13 Virtual Router Redundancy Protocol (VRRP)

Introduction

The Virtual Router Redundancy Protocol (VRRP) is a standard router redundancy protocol supported in IP version 4. It is based on RFC 2338 and provides redundancy by eliminating the single point of failure inherent in a static default route environment.

VRRP allows routers on a LAN to back up a static default route with a virtual router. VRRP dynamically assigns responsibility for a virtual router to a physical router (VRRP router) on the LAN. The virtual router is associated with an IP address (or set of IP addresses) on the LAN. A virtual router master is elected to forward packets for the virtual router's IP address. If the master router becomes unavailable, the highest priority backup router will transition to the master state.

One advantage of using VRRP is that it does not require the configuration of dynamic routing or router discovery protocols. Dynamic routing protocols are suited to large, meshed networks, but for smaller networks and end systems it may not be possible to run a dynamic routing protocol on every end host because of administrative overhead, processing overhead, security issues, or lack of protocol implementation. Router (or neighbor) discovery protocols may require each end host to support the protocol. Large timer values are required and may cause significant delay in the detection of a dead neighbor.

VRRP is supported on the OmniSwitch and the Omni Switch/Router (OmniS/R). It may be configured over any interface that has IP configured to run over Ethernet, FDDI, or Token Ring LANs.

Virtual Routers

To back up an IP address or addresses using VRRP, a virtual router must be configured on VRRP routers on a common LAN. A VRRP router is a physical router, such as an OmniSwitch, running VRRP. A virtual router is defined by a virtual router identifier (VRID) and a set of associated IP addresses on the LAN. (On the OmniSwitch and OmniS/R only one IP address is assigned to an interface, but other VRRP routers may have multiple IP addresses per interface.) The VRID must be unique on the switch.

Each VRRP router may back up one or more virtual routers. The VRRP router that contains the physical interfaces to which the virtual router IP addresses are assigned is called the *IP address owner*. If it is available, the IP address owner will function as the master router. The master router assumes the responsibility of forwarding packets sent to the IP addresses associated with the virtual router and answering ARP requests for these addresses.

To minimize network traffic, only the master router sends VRRP advertisements on the LAN. The IP address assigned to the physical interface on the current master router is used as the source address in VRRP advertisements. The advertisements communicate to all VRRP routers the priority and state of the master router associated with the VRID. The advertisements are IP multicast datagrams sent to the VRRP multicast address 224.0.0.18 (as determined by the Internet Assigned Numbers Authority).

If a master router becomes unavailable, it stops sending VRRP advertisements on the LAN. The backup routers know the master is unavailable based on the following algorithm:

Master Down Interval = (3 * *Advertisement Interval*) + *Skew Time*

where Advertisement Interval is the time interval between VRRP advertisements, and Skew Time is calculated based on the VRRP router's priority value as follows:

Skew Time = (256 - *Priority*) / 256

If backup routers are configured with priority values that are close in value, there may be a timing conflict, and the first backup to take over may not be the one with the highest priority; a backup with a higher priority will then preempt the new master. The virtual router may be configured to prohibit any preemption attempts, except by the IP address owner. An IP address owner, if it is available, will always become master of any virtual router associated with its IP addresses.

VRRP Authentication

When a VRRP interface receives a VRRP packet, it verifies that the IP Time to Live (TTL) is 255, the VRRP version is correct, the checksum is correct, and the packet length is greater than or equal to the VRRP header. If the virtual router is configured for VRRP authentication, it will also authenticate the packet. (This authentication process is transparent to the user.) The authentication supported is simple text password, which is similar to simple text authentication for Open Shortest Path First (OSPF) routing protocol.

Authentication is recommended because it protects against accidental misconfiguration of routers on a LAN and inadvertently backing up another router. If authentication is used, all virtual routers on the LAN must be configured with the same password.

♦ Note ♦

This type of authentication makes it difficult for a VRRP packet to be sent from another LAN to disrupt VRRP operation, but it does not offer secure protection. The simple text password is sent out frequently and could be learned by a hostile router.

Authentication may be configured using the **vrrpadd** command or **vrrpmodify** command. The authentication type is initially set to **None**. The default should only be used in environments where there is little security risk and little chance for configuration errors.

VRRP MAC Addresses

Each VRRP router has a single well-known MAC address, which is used as the source in all periodic VRRP advertisements sent by the master router and as the MAC address in ARP replies (instead of a virtual router's physical MAC address). The MAC address has the following format:

00-00-5E-00-01-[virtual router ID]

This mapping provides for up to 255 VRRP routers on a network.

VRRP and ARP Requests

When an end host sends an ARP request for one of the virtual router's IP addresses, the master router responds to the ARP request using the virtual router's MAC address rather than the virtual router's physical MAC address. Gratuitous ARP requests are broadcast upon configuring a VRRP interface. For VRRP interfaces, gratuitous ARP requests/responses are delayed at system boot until both the IP address and the virtual router MAC address are configured.

VRRP and ICMP Redirects

ICMP redirects are not sent out over a VRRP interface.

VRRP and Token Ring

Since some older Token Ring adapters do not support general multicast, the Alcatel VRRP implementation uses Token Ring functional addresses for virtual router MAC addresses. The functional address mode of Token Ring must be configured in order to run VRRP over the interface.

Token Ring functional addresses range from 03-00-00-00-00-80 through 03-00-02-00-00-00 (canonical format). Unlike multicast addresses, there is only one unique functional address per bit position. There are 12 functional addresses (from 03-00-00-10-00-00 through 03-00-02-00-00-00) that are reserved for user-defined applications. IPX uses 03-00-00-10-00-00 so this address is not used for VRRP. The other 11 addresses are mapped to VRIDs as given in the following table:

VRID	Token Ring Functional Address
1	03-00-02-00-00-00
2	03-00-04-00-00-00
3	03-00-08-00-00-00
4	03-00-10-00-00-00
5	03-00-20-00-00-00
6	03-00-40-00-00-00
7	03-00-80-00-00-00
8	03-00-00-01-00-00
9	03-00-00-02-00-00
10	03-00-00-04-00-00
11	03-00-00-08-00-00

Other non-IP protocols may be using one of these functional addresses, so a user running VRRP over Token Ring should make sure there are no conflicts. Typically most non-IP protocols use the first one or two user-defined functional addresses.

♦ Important Note ♦

To avoid conflicts, do not assign a virtual router ID higher than 11 to a Token Ring interface.

VRRP Configuration Example 1

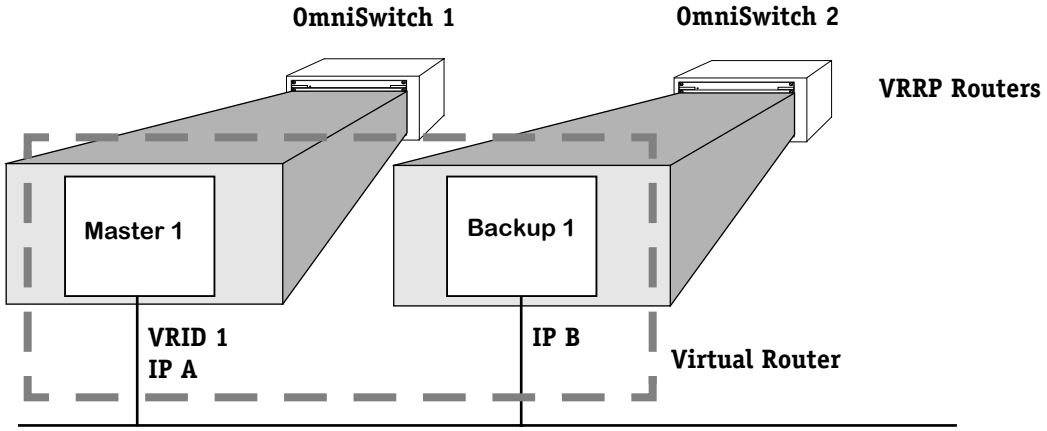
This example is provided here for understanding VRRP and does not show a configuration that would be used in an actual network.

Each of the VRRP routers configures a virtual router, VRID 1, which is associated with IP address A. OmniSwitch 1 is the master router because it contains the physical interface to which IP address A is assigned. OmniSwitch 2 is the backup router.

OmniSwitch 2 uses IP address B to access the LAN, but IP address B is not backed up. If OmniSwitch 2 becomes unavailable, IP address B is unavailable.

When first configured, OmniSwitch 1 will send a gratuitous ARP request for IP address A using the virtual router's MAC address (00:00:5E:00:01:01) as the MAC address. OmniSwitch 2 will send an ARP request for IP address B using the OmniSwitch's physical MAC address. The two routers will respond to ARP requests the same way.

If OmniSwitch 1 becomes unavailable, OmniSwitch 2 will forward packets for IP address A and respond to ARP requests for IP address A using the virtual router's MAC address (00:00:5E:00:01:01). It will also forward packets for IP address B and respond to ARP requests for IP address B using the OmniSwitch's physical MAC address.



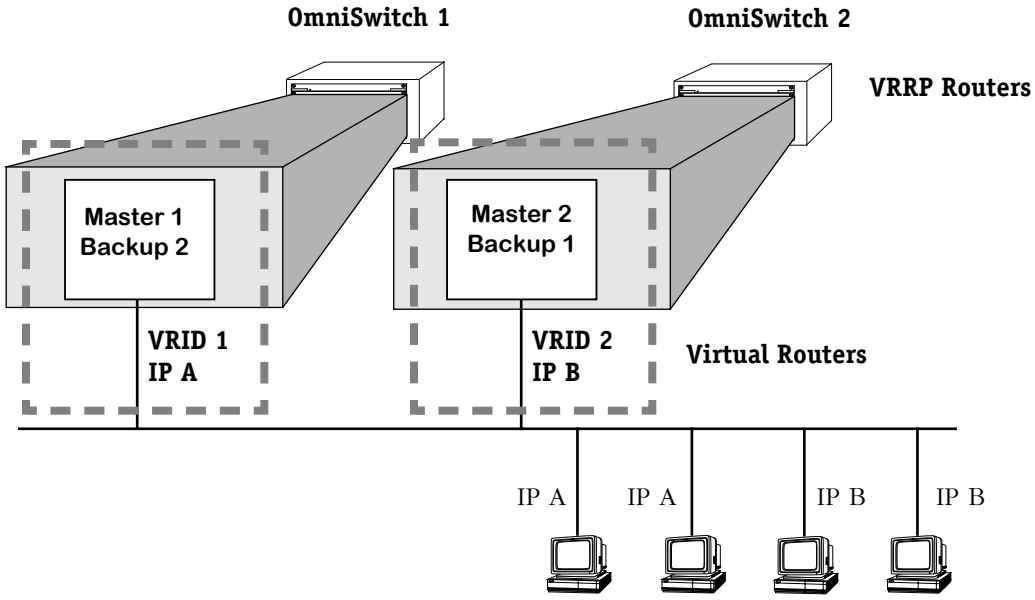
VRRP Example 1

VRRP Configuration Example 2

In addition to showing redundancy, this example shows load balancing of outgoing traffic and represents the kind of configuration that may be used in actual practice. The figure shows two virtual routers with their hosts splitting traffic between them. Half of the hosts configure a default route to virtual router 1's IP address (IP A), and the other half configure a default route to virtual router 2's IP address (IP B).

Each of the VRRP routers (OmniSwitch 1 and OmniSwitch 2) configures two virtual routers, VRID 1 and VRID 2. The master of VRID 1 will respond to ARP requests for IP address A using the virtual router MAC address for VRID 1 (00:00:5E:00:01:01). OmniSwitch 1 is the master for VRID 1 since it contains the physical interface to which IP address A is assigned. If OmniSwitch 1 should become unavailable, OmniSwitch 2 will become master for IP address A.

In the same way, the master of VRID 2 will respond to ARP requests for IP address B using the virtual router MAC address for VRID 2 (00:00:5E:00:01:02). OmniSwitch 2 is the master for VRID 2 since it contains the physical interface to which IP address B is assigned. If OmniSwitch 2 should become unavailable, OmniSwitch 1 will become master for IP address B. This configuration provides uninterrupted service for the end hosts.



VRRP Example 2

Installation

The VRRP image file is called **vrrp.img**. To upload the file, use standard FTP or ZMODEM procedures. Refer to your switch user manual for information about uploading the software.

By default, VRRP is loaded into the switch at system boot and is enabled. Virtual routers must be configured as described in *User Interface Commands* on page 13-7.

Disabling VRRP

If you want to disable the VRRP feature, use the **vrrpoff** command (see *Shutting Down the VRRP Process* on page 13-11). This command disables VRRP temporarily. To restart VRRP, use the **vrrpon** command or reboot the switch.

You can control whether or not VRRP is loaded at system boot by modifying the **mpm.cmd** or **mpx.cmd** file. To modify this file, use the **edit** command (see your switch user manual for instructions on using the **edit** command).

♦ Important Note ♦

If you add this command, it *must* appear before the command that invokes **cmInit**.

Add the following command:

```
use_vrrp=0
```

Reboot the switch; VRRP will not be loaded. To load VRRP again, delete the command from the file and reboot the switch.

User Interface Commands

When VRRP is loaded into the switch, it adds a submenu called **VRRP** to the Networking menu of the User Interface (UI).

Commands in the UI are executed by typing the command and pressing **<Enter>**. If you are using verbose mode, additional text may display for some prompts.

On configuration screens, parameters may be changed by entering the number next to the relevant parameter, an equal sign, and the desired value at the prompt (for example **6=N**). After changes are made, enter **save**, **quit**, or **cancel** at the prompt.

♦ Note ♦

For general information about the UI, see your switch user manual.

VRRP Submenu

To display the VRRP submenu, enter the following command:

```
vrrp
```

If the UI is configured for terse mode, enter a **?** to display the submenu. In verbose mode the submenu automatically displays.

```
Command          VRRP Menu
---------------------  ------------------------------------------------------------------------
vrrpadd          Add a Virtual Router Instance
vrrpclear        Clear/Reset VRRP Statistics Counters
vrrpdelete       Delete a Virtual Router Instance
vrrpmodify       Modify a Virtual Router Instance
vrrpon           Start the VRRP Process
vrrpoff          Shutdown the VRRP Process
vrrpstats        Statistics & Errors of Virtual Router Instance(s)
vrrptrap         Enable/Disable the Generation of VRRP SNMP Traps
vrrpview         View Virtual Router Instance(s)

     Main      File      Summary   VLAN      Networking
     Interface Security  System    Services  Help
```

Adding a Virtual Router Instance

At least two VRRP routers must be configured on the LAN, a master router and a backup. Use the **vrrpadd** command to create a virtual router instance. The virtual router instance is identified by a number called the virtual router ID (VRID), an IP address (or addresses), and a pair of numbers indicating the relevant group and VLAN. There may be multiple virtual router instances per VRRP router.

To add a virtual router instance to the configuration, enter the command with the desired VRID. For example:

```
vrrpadd 1
```

The VRID must be a unique number in the range from 1 to 255 for any virtual router on the same switch. If you do not include a VRID, the system prompts you to enter one. For example:

```
Add Virtual Router Instance. Please specify a unique VRID number to identify
this Router Instance.

VRID (1) :
```

♦ Note ♦

On the OmniS/R, up to 8 virtual routers may be configured. Each VRID must be unique and defined as one of the following values: 1, 2, 4, 8, 16, 32, 64, or 128.

The screen displays similar to the one shown here:

```
Adding VRRP configuration record for VRID:1

Enter VRRP parameters:

1) Administrative Status . . . . . Enabled
   {(E)nable, (D)isable}
2) Group:Vlan. . . . . 1:1
   {Group:Vlan Pair}
3) IP Address(es) . . . . . 0.0.0.0
   {Valid IP address notation e.g., x.x.x.x}
4) Priority . . . . . 100
   {255 if owner of IP addresses, 1-254 if not owner}
5) Advertisement Interval . . . . . 5
   {Interval (in seconds) between Advertisements 1..255}
6) Preempt Mode . . . . . Preempt
   {(P)reempt, (N)one}
7) Authentication Type . . . . . None
   {(N)one, (S)impleText}
```

The IP address must be configured. The group:VLAN pair must also be configured if the desired value is anything other than the default, which is **1:1**. If the IP address is the actual address for the group/VLAN, the priority value will be automatically set to 255. Other parameters may keep the defaults.

Fields on the screen have the following definitions:

Administrative Status

Indicates the administrative status of the VRRP instance; **Enabled** allows the VRRP instance to operate; **Disabled** disables the instance without deleting it.

Group:Vlan

The first number is the group associated with the VRRP instance. The second number is the VLAN associated with this VRRP instance.

IP Address(es)

Lists one or more addresses that are associated with this virtual router.

Priority

Specifies the VRRP router's priority for the virtual router. Higher values equal higher priority. Note the following:

- A value of 255 indicates that the VRRP router owns the IP address, that is, that the router contains the real physical interface to which the IP address is assigned. The system automatically sets this value to 255 if it detects that this router is the IP address owner. This value cannot be set to 255 if the router is not the IP address owner. The IP address owner will always be the master router if it is available.
- VRRP routers backing up a virtual router must use priority values from 1 to 254. The default priority value for VRRP routers backing up a virtual router is 100. If you configure more than one backup, their priority values should be different (see definition of **Preempt Mode** parameter).
- The system sets this value to zero in the last VRRP advertisement packet before a master router is shut down (such as when the **vrrpoff** command is used to shut down the VRRP process, or when the VRID is administratively disabled using the **vrrpadd** command or **vrrpmodify** command).

Advertisement Interval

Indicates the time interval between VRRP advertisements. The default is 5 seconds.

Preempt Mode

Controls whether a higher priority backup router preempts a lower priority master. Values are **P** (preempt) to allow preemption and **N** (none) to prevent preemption. The default is to allow it. If you set this value to **N**, the first backup to take over for the master will not be preempted by a backup with a higher priority. This is useful when backup routers have similar priority values because the backup with the highest priority may not be the one to take over initially for the master.

♦ Important Note ♦

The router that owns the IP address(es) associated with the virtual router always becomes the master router if it is available, regardless of the preempt mode setting.

Auth Type

Indicates the authentication type used for VRRP exchanges between virtual routers, **Simple Text** or **None**. **None** is the default.

To configure the new virtual router instance, follow the steps here:

1. Configure the IP address. For example, at the system prompt enter:

   3=198.206.184.31

2. Configure the group:VLAN pair if the value should be something other than the default, which is **1:1**. For example, enter:

   2=2:1

3. If you are configuring a virtual router with an IP address that is assigned to the physical interface of the VRRP router, the priority value will be automatically set to 255. If you are configuring a single backup router on the LAN, the default priority value may be used. If you are configuring multiple backup routers, the priority values should be different. For example:

   4=200

   ♦ Note ♦

   If you are configuring multiple backup routers on the LAN, make sure the priority values do not overlap or are similar in value; otherwise there may be a timing conflict when a backup must transition to the master state. A backup with a lower priority value may take over first and then be preempted by a backup with a higher priority value.

4. Configure the authentication type. By default authentication is disabled; it is recommended that authentication be configured. (For more information about authentication, see *VRRP Authentication* on page 13-2.) To change the authentication setting, enter **7=s** (for simple text). The screen redisplays as follows:

   Enter VRRP parameters:

   1) Administrative Status . . . . . Enabled
   {(E)nable, (D)isable}
   2) Group:Vlan. 2:1
   {Group:Vlan Pair}
   3) IP Address(es). 198.206.184.31
   {Valid IP address notation e.g., x.x.x.x}
   4) Priority 200
   {255 if owner of IP addresses, 1-254 if not owner}
   5) Advertisement Interval. 5
   {Interval (in seconds) between Advertisements 1..255}
   6) Preempt Mode . . . . . Preempt
   {(P)reempt, (N)one}
   7) Authentication Type . . . . . Simple Text
   {(N)one, (S)impleText}
   70) Password. . . . . .
   {8-character password}

5. Configure a password for authentication by entering **70=<any 8-character password>**. All virtual routers on the same LAN must be configured with the same password.

6. Enter **save** at the system prompt.

7. Enter **q** to exit the command.

Deleting a Virtual Router Instance

Use the **vrrpdelete** command to delete an existing VRRP instance using the following syntax:

```
vrrpdelete <VRID>
```

A screen similar to the following displays:

```
This will delete the configuration for VRID:1
Continue? {(Y)es, (N)o}:N
```

To delete the instance, enter **y**. If you want to cancel the deletion, press **<Enter>** to accept the default (no).

Modifying a Virtual Router Instance

Use the **vrrpmodify** command to modify the parameters of an existing virtual router instance using the following syntax.

```
vrrpmodify <VRID>
```

A screen similar to the following displays:

```
Modify VRRP configuration record for VRID: 1

Enter VRRP parameters:

1) Administrative Status . . . . . Enabled
   {(E)nable, (D)isable}
2) Group:Vlan. . . . . 2:1
   {Group:Vlan Pair}
3) IP Address(es). . . . . 198.206.184.31
   {Valid IP address notation e.g., x.x.x.x}
4) Priority . . . . . 200
   {255 if owner of IP addresses, 1-254 if not owner}
5) Advertisement Interval. . . . . 5
   {Interval (in seconds) between Advertisements 1..255}
6) Preempt Mode . . . . . Preempt
   {(P)reempt, (N)one}
7) Authentication Type . . . . . Simple Text
   {(N)one, (S)impleText}
70) Password . . . . . .
      {8-character password}
```

Fields on this screen are the same as fields on the **vrrpadd** screen. See *Adding a Virtual Router Instance* on page 13-8.

Shutting Down the VRRP Process

Use the **vrrpoff** command to shut down the VRRP process. VRRP is not removed from the switch memory but is disabled; any VRRP commands (except **vrrpon**) are ignored. After you enter the command, the following message displays:

```
This will shutdown the VRRP Process. Continue? {(Y)es, (N)o} (n):
```

To stop VRRP, enter **y**. To cancel the shutdown, enter **n** or press **<Enter>**.

This command disables the VRRP process until the **vrrpon** command is entered or the switch is rebooted.

Restarting the VRRP Process

After using the **vrrpoff** command, use the **vrrpon** command to restart VRRP without rebooting the switch. After you enter the command, a confirmation message displays.

Resetting Statistics

Use the **vrrpclear** command to reset statistics counters of one or more VRRP instances. All operational and error statistics (displayed using the **vrrpstats** command) are reset.

♦ Note ♦

The VRID, Group:Vlan, State, and UpTime parameters are not reset by this command.

To reset statistics for all virtual router instances, enter:

```
vrrpclear
```

To reset statistics for a particular instance, enter the VRID with the command. For example:

```
vrrpclear 1
```

Viewing VRRP Statistics

Use the **vrrpstats** command to view operational and error statistics of one or more VRRP instances as described in the following sections.

Viewing Statistics for All Instances

To display the statistics for all instances, enter the command without the VRID:

```
vrrpstats
```

A screen similar to the following displays:

```
VRRP is running. (Build 4.0.0.3)

VRID    Group:VLAN    State       UpTime    Become Master    Adv Rcvd
=====   ============  =======     ========  ==============   =========
    1           1:1   master        2076                1           0
    2           2:1   backup        2098                0         122
    3           4:1   initialize       6                0           0
```

Fields in the table are defined as follows:

VRID. Virtual router identifier.

Group:VLAN. The first number is the group associated with the VRRP instance. The second number is the VLAN associated with this VRRP instance.

State. The administrative state of the VRRP instance; **initialize** means that this VRRP instance is waiting for a startup event, such as a reboot, enabling a new virtual router instance, or issuing the **modvl** command (see your switch user manual for information about this command); **backup** means that this instance is monitoring the availability and the state of the master router; **master** means that this instance is functioning as the master router.

UpTime. Time interval (in hundredths of a second) since this virtual router was last reinitialized.

Become Master. The total number of times that this virtual router's state has transitioned to master.

Adv Rcvd. The total number of VRRP advertisements received by this virtual router.

Viewing Statistics for a Single VRID

To view operational and error statistics for a particular VRRP instance, enter the command with the VRID. For example:

```
vrrpstats 1
```

A screen similar to the following displays:

```
VRRP is running. (Build 4.0.0.3)

VRRP Statistics for VRID: 1 (1:1)

VRID    Group:VLAN    State      UpTime      Become Master    Adv Rcvd
=====   ============  =======    ========    ==============   =========
    1           1:1    master        2076                1           0

Chksum  Vers  VrId   Adv-Int  Auth      IpTTL  Zero  Zero  Inv   Addr  Invalid     AuthType
Errs    Errs  Errs   Errs     Failures  Errs   Sent  Rcvd  Type  Errs  Auth        Mismatch
======  ====  ====   ======   =======   =====  ====  ====  ===   ====  =======     =======
     0     0     0        0         0      0     0     0     0     0           0           0
```

Fields in the first row are described in *Viewing Statistics for All Instances* on page 13-12. An additional row of fields displays for this screen. Definitions are as follows:

Chksum Errs. The total number of VRRP packets received with an invalid checksum value.

Vers Errs. The total number of VRRP packets received with an invalid version number.

VrId Errs. The total number of VRRP packets received with an invalid VRID for this virtual router.

Adv-Int Errs. The total number of VRRP advertisement packets received for which the advertisement interval is different than the one configured for the local virtual router.

Auth Failures. The total number of VRRP packets received that do not pass the simple text password authentication check.

IpTTL Errs. The total number of VRRP packets received by the router with IP TTL not equal to 255. A VRRP router can accept only TTLs with a value of 255.

Zero Sent. The total number of VRRP packets sent by the virtual router with a priority of zero.

Zero Rcvd. The total number of VRRP packets received by the virtual router with a priority of zero.

Inv Type. The number of VRRP packets received by the virtual router with an invalid value in the VRRP type field.

Addr Errs. The number of VRRP packets received in which the address list does not match the locally configured list for the virtual router.

Invalid Auth. The number of VRRP packets received with an unknown authentication type.

AuthType Mismatch. The number of VRRP packets received when the authentication type is not equal to the locally configured authentication method.

VRRP SNMP Traps

Use the **vrrptrap** command to enable/disable the generation of VRRP SNMP traps. If enabled, the VRRP-enabled router will generate SNMP traps for events defined in the VRRP SNMP MIB. When VRRP traps are disabled, the router will not send any traps.

♦ Note ♦

In order for VRRP traps to be generated correctly, traps must be enabled in the SNMP configuration (snmpc).

To enable VRRP traps, enter the **vrrptrap** command. The resulting message display depends on whether VRRP traps are enabled or disabled. Traps are disabled by default.

If VRRP traps are currently disabled, a message similar to the following displays:

```
VRRP Traps are currently disabled. Enable? {(Y)es, (N)o} (n):
```

Enter **y** to enable traps. The following message displays:

```
VRRP Traps have been enabled.
```

If VRRP traps are currently enabled, a message similar to the following displays:

```
VRRP Traps are currently enabled. Disable? {(Y)es, (N)o} (n):
```

Enter **y** to disable traps. The following message displays:

```
VRRP Traps have been disabled.
```

Viewing Configuration Parameters

Use the **vrrpview** command to view configuration information about all VRRP instances or a single VRRP instance.

To view configuration information for all instances, enter:

```
vrrpview
```

A screen similar to the following displays:

VRID	GP:VLAN	IP Address(es)	Admin Status	Priority	AuthType	Preempt Mode	Adv-Interval
1	1:1	22.0.0.1	enabled	255	SimpleText	preempt	5
2	2:1	25.0.0.1	enabled	255	SimpleText	preempt	5

To view information about a particular instance, enter the command with the VRID. For example:

```
vrrpview 1
```

A screen displays similar to the following:

VRID	GP:VLAN	IP Address(es)	Admin Status	Priority	AuthType	Preempt Mode	Adv-Interval
1	1:1	22.0.0.1	enabled	255	SimpleText	preempt	5

Fields in the table are configured using the **vrrpadd** command or **vrrpmodify** command (see *Adding a Virtual Router Instance* on page 13-8 or *Modifying a Virtual Router Instance* on page 13-11). The fields are defined as follows:

VRID. Virtual router identifier.

GP:VLAN. The first number is the group associated with the VRRP instance. The second number is the VLAN associated with this VRRP instance.

IP Address(es). The assigned IP address(es) that a virtual router is responsible for backing up.

Admin Status. The administrative status of this virtual router instance; **enabled** allows the virtual router instance to operate; **disabled** disables the virtual router instance without deleting it.

Priority. Indicates the VRRP router's priority for the virtual router. Higher values equal higher priority. Note the following:

- A value of 255 indicates that the VRRP router owns the IP address, that is, that the router contains the real physical interface to which the IP address is assigned. The system automatically sets this value to 255 if it detects that this router is the IP address owner. This value cannot be set to 255 if the router is not the IP address owner. The IP address owner will always be the master router if it is available.
- VRRP routers backing up a virtual router must use priority values from 1 to 254. The default priority value for VRRP routers backing up a virtual router is 100. If you configure more than one backup, their priority values should be different (see definition of **Preempt Mode** parameter).
- The system sets this value to zero in the last VRRP advertisement packet before a master router is shut down (such as when the **vrrpoff** command is used to shut down the VRRP process, or when the VRID is administratively disabled using the **vrrpadd** command or **vrrpmodify** command).

AuthType. Indicates the authentication type used for VRRP exchanges between virtual routers, **Simple Text** or **None**.

Preempt Mode. Controls whether a higher priority virtual router will preempt a lower priority master: **preempt** indicates that a higher priority virtual router will preempt a lower priority master; **none** indicates that the first backup router to take over for the master will not be preempted by a backup with a higher priority. In either case the IP address owner will always take over if it is available.

Adv-Interval. Indicates the time interval, in seconds, between sending advertisement messages. Only the master router sends VRRP advertisements.