

## Reliability Configuration

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# Chapter 1 VRRP Configuration

## 1.1 Overview

The Virtual Router Redundancy Protocol (VRRP) ensures the successful single-node service in the default static routing condition. VRRP avoids the defects of the statically designated gateway. A group of OLTs can work together as a virtual OLT through VRRP. The virtual OLT has a virtual IP address and a virtual MAC address for the outside. VRRP chooses one OLT from the OLT group as the master OLT, responsible for forwarding packet. When the master OLT has problems, the standby OLT will promptly take over the tasks of the master OLT without changing the default gateway address. The whole takeover process is transparent to the terminal system. This mechanism can provide fast and effective resolution when trouble occurs.

## 1.2 VRRP Configuration Task List

- Enabling/Disabling VRRP on the Interface
- Configuring VRRP authentication mode
- Configuring VRRP priority preemption
- Configuring VRRP priority
- Configuring VRRP clock value
- Monitoring and maintaining VRRP

## 1.3 VRRP Configuration Task

### 1.3.1 Configuring VRRP Virtual IP Address

Run the following commands in vlan interface configuration mode.

Command	Purpose
<b>vrrp</b> <i>vrid</i> <b>associate</b> <i>virtual-address</i> <i>address-mask</i>	Configures VRRP Virtual IP address on the interface
<b>no vrrp</b> <i>vrid</i> <b>associate</b> [ <i>virtual-address</i> <i>address-mask</i> ]	Deletes VRRP Virtual IP address on the interface

The virtual OLT is enabled after the virtual address of VRRP is configured. The virtual address and the primary IP address of the port must be in the same network segment. Otherwise, the virtual OLT remains in the Init state. When the virtual IP address and the IP address of the port are consistent, the system automatically promote the precedence of the routing OLT to 255.

### 1.3.2 Configuring VRRP Authentication Mode

Run the following commands in vlan interface configuration mode.

Command	Purpose
<b>vrrp vrid authentication WORD</b>	Configures VRRP authentication mode to simple-text.
<b>no vrrp vrid authentication</b>	Resumes the VRRP authentication mode to the default setting.

In simple-text authentication mode, the authentication character string is in the message as clear code and is forwarded out. The receiver checks the authentication character string in the message to see whether it matches the locally configured authentication character string. The authentication character string has eight characters at most.

By default, the authentication mode of VRRP is no-authen.

### 1.3.3 Configuring VRRP Description

Run the following commands in vlan interface configuration mode.

Command	Purpose
<b>vrrp vrid description WORD</b>	Configures VRRP description information
<b>no vrrp vrid description</b>	Deletes VRRP description information

VRRP description information, which is used for stating the usage of local VRRP.

By default, VRRP has no description information.

### 1.3.4 Configuring VRRP Priority Preemption

Run the following commands in vlan interface configuration mode.

Command	Purpose
<b>vrrp vrid preempt [delay second]</b>	Configures VRRP priority preemption
<b>no vrrp vrid preempt [delay]</b>	Resumes the default VRRP priority preemption mode.

The priority preemption is effective only to the backup OLT. After the backup OLT receives the announce message from the master OLT, it will examine the priority of the master OLT. If the priority level of the master OLT is lower than the locally configured priority level and the backup OLT is configured with priority preemption, the backup OLT will leap from the backup state to the master state and send the announce message to the outside. Otherwise, the backup OLT remains in the backup state.

In default state, the authentication mode of VRRP is no-authen.

### 1.3.5 Configuring VRRP Protocol Packet MAC Address

Run the following commands in vlan interface configuration mode.

Command	Purpose
<b>vrrp vrid source-mac-use-system</b>	Configures VRRP group to forward packets with system mac address
<b>no vrrp vrid source-mac-use-system</b>	Configures VRRP group to forward packets with protocol mac address

By default, VRRP protocol packet forward source address with protocol mac address; after the command is configured, VRRP protocol packet forwards the system mac address as the source address.

### 1.3.6 Configuring VRRP Priority

Run the following commands in vlan interface configuration mode.

Command	Purpose
<b>vrrp vrid priority value (1~254)</b>	Configures VRRP priority
<b>no vrrp vrid priority</b>	Resumes the default VRRP priority mode.

When the virtual address and the port address are same, VRRP will automatically increase its priority value to 255. After the virtual address or the port address changes, the priority value automatically resumes to the original value.

The default value is 100.

### 1.3.7 Configuring VRRP Clock Value

Run the following commands in vlan interface configuration mode.

Command	Purpose
<b>vrrp vrid timer advertise { value   dsec value   csec value }</b>	Configures VRRP clock value
<b>no vrrp vrid timer advertise</b>	Resumes the VRRP clock value to the default value.
<b>no vrrp vrid timer learn</b>	Configures VRRP clock as the learning mode

The clock value means the shortest time for the virtual routing OLT to recover from a trouble. When the master routing OLT is down, the backup routing OLT will serve as the master routing OLT after the  $3 \times \text{advertisement} + \text{skew\_time}$  interval. It is clear that the trouble cannot be removed immediately if the advertisement clock value is too big. Hence, the default value of the advertisement clock is recommended.

The default value is 1 second.

### 1.3.8 Configuring VRRP Monitoring Object

Run the following commands in vlan interface configuration mode.

Command	Purpose
<b>vrrp vrid track interface</b> <i>intf-id value</i>	Configures VRRP monitoring local interface state
<b>no vrrp vrid track interface</b> <i>intf-id</i>	Resumes to the default setting
<b>vrrp vrid track ip</b> <i>ip-address value</i>	Configures VRRP monitoring to the static routing state to the designated address
<b>no vrrp vrid track ip</b> <i>ip-address</i>	Resumes to the default setting.

With the monitoring function, VRRP group can adjust the priority appropriately according to the change of the link state. It provides an opportunity of switching master line state to the backup line state. The change of the link state refers to whether the destination link bypass the VRRP routing OLT is reachable, rather than the VRRP OLT itself is reachable.

VRRP supports two monitoring objects: First, monitoring the interface status. When the monitored port link state is down, lower the priority of itself proactively. Second, monitoring the static route state of designated node. When the monitored route is unreachable, lower the priority of itself proactively. Monitoring the static route state of designated node needs to apply the function of BFD detecting static route.

### 1.3.9 Monitoring and Maintaining VRRP

Run the following commands in EXEC configuration mode.

Command	Purpose
<b>show vrrp { brief   [interface <i>vlan_intf</i>] [detail]}</b>	Displays the VRRP information.
<b>debug vrrp [interface <i>intf-id vrid</i>] {errors   events   packets   all}</b>	Enables the debugging on-off for VRRP packets and events.
<b>no debug vrrp</b>	Disables the debugging on-off for VRRP packets and events.

Displaying the VRRP information:

```
Switch_config# show vrrp interface vlan 1 detail
VLAN1 - Group 1
  VRRP State is Master
  Virtual IP address : 192.168.20.110/24
  Virtual Mac address : 0000.5e00.0101
  Current Priority : 100   (Config 100)
  VRRP timer : Advertise 1.0 s (default)   master_down 3.6 s
  VRRP current timer : Advertise 1.0 s master_down 0.0 s preempt after 0.0 s
  Authentication string is not set
  Preempt is set   (delay : 0   s)
  Learn Advertise Interval is not set
  Master Router IP : 192.168.20.118, priority : 100, advertisement : 1.0 s
```

### 1.3.10 VRRP Configuration Example

The network topology is shown in figure 1.

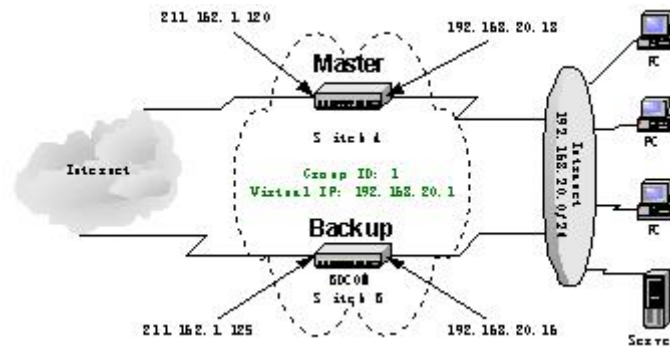


Figure1 1-1 Network topology

## 1. 1. Configuring OLT Switch A

- (1) Fault 1: Configure the address for the interface of the private network.  

```
Switch_config_v1# ip address 192.168.20.18 255.255.255.0
```
- (2) Fault 2: Configure the address for the interface of the public network.  

```
Switch_config_v2# ip address 211.162.1.120 255.255.255.0
```
- (3) Fault 3: Configure virtual switch group 1 on the interface of the private network. The virtual address is 192.168.20.1. The priority value is 120.  

```
Switch_config_v1# vrrp 1 associate 192.168.20.1 255.255.255.0
```

```
Switch_config_v1# vrrp 1 priority 120
```
- (4) Fault 4: Display information about the virtual OLT.  

```
Switch_config#show vrrp detail
```

VLAN1 - Group 1

VRRP State is Master

Virtual IP address : 192.168.20.1/24

Virtual Mac address : 0000.5e00.0101

Current Priority : 120 (Config 120)

VRRP timer : Advertise 1.0 s (default) master\_down 3.6 s

VRRP current timer : Advertise 1.0 s master\_down 0.0 s preempt after 0.0 s

Authentication string is not set

Preempt is set (delay : 0 s)

Learn Advertise Interval is not set

Master Router IP : 192.168.20.18, priority : 100, advertisement : 1.0 s

## 2. Configuring OLT Switch B

- (1) Configure the address for the interface of the private network.  

```
Switch_config_v1# ip address 192.168.20.16 255.255.255.0
```
- (2) Configure the address for the interface of the public network.

```
Switch_config_v2# ip address 211.162.1.125 255.255.255.0
```

Configure virtual OLT group 1 on the interface of the private network. The virtual address is 192.168.20.1. The priority value is 120.

```
Switch_config_v1# vrrp 1 associate 192.168.20.1 255.255.255.0
```

Display information about the virtual OLT.

```
Switch_config#show vrrp detail
```

```
Switch_config#show vrrp interface vlan 1 detail
```

VLAN1 - Group 1

VRRP State is Backup

Virtual IP address : 192.168.20.1/24

Virtual Mac address : 0000.5e00.0101

Current Priority : 100 (Config 100)

VRRP timer : Advertise 1.0 s (default) master\_down 3.6 s

VRRP current timer : Advertise 0.0 s master\_down 3.0 s preempt after 0.0 s

Authentication string is not set

Preempt is set (delay : 0 s)

Learn Advertise Interval is not set

Master Router IP : 192.168.20.18, priority : 120, advertisement : 1.0 s

### 3. Configuring PC and Server of the Private Network

Configure the default gateway for each PC and server in the private network to 192.168.20.1.