**FS**

# Reliability Configuration

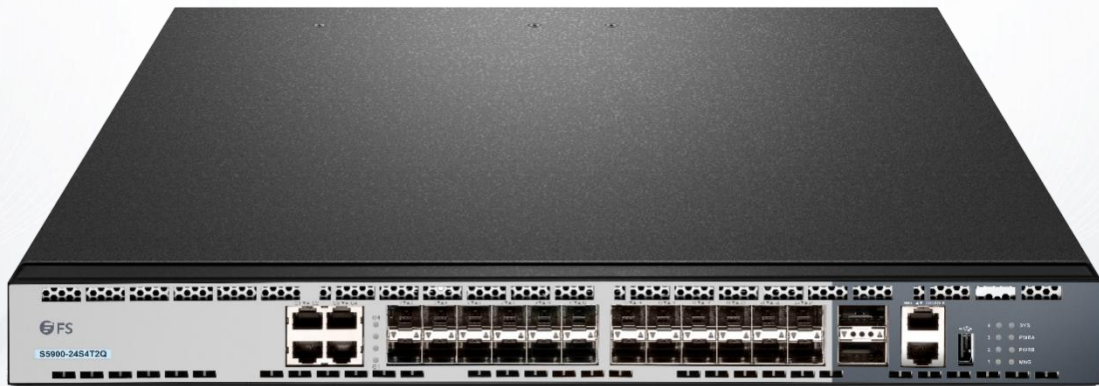Model: S5900-24S4T2Q

# Table of Contents

# 1. Configuring Port Backup

This chapter discusses how to back up the interface, describes the backup functions on the asynchronism serial interface, synchronism serial interface or ISDN interface.

For details about interface backup commands, refer to *Interface Backup Command Reference*.

## 1.1 Overview

Interface backup functions can enable Backup interface or disable it according to statement or flux information of Primary interface. If primary interface is down because of lines and etc., backup interface will enable auto and data can send or receive through it instead of primary interface. It can add reliability from source router to destination. If flux of primary interface is crowded, it can activate backup interface also, share the data transportations to speed up data transportations. If primary interface is between "down" and "up" or flux of primary interface and backup interface are both small, backup interface can be activated but not transporting data. This can save cost of lines. The listing interfaces can be primary interface:

·asynchronism serial port

·ISDN

·synchronism serial port

Except above types, backup interfaces include Dialer logic interface also.

## 1.2 Backup Interface Configuration Task List

If you want to configure interface backup in above interfaces, you should do as follows in interface configure mode.

• Enabling backup and choosing the backup interface

You can also do these tasks. These tasks are optional, can provide many uses and enforce interface backup functions.

• Enabling interface backup rejection

• Enabling flux equalization backup

## 1.3 Backup Interface Configratoin Task

### 1.3.1 Enabling Backup and Choosing the Backup Interface

To realize interface backup functions, you should configure backup interface of this interface first. You can use instructions as follows in interface configuration mode.

| Command | Purpose |
|---|---|
| backup interface slot/port | choose backup interface of this interface. |

### 1.3.2 Enabling Backup Interface Rejection

Set delaying of enabled and disabled backup interface. To realize time gap between primary interface state changing and the result of state of backup interface changing.

1. choose backup interface

2. enabled interface backup delaying in this interface.

Choose backup interface, you can use instructions as follows in interface configuration mode.

| Command | Purpose |
|---|---|
| Backup interface slot/port | Choose backup interface of this port. |

Enabled interface backup delaying, you can use instructions as follows in interface configuration mode.

| Command | Purpose |
|---|---|
| backup delay (enable-delay \| never ) (disable-delay \| never} | Difine backup interface activation and deactivation delaying. |

### 1.3.3 Enabling Flux Equlization Backup

Flux equlization backup function will work if real flux of primary interface pass the percentage limit, backup interface will be activated to work state. If real flux of primary interface and backup interface is less than percentage limit to primary band width, backup interface will be activated to backup state.

Enabled flux equalization backup, you should execute tasks as follows:

 • Choosing the backup interface
 • Enabling flux equalization of this interface

1. Choosing backup interface.

You can use instructions as follows in interface configuration mode.

| Command | Purpose |
|---|---|
| Backup interface slot/port | Choose backup interface of this interface |

2. Enabling flux equalization of this interface.

You can use instructions as follows in interface configuration mode.

| Command | Purpose |
|---|---|
| Backup load [enable-threshold\|never][disable-threshold\| never] | Configure interface backup flux to activate or deactivate backup interface limit. |

## 1.4  Examples of Port Backup Configuration

Enable the backup interface on serial interface 1/0, and choose serial interface 1/1 as his backup interface. The time of backup interface activation and deactivation is both 5 seconds. Flux equalization setting is when true flux of primary interface pass 60% of band width, activate backup interface, while flux through both interfaces is less than 30% of band width of primary interface, activate backup interface.

configure routers

interface s1/0

backup interface int s1/1

backup delay 5 5

backup load 70 30

It is enabled when the primary interface is "down", while the dialing backup interface is always connected.

If the backup interface is a normal dialing interface, when the primary interface is down and the backup interface does not need to send data, the backup interface will not dial initiative, only dial when sending data. After enabled this, regardless of transporting data, when primary interface is "down", backup interface will dial at once to connect. (if you take slow dial interface as backup interface, it is fit).

Enabled flux equlization backup, you must execute tasks as follows:

· Choose backup interface

· Enabled backup interface dial at once when primary interface is "down".

1. Choose backup interface. You can use instructions as follows in interface configuration mode.

| Command | Purpose |
|---|---|
| backup interface slot/port | Choose backup interface of this interface. |

2. Enabled backup interface dial at once when primary interface is "down".

You can use instructions as follows in interface configuration mode.

| Command | Purpose |
|---|---|
| backup always | When primary interface is down, backup Interface is always connected. |

For an example (a O/O as a dial interface)

configure router

interface s1/0

backup interface a0/0

backup always

# 2. Configuring Port Backup

## 2.1 Overview

HSRP is a standard method of providing high network availability by providing first-hop redundancy for IP hosts on an IEEE 802 LAN configured with a default gateway IP address. HSRP routes IP traffic without relying on the availability of any single router. It enables a set of router interfaces to work together to present the appearance of a single virtual router or default gateway to the hosts on a LAN. When HSRP is configured on a network or segment, it provides a virtual Media Access Control (MAC) address and an IP address that is shared among a group of configured routers. HSRP allows two or more HSRP-configured routers to use the MAC address and IP network address of a virtual router. The virtual router does not exist; it represents the common target for routers that are configured to provide backup to each other. One of the routers is selected to be the active router and another to be the standby router, which assumes control of the group MAC address and IP address should the designated active router fail.

HSRP detects when the designated active router fails, and a selected standby router assumes control of the Hot Standby group's MAC and IP addresses. A new standby router is also selected at that time. Devices running HSRP send and receive multicast UDP-based hello packets to detect router failure and to designate active and standby routers. When HSRP is configured on an interface, Internet Control Message Protocol (ICMP) redirect messages are disabled by default for the interface.

HSRP can be configured in Ethernet/Fast Ethernet/VLAN network without supporting token ring, token bus, FDDI and ATM LAN network.

## 2.2 HSRP Protocol Configuration Task List

· Enabling HSRP Protocol

· Configuring HSRP Group Property

## 2.3 HSRP Protocol Configuration Task

### 2.3.1 Enabling HSRP Protocol

To enable hsrp protocol in interface , you should configure the below command in interface configure model:

| Command | Purpose |
|---|---|
| standby [group-number\ ip [ip-address [secondary]] | Enable hsrp protocol. |

### 2.3.2 Configuring HSRP Group Property

To configure HSRP group property, you should configure one or more command list below in interface configure model:

| Command | Purpose |
|---|---|
| standby [group-number] timers hellotime holdtime | Configure HSRP timer parameter. |
| standby [group-number] mac-address mac-address | Configure HSRP group virtual mac address. |
| standby [group-number\ priority priority | Configure hsrp priority level.(To vote in active/standby router) |
| standby [group-number\ preempt [delay delay\ | Configure hsrp preempt. If local router's priority is larger than active router, local router should try to replace the active router. Configure hsrp preempt delay timer. Local router should replace active router after preempt delay timer. |
| standby [group-number] track type number [interface-priority] | Contgure hsrp group tracking interface list. If the tracking interface is failed, HSRP priority value decreased. |

| standby [group-number] authentication string | Configure the HSRP group authentication string to authenticate hsrp packet validation. |
|---|---|

## 2.4  Example of Hot Standby Configuration

The following is a typical HSRP configuration example. The host in network segment 171.16.6.0/24 access server 1 and server 2 through R1/R2/R3. R1 and R2 backups each other in network segment 172.16.2.0/24. Both R1 and R2 realize the load-share function.
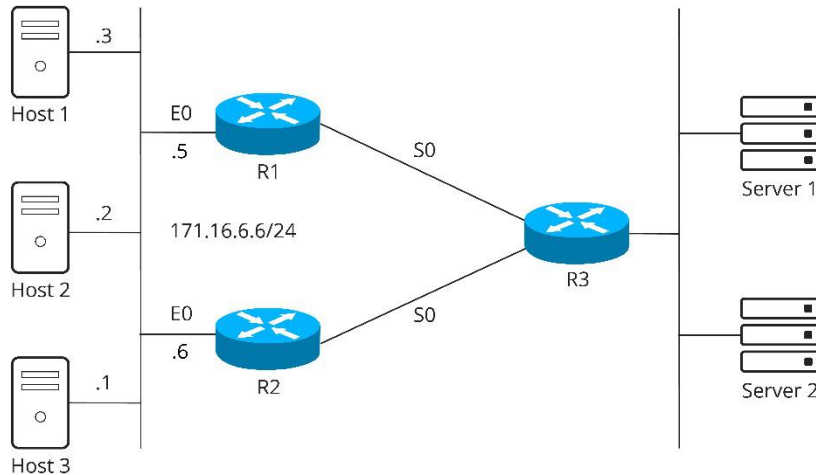


Figure 2-1 HSRP configuration

The following is R1 configuration:

First configure two HSRP groups on port Ethernet0, of which the virtual IP of group 1 is 171.16.6.100. The value of the default privilege level is 100, while the value of the privilege of group l on R2 is 95. Therefore, R1 is the active router of group l. If the s0 protocol is down, the privilege of group 1 decreases to 90 by 10. In this case, the privilege of group l on R2 is higher than that of group l on R1. Because group 1 on R2 has the occupation mechanism, group 1 on R2 then automatically switches to the active state and group l of R1 switches to the standby state.

The virtual IP of group2 is 171.16.6.200 and the privilege of group 2 is 95. Because the default value of the privilege of group 2 on R2 is 100, group 2 of R2 is then the standby router.

| R1 HSRP Configuration |
|---|
| Interface Ethernet0 |
| ip address 171.16.6.5 255.255.255.0 |
| standby 1 preempt |
| standby 1 ip 171.16.6.100 255.255.255.0 |
| standby 1 trackl Serial0 |
| standby 2 preempt |
| standby 2 ip 171.16.6.200 255.255.255.0 |
| standby 2 track Serial0 |
| standby 2 priority 95 |

The following is the R2 configuration:

Configure two HSRP group son interface Ethernet0. The visual IP of group 1 is 171.16.6.100 and the privilege of group l is 100, so R2 is the standby router of group l.

The virtual IP of group 2 is 171.16.6.200 and the default privilege of group 2 is 100. Because the privilege of group 2 on R2 is 95, R2 is then the active router of group 2.

| R1 HSRP Configuration |
| --- |
| Interface Ethernet0 |
| ip address 171.16.6.5 255.255.255.0 |
| standby 1 preempt |
| standby 1 ip 171.16.6.100 255.255.255.0 |
| standby 1 trackl Serial0 |
| standby 2 preempt |
| standby 2 ip 171.16.6.200 255.255.255.0 |
| standby 2 track Serial0 |
| standby 2 priority 95 |

The following is the R2 configuration:

Configure two HSRP group son interface EthernetO. The visual IP of group 1 is 171.16.6.100 and the privilege of group l is 100, so R2 is the standby router of group l.

The virtual IP of group 2 is 171.16.6.200 and the default privilege of group 2 is 100. Because the privilege of group 2 on R2 is 95, R2 is then the active router of group 2.

| R2 HSRP Configuration |
| --- |
| Interface Ethernet0 |
| ip address 171.16.6.6 255.255.255.0 |
| standby 1 preempt |
| standby 1 ip 171.16.6.100 255.255.255.0 standby 1 trackl Serial0 |
| standby 1 priority 95 |
| standby 2 preempt |
| standby 2 ip 171.16.6.200 255.255.255.0 |
| standby 2 track Serial0 |

Then set the gateways of the host in network segment 172.16.6.0/24 to 172.16.6.100 and 172.16.6.200 respectively. In this case, the load balance then functions.

# 3. Configuring VRRP

## 3.1 VRRP Overview

The Virtual Router Redundant Protocol (VRRP) can take several routers as a router backup group, providing network users a virtual-gateway router. It is useful to users when the router detection protocol is not supported. This is because it cannot automatically switch to a new NMS router when the selected router is reinstalled or breaks down.

VRRP provides a virtual MAC address and a virtual IP which is shared by a group of VRRP-running routers. VRRP will select a router from this router group to server as a main router. The main router receives and forwards the packets whose destination address is the virtual MAC address of the backup group. When VRRP detects the invalidity of the main router, the VRRP routers will select one as a new main router to obtain the MAC and the IP of the backup group.

The VRRP-running main router transmits the Advertise packets based on the Sock Raw multicast, while the standby routers receive these packets. The standby routers can serve as the main router through their Timer out mechanism and the Preempt mechanism. You can configure multiple hot standby groups on an interface to fully use the router.

Currently VRRP supports Ethernet/Fast Ethernet/VLAN protocols, but it does not support the token ring and the token bus.

VRRP is designated by IETF VRRP working group which is defined in RFC2338.

### 3.1.1 VRRP Application

**Line backup**

You can back up a link through VRRP.

For example, if a node in a company or in a bank wants to connect the outside network through the VRRP group, another router will automatically take over the jobs when one router invalidates.
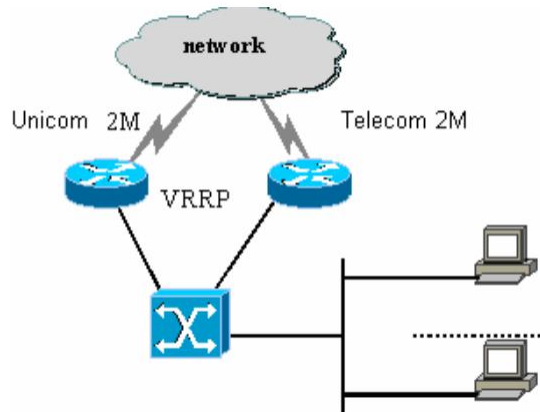


Figure 3-1 VRRP application

### 3.1.2 VRRP Terms

| | |
|---|---|
| VRRP | Virtual Router Redundancy Protocol |
| VIP | Virtual IP |
| VMAC | Virtual MAC address |
| VRRP Router | A router which runs VRRP |
| Virtual Router | a VRRP group which is viewed by other parts in the network as a virtual router |
| IP Address Owner | A VRRP router that sets a real IP of an interface to VRRP VIP |
| Virtual Router Master | Active router that forwards the data in the current VRRP group |
| Primary IP Address | An IP address selected from the addresses of an interface according to a certain regulation, which is normally the first IP address |
| Virtual Router Backup | A standby router which will be selected to serve as a data-forwarding router when the master router invalidates |

## 3.2 VRRP Configuration Task List

· Enabling VRRP

· Configuring the time for VRRP

· Configuring the VRRP learning mode

· Configuring the description string for VRRP

· Configuring the privilege for VRRP hot backup

· Configuring the preemption mode

· Configuring the privilege for tracking other interfaces

· Configuring the authentication string

· Monitoring and maintaining VRRP

## 3.3 VRRP Configuration Tasks

### 3.3.1   Enabling VRRP

| Command | Purpose |
| --- | --- |
| [no] vrrp group-number ip [ip-address netmask [secondary]] | Enables or disables VRRP. |

### 3.3.2   Configuring the Time of VRRP

| Command | Purpose |
| --- | --- |
| [no] vrrp group-number timers advertise \|> | Sets the time of VRRP whose unit is second or 0.1 second. |

### 3.3.3   Setting the VRRP Learning Mode

| Command | Purpose |
| --- | --- |
| [no] vrrp group-number timers learn | Sets the VRRP learning mode. |

### 3.3.4   Configuring the Description String of VRRP

| Command | Purpose |
| --- | --- |
| [no] vrrp group-number description TEXT | Configures the description string for VRRP. |

### 3.3.5   Configuring the Privilege for VRRP Hot Backup

| Command | Purpose |
| --- | --- |
| [no] vrrp group-number priority | Sets the hot standby privilege level in the VRRP router for selecting the primary router and the standby router. |

### 3.3.6 Configuring the Preemption Mode

| Command | Purpose |
|---|---|
| [no] vrrp group-number preempt [delay ] | Sets the preemption mode. |

### 3.3.7 Configuring the Privilege for Tracking Other Ports

Configuring the Privilege for Tracking Other Ports

| Command | Purpose |
|---|---|
| [no] vrrp group-number track type number [interface-priority] | Configures the privilege for tracking other ports, enabling the VRRP privilege to vary with the state change of the tracked port. When the tracked port invalidates, the VRRP privilege decreases; when the tracked port resumes effective, the VRRP privilege increases. |

### 3.3.8 Configuring the Authentication String

| Command | Purpose |
|---|---|
| [no] vrrp group-number authentication string | Configures the privilege for tracking other ports, enabling the VRRP privilege to vary with the state change of the tracked port. When the tracked port invalidates, the VRRP privilege decreases; when the tracked port resumes effective, the VRRP privilege increases. |

### 3.3.9 Monitoring and Maintaining VRRP

| Command | Purpose |
|---|---|
| show vrrp [interface interface-number\ brief | detail | Displays the running state of the current VRRP. |
| debug vrrp [interface interface-number group-number] all | packets | events | errors | Debugs three kinds of VRRP events. |

## 3.4 VRRP Configuration Example

In the following network topology, two subnets in a same network use their own gateways (gateway A and gateway B) respectively to access the Internet, but gateway A and gateway B are standby ones each other. When one gateway (one router) breaks down, the other will work for the two subnets.
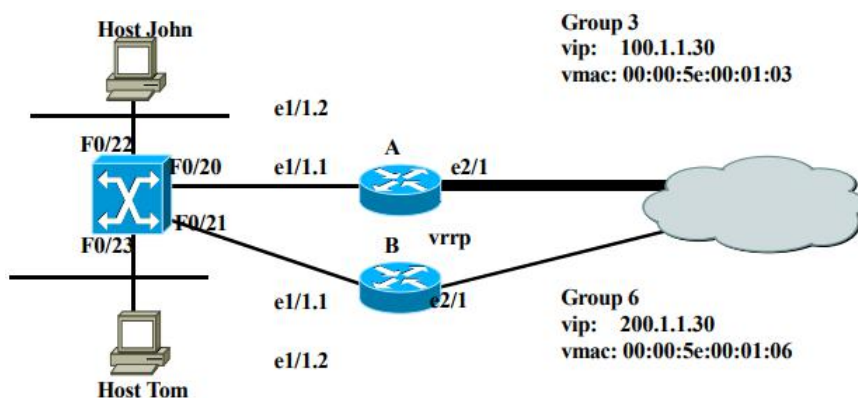


Figure 3-2 Simple VRRP application

The configuration is shown as follows:

**Router A:**

-----------------------------------

interface Ethernet1/1.1

encapsulation dot1Q 2

ip address 100.1.1.5 255.255.255.0

vrrp 3 associate 100.1.1.30 255.255.255.0

vrrp 3 priority 120

vrrp 3 description line1-master

vrrp 3 authentication line1pwd

vrrp 3 preempt

vrrp 3 timers advertise dsec 15

-----------------------------------

interface Ethernet1/1.2

encapsulation dot1Q 3

ip address 200.1.1.5 255.255.255.0

vrrp 6 associate 200.1.1.30 255.255.255.0

vrrp 6 priority 110

 vrrp 6 description line2-backup

vrrp 6 authentication line2pwd

vrrp 6 preempt

vrrp 6 timers advertise dsec 15

—————————————————————————————

 **Router B:**

-----------------------------------

interface Ethernet1/1.2

encapsulation dot1Q 2

ip address 100.1.1.6 255.255.255.0

vrrp 3 associate 100.1.1.30 255.255.255.0

vrrp 3 priority 110

vrrp 3 description line1-backup

vrrp 3 authentication line1pwd

vrrp 3 preempt

vrrp 3 timers advertise dsec 15

-----------------------------------

interface Ethernet1/1.2

encapsulation dot1Q 3

ip address 200.1.1.6 255.255.255.0

vrrp 6 associate 200.1.1.30 255.255.255.0

vrrp 6 priority 120

vrrp 6 description line2-master

vrrp 6 authentication  line2pwd

vrrp 6 preempt

vrrp 6 timers advertise dsec 15

---------------------------------

Switch A:

---------------------------------

interface FastEthernet0/20

switchport trunk vlan-allowed (2,3)

!

 interface FastEthernet0/21

 switchport trunk vlan-allowed (2,3)

 !

 interface FastEthernet0/22

 switchport pvid 2

!

 interface FastEthernet0/23

 switchport pvid 3

 !

interface VLAN2

ip addr 100.1.1.8 255.255.255.0

no ip directed-broadcast

!

interface VLAN3

ip addr 200.1.1.8 255.255.255.0

no ip directed-broadcast

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