease. This argument ranges from 1 to 255 and defaults to 10.

Description

Use the **vrrp vlan-Interface vrid track** command to enable the port tracking function on the physical ports of a backup group.

Use the **undo vrrp vlan-Interface vrid track** command to disable the port tracking function.

With the VRRP backup group port tracking function enabled, you can specify to track a specified port and decrease the priority of the switch when the port fails.

Using this function, you can enable the priority of a master switch to decrease by specific value when the uplink port of the master switch fails. This in turn triggers the new master to be determined in the backup group.

Note:

- The port to be tracked can be in the VLAN which the backup group belongs to.
- Up to eight ports can be tracked simultaneously.

Example

Configure that the priority of the switch decreases by 50 if its GigabitEthernet1/0/1 port fails.

```
<Quidway> system-view
[Quidway] vlan 2
[Quidway-vlan2] port GigabitEthernet1/0/1
[Quidway-vlan2] quit
[Quidway] interface vlan-interface2
[Quidway-Vlan-interface2] vrrp vlan-interface 2 vrid 1 track reduced 50
```