Chapter 14

Configuring VRRP

This chapter describes how to configure the Virtual Router Redundancy Protocol (VRRP) on your E-series router.

Overview

VRRP can prevent loss of network connectivity to end hosts if the static default IP gateway fails. By implementing VRRP, you can designate a number of routers as *backup* routers in the event that the default *master* router fails. VRRP fully supports Virtual Local Area Networks (VLANs) and stacked VLANs (S-VLANs).

NOTE: The term *virtual router* as defined in *JUNOSe System Basics Configuration Guide, Chapter 13, Configuring Virtual Routers*, is different from what is implied by VRRP. In this chapter, the term *virtual router* always refers to a VRRP router; that is, a router that has enabled VRRP.

In case of a failure, VRRP dynamically shifts the packet-forwarding responsibility to a backup router. VRRP creates a redundancy scheme which enables hosts to keep a single IP address for the default gateway but maps the IP address to a well-known virtual MAC address. VRRP provides this redundancy without user intervention or additional configuration at the end hosts.

VRRP Terms

Table 20 provides definitions for the basic VRRP terms used in this chapter.

Table 20: VRRP Definitions

Term	Definition
VRRP router	A router that is running VRRP. It might participate in one or more virtual router IDs (VRIDs). An IP redundancy instance can: ■ Act as a master with associated addresses it owns at an IP interface ■ Act simultaneously as a backup for other routers with additional VRID mappings and priorities for those routers
Master router	The VRRP router that takes the responsibility of forwarding packets sent to the IP addresses associated with the virtual router, and that answers ARP requests for these IP addresses. If the IP address owner is available, it always becomes the master.
Backup router	The VRRP router available to take forwarding responsibility if the current master router fails.
IP address owner	The IP interface–VRID pair instance that has the associated IP addresses as real interface addresses. This router, when up, responds to packets addressed to one of these IP addresses for Internet Control Message Protocol (ICMP) pings or Transmission Control Protocol (TCP) connections. The IP address owner is the *primary router*.
Primary IP address	An IP address configured as primary from the set of real interface addresses. VRRP advertisements are always sent (by the master router) using the primary IP address as the source of the IP packet.

Platform Considerations

For information about modules that support VRRP on ERX-14xx models, ERX-7xx models, and the ERX-310 router:

- See *ERX Module Guide, Table 1, Module Combinations* for detailed module specifications.
- See *ERX Module Guide, Appendix A, Module Protocol Support* for information about the modules that support VRRP.

For information about modules that support VRRP on the E120 router and the E320 router:

- See *E120 and E320 Module Guide, Table 1, Modules and IOAs* for detailed module specifications.
- See *E120 and E320 Module Guide, Appendix A, IOA Protocol Support* for information about the modules that support VRRP.

References

For more information about VRRP, see:

- RFC 2338—Virtual Router Redundancy Protocol (April 1998)
- RFC 2787—Definitions of Managed Objects for the Virtual Router Redundancy Protocol (March 2000)

NOTE: We recommend that you have some background understanding of the Address Resolution Protocol (ARP) before you configure VRRP. See the section, *Address Resolution Protocol*, in *JUNOSe IP, IPv6, and IGP Configuration Guide, Chapter 1, Configuring IP*.

How VRRP Works

The advantage of using VRRP is that you gain a higher availability for the default path without requiring configuration of dynamic routing or router discovery protocols on every end host.

VRRP routers viewed as a *redundancy group* share the responsibility for forwarding packets as if they *owned* the IP address corresponding to the default gateway configured on the hosts. At any time, one of the VRRP routers acts as the master, and other VRRP routers act as backup routers. If the master router fails, a backup router becomes the new master. In this way, router redundancy is always provided, allowing traffic on the LAN to be routed without relying on a single router.

A master always exists for the shared IP address. If the master goes down, the remaining VRRP routers elect a new master VRRP router. The new master forwards packets on behalf of the owner by taking over the virtual MAC address used by the owner.

When implemented in your network, VRRP interprets any active link to a subnet to indicate the router has access to the entire subnet. VRRP leverages the broadcast capabilities of Ethernet. Provided that one of the routers in a VRRP configuration is running, ARP requests for the IP addresses assigned to the default gateway always receive replies. Additionally, end hosts can send packets outside their subnet without interruption.

Configuration Examples

This sections describes and illustrates three VRRP configuration examples. They include:

- Basic VRRP Configuration on page 336
- Commonly Used VRRP Configuration on page 337
- VRRP Configuration Without the Real Address Owner on page 338

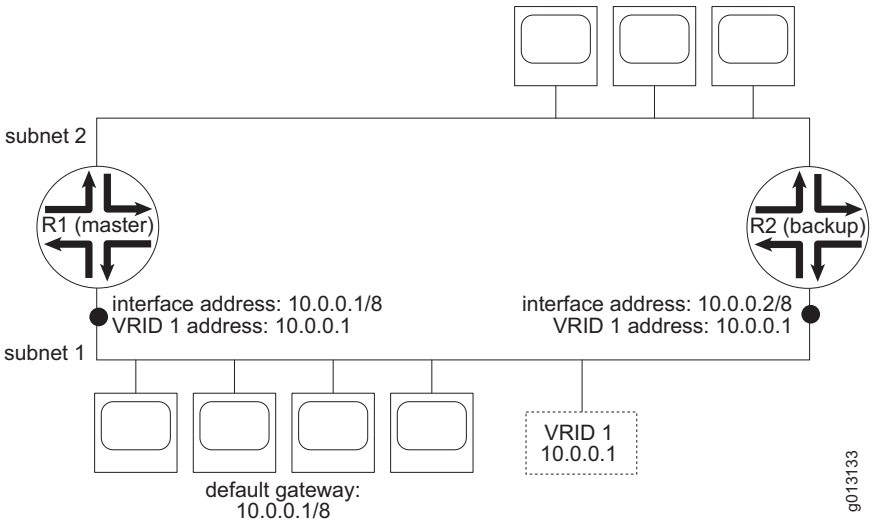
Basic VRRP Configuration

As Figure 30 shows, the basic VRRP configuration uses a single VRID (VRID 1). Because R1 is the address owner, it serves as the master router. Router R2 is the backup router. The four end hosts on subnet 1 are configured to use 10.0.0.1/8 as the default router. IP address 10.0.0.1 is associated with VRID 1.

In this example, if R1 becomes unavailable, R2 takes over VRID 1 and its associated IP addresses. Packets sent to IP destinations outside the 10.x.x.x subnet using 10.0.0.1 as the router are then forwarded by R2. Even though R2 assumes R1's forwarding responsibilities, it may or may not process any packet with destination address (DA) 10.0.0.1, depending on the accept-data configuration. When R1 becomes active again, it takes over as the master router and R2 reverts to the backup router.

The VRRP MAC address is always 00-00-5e-00-01-*vrid*. The valid VRID range is 0x01–0xFF.

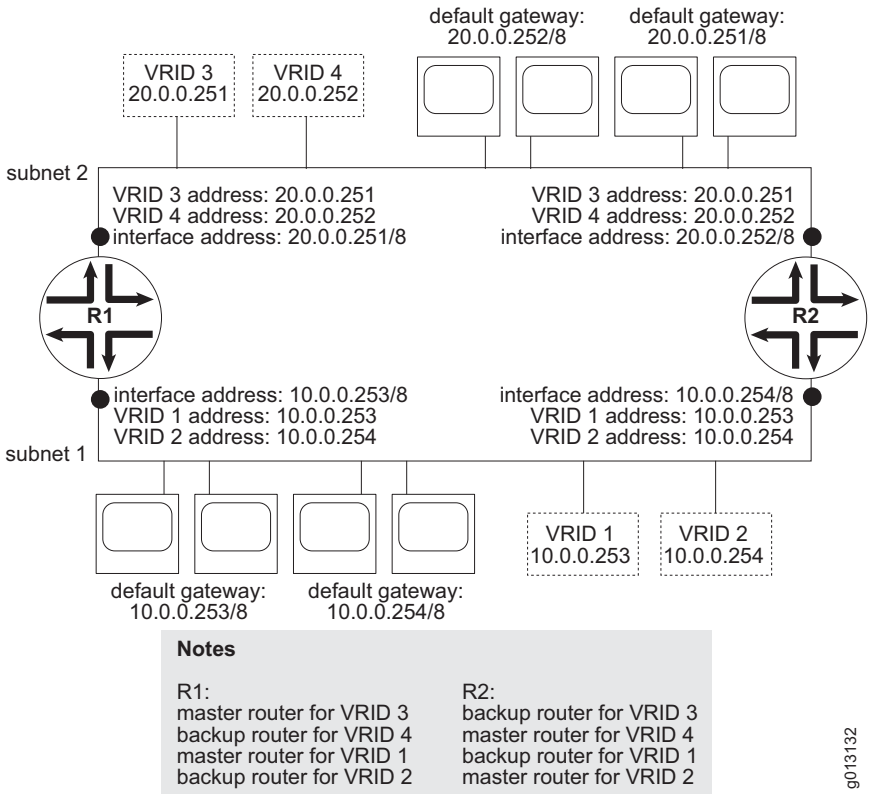
Figure 30: Basic VRRP Configuration



Commonly Used VRRP Configuration

Figure 31 shows two physical routers backing up each other through VRRP. Routers R1 and R2 are both configured with VRID 1 and VRID 2. In this configuration, under normal circumstances the routing load is distributed between the two routers.

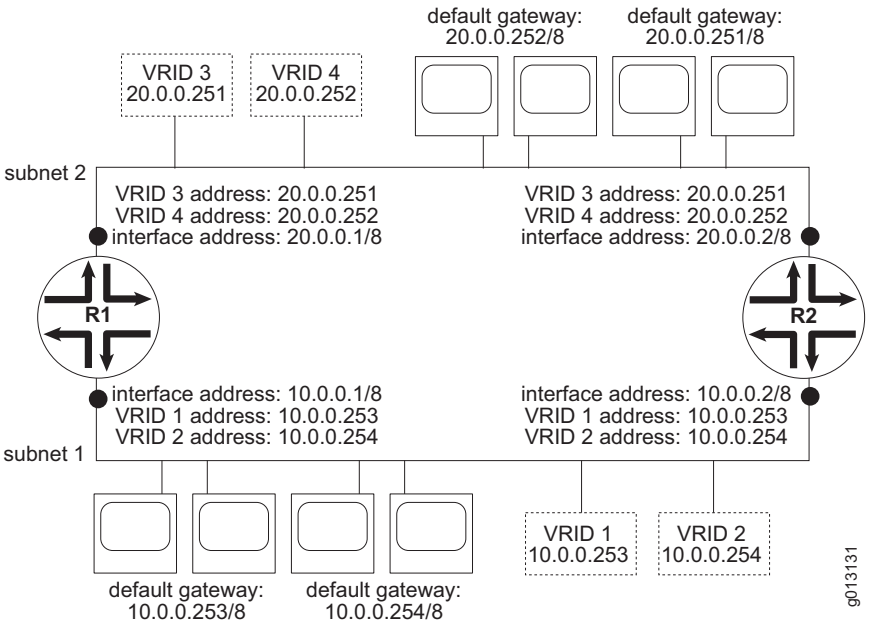
Figure 31: Commonly Used VRRP Configuration



VRRP Configuration Without the Real Address Owner

Figure 32 is noticeably similar to Figure 31 except that the addresses configured by the VRIDs have no real owner. Consequently, both routers R1 and R2 are configured as backup routers for VRID 1, VRID 2, VRID 3, and VRID 4.

Figure 32: VRRP Configuration Without the Real Address Owner



Assuming that preemption is enabled, the router that is configured with the highest priority for each VRID becomes the master router. If priorities are the same, the router that has the highest primary address becomes the master router.

This configuration shows how the address owner does not necessarily need to exist under VRRP, and all PCs can reach destinations outside of their network through the current master VRRP router. Depending on the accept-data configuration, the PCs may even be able to ping their default gateway.

The election protocol specified in VRRP uses IP multicast packets to provide the router with redundancy. Therefore, VRRP can operate over a variety of multiaccess LAN technologies that support IP multicast. It is important to remember that there is always one master router for an IP address shared by the redundancy group.

How VRRP Is Implemented in E-series Routers

VRRP is implemented in E-series routers to meet two goals. The first goal is to avoid the single point of failure inherent to hosts that have a single default gateway configured. The second goal is to keep the complexity of redundancy away from the hosts themselves. These goals comply with RFC 2338 and RFC 2787.

The association between VRIDs and IP addresses is coordinated among all participating VRRP routers. The following scenario can help you understand how VRRP is implemented in the router.

1. An E-series router assigns common VRIDs to the group of routers that are going to share IP addresses.

2. The E-series router sends VRRP advertisements to well-known multicast addresses. The router that owns the addresses automatically becomes the master and sends periodic VRRP advertisement messages. A VRRP advertisement consists of the IP addresses that the master router controls and the VRID.

3. If the master router stops advertising for a predetermined period of time, the remaining routers using the same VRID enter an election process to determine which router takes over the master router responsibilities.

4. Depending on the configuration, the master router that does not own the IP addresses might do one of the following:

   - Drop all packets that have destination addresses to these IP addresses (default)

   - Accept packets that have destination addresses to these IP addresses as if the addresses belonged to the master router (using the **ip vrrp accept-data** command).

5. If the elected master router fails, backup routers start the election process again.

6. When the original master router becomes operational again, it restarts broadcasting advertisements as long as preemption is enabled or the master router is the address owner. Packet forwarding responsibility then shifts back to the original master router.

Router Election Rules

If the master router becomes unavailable, the following rules govern election of the master router:

- The backup router assigned the highest priority for each VRID becomes the master router.
- If two backup routers were assigned the same priority, the router that has the highest primary address becomes the master router. For example, if several routers were all assigned the default priority of 100, the IP addresses must be compared.
- Router election on a VRRP router can also be determined by whether the preemption option is enabled.

  When a backup router detects a master router with a lower priority than the backup router has, the backup router might leave the current master router alone or take over the current master router and become the master router itself.

  When preemption is enabled, a backup router always preempts or takes over the responsibility of the master router. When preemption is disabled, the lower-priority backup is left in the master state.

NOTE: Using VRRP can override the source address of the ICMP redirect. When a backup VRID functions as a master router on a given IP interface, its ICMP redirects must *fake* the source IP address of the IP address owner. The redirect must fake the IP address because hosts accept only an ICMP redirect that is sent by the current gateway of the host.

Configuring VRRP

Configuring VRRP requires that you first configure an IP interface over which you can configure VRRP and any VRID instances in which you want the VRRP routers to participate.The following sections contain information for configuring the IP interface for VRRP, any VRID instances for the VRRP routers, and steps for creating a basic VRRP configuration.

Configuring the IP Interface

Before you configure VRRP, you must configure an IP interface and assign a primary IP address and subnet mask. When the IP address belongs to the owner of the VRID, you must associate the IP address with the VRID that you create.

To configure the IP interface for VRRP:

1. Configure an IP interface.

   host1(config)#**interface fastEthernet 4/0**

2. Assign an IP address and a subnet mask.

   host1(config-if)#**ip address 194.50.1.42 255.255.255.0**

NOTE: We recommend that you complete all IP address configurations before you configure VRRP. If for any reason the IP address information changes after you configure VRRP, you must revise the associated IP addresses configured on the related VRRP entries. If you specify **auto** addresses in the **ip vrrp virtual-address** command along with using priority 255, you must disable and reenable the VRRP entry to update the association list.

Creating VRIDs

A master or backup router running the VRRP protocol can participate in one or more VRID instances. You can create a VRID instance in several ways:

- We recommend that you create and configure a VRID instance first, and enable it last. For example:

  host1(config-if)#**ip vrrp 198**
  host1(config-if)#**ip vrrp 198 priority 255**

- You can create and enable a VRID instance by using the **ip vrrp** *vrid* **enable** command. For example:

  host1(config-if)#**ip vrrp 25 enable**

- You continue to configure the VRID by identifying the VRID each time you use a VRRP command. For example:

  host1(config-if)#**ip vrrp 175 authentication-type none**

- Alternatively, you can create a new VRID when you use any VRRP command, provided that you are using the VRID instance for the first time. For example, if you execute the **ip vrrp** *vrid* **preempt** command and it is the first time that you use the VRID, the command creates a new VRID.

  host1(config-if)#**ip vrrp 16 preempt**

- Use the ip **vrrp** *vrid* **enable** command last. The new VRID is not enabled until you execute this command.

  host1(config-if)#**ip vrrp 198 enable**
  host1(config-if)#**ip vrrp 16 enable**
  host1(config-if)#**ip vrrp 175 enable**

Configuration Steps

Before you configure VRRP, we recommend that you review the configuration examples in the earlier section *How VRRP Works* on page 335.

To configure VRRP parameters:

1. (Optional) Create a VRID instance.

   host1(config-if)#**ip vrrp 25**

2. (Optional) Set a VRRP advertisement interval for the same VRID.

   host1(config-if)#**ip vrrp 25 advertise-interval 50**

3. Set the VRRP router priority for owner or backup router(s).

   This step is mandatory to configure priority for the owner VRID (255). This step is optional to configure priority for a backup VRID (1–254). The default value is 100.

   host1(config-if)#**ip vrrp 25 priority 255**
   host1(config-if)#**ip vrrp 22 priority 254**

4. (Optional) Specify that the backup router can process packets with an IP destination address of the virtual address.

   host1(config-if)#**ip vrrp 22 accept-data**

5. (Optional) Set the preempt option. This example creates a new VRID.

   host1(config-if)#**ip vrrp 10 preempt**

6. Associate an IP address with a VRID.

   host1(config-if)#**ip vrrp 25 virtual-address 194.2.1.63**

7. (Optional) Set the VRRP authentication type to either **text** or **none**.

   host1(config-if)#**ip vrrp 25 authentication-type none**

8. (Optional) Configure the VRRP authentication key.

   host1(config-if)#**ip vrrp 25 authentication-key dublin**

9. Enable the VRID instance.

   host1(config-if)#**ip vrrp 25 enable**

ip vrrp

- Use to create a VRID instance.
- The VRID range is 1–255.
- Example

  host1(config-if)#**ip vrrp 25**

- Use the **no** version to remove a VRID instance.

ip vrrp accept-data

- Use to enable the backup router to process packets with an IP destination address equivalent to the virtual addresses while the backup router is in the master state.
- Use the default state (disabled) for full compliance with RFC 2338.
- The configuration ignores this attribute if the VRRP entry uses a priority of 255 (owner).

NOTE: When using this attribute and also restricting incoming packets to ICMP only, you must use policy filters to accept only ICMP packets with the virtual address as the destination address.

- Example

  host1(config-if)#**ip vrrp 22 accept-data**

- Use the **no** version to disable processing of data packets by the backup router while the router is in the master state. When disabled, the master router drops any packets with an IP destination address equivalent to the virtual addresses.

ip vrrp advertise-interval

- Use to configure the amount of time the VRRP router waits between advertisements.
- Specify the interval time in seconds or milliseconds.
- Use seconds to be in compliance with RFC 2338.
- If your VRID environment consists of only E-series routers, you can optionally use milliseconds.
- Example

  host1(config-if)#**ip vrrp 25 advertise-interval 50**

- Use the **no** version to restore the default value, 1 second.

ip vrrp authentication-key

- Use to specify the authentication key.
- Use the **key** keyword only when the authentication type is **text**. See the **ip vrrp authentication-type** command.
- Example

  host1(config-if)#**ip vrrp 25 authentication-key dublin**

- Use the **no** version to set the authentication key to its default, an empty string.

ip vrrp authentication-type

- Use to specify the authentication type; **text** or **none**.
- Example

  host1(config-if)#**ip vrrp 175 authentication-type none**

- Use the **no** version to set the authentication type to its default, none.

ip vrrp enable

- Use to enable an existing VRID instance.
- Specify a VRID in the range 1–255.
- The default is that VRRP is disabled.
- Example

  host1(config-if)#**ip vrrp 175 enable**

- Use the **no** version to disable an existing VRID instance.

ip vrrp preempt

- Use to enable preemption. When preemption is enabled, a backup router always takes over the responsibility of the master router. When preemption is disabled, the lower-priority backup router is left in the backup state.
- Example

  host1(config-if)#**ip vrrp 10 preempt**

- The default is that VRRP preemption is enabled.
- Use the **no** version to disable preemption.

ip vrrp priority

- Use to configure the priority of VRRP routers.
- Use a value of 255 to imply *master router* priority.
- Use a value in the range 1–254 to imply *backup router* priority.
- Example

  host1(config-if)#**ip vrrp 25 priority 255**

- Use the **no** version to set the priority to the default value, 100.

ip vrrp virtual-address

- Use to associate an IP address with a VRID.
- Use the **auto** keyword to automatically learn or configure associated addresses, depending on the priority attribute.
- There is no default.
- Example

  host1(config-if)#i**p vrrp 25 virtual-address 194.2.1.63**

- Use the **no** version to remove an IP address association with a VRID. If you use **auto** addressing, the **no** version clears the **auto** flag.

Changing Object Priority

You can use the **ip vrrp track** command (in conjunction with the **track** command) to track an object by its virtual router ID (VRID). When the state of the object changes from an up state to a down state, the priority of the vrid is decremented. When the object changes back to an up state the priority is restored. You can specify a priority value in the range 1–255 to be used for modifying the priority; the default value is 10.

NOTE: For information about the **track** command see *JUNOSe System Basics Configuration Guide, Chapter 5, Managing the System*.

ip vrrp track

- Use to dynamically change the priority of a virtual router ID (VRID) in response to a change in the state of a specified object. You can specify the value by which the priority changes in the range 1–255 or use the default value (10). Multiple VRIDs can track the same object and a single VRID can track multiple objects. The object priority is restored when the state of the object returns to an up state.
- Example 1

  host1(config-if)#**ip vrrp 25 track abc**

- Example 2

  host1(config-if)#**ip vrrp track xyz decrement 15**

- Use the **no** version to disable any tracking for the object.

Monitoring VRRP

You can use several VRRP show commands to *display* the details of your VRRP configuration.

baseline ip vrrp

- Use to establish the baseline on all VRRP statistics as the current value.
- Example

  host1#**baseline ip vrrp**

show ip vrrp

- Use to display a detailed summary of all configured VRIDs.
- Use the **interface** keyword to specify a specific Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet interface.
- Use the **summary** keyword to display a summary count on all configured VRIDs

- Field descriptions
  - Interface—Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet interface specifier and VRID
  - primary address—IP address used while in master state; not necessarily an associated address
  - operational state—State of the VRRP router: master, backup, or init; when the operational state is backup, the current master router IP address is provided
  - admin state—Administrative status: enabled or disabled
  - up time—Number of seconds that the VRID has been enabled in non-init state
  - interval—VRRP advertisement interval in seconds or milliseconds
  - last error status—Help text used to debug any error detected
  - priority—Priority value of VRRP router
  - admin priority—Priority of the VRRP administrative router
  - auth type—The VRRP authentication type: none or text
  - preemption—VRRP router preemption status: enabled or disabled
  - accept data—VRRP router accept data status: enabled or disabled
  - assoc address(es)—IP addresses associated with the VRID
  - track object—Name and state of the tracked object and the value by which the object priority changes following an object state change
  - ip interfaces with vrrp—Number of IP interfaces using VRRP
  - entries—Total number of entries
  - entries enabled—Number of enabled entries
  - entries with owner priority—Number of entries with an owner priority
  - entries in init state—Number of entries in an initialization state
  - entries in backup state—Number of entries in a backup state
  - entries in master state—Number of entries in a master state
  - entries performing tracking—Number of entries performing tracking functions
- Example 1

```
host1#show ip vrrp
Interface: FastEthernet3/0 vrrpVrid: 1
  primary address: 12.60.1.1
  operational state: init
  admin state: disabled
  up time: N/A
  interval: 1 second
  last error status: no error
  priority: 100  ( admin priority: 100 )
  auth type: none
```

```
  preemption: enabled
  accept data: disabled
  assoc address(es): none
  track object:  xyz  state:  Up  decrement:  10
```

- Example 2

```
host1#show ip vrrp summary
ip interfaces with vrrp: 1
  entries: 10
  entries enabled: 10
  entries with owner priority: 1
  entries in init state: 0
  entries in backup state: 9
  entries in master state: 1
  entries performing tracking: 2
```

show ip vrrp brief

- Use to display a brief summary of all configured VRIDs.
- Use the **interface** keyword to specify a specific Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet interface.
- Field descriptions
  - Interface—Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet interface specifier
  - VRID—VRRP router instance configured on this interface
  - Primary Address—IP address used while in master state; not necessarily an associated address
  - State—Operational state of VRRP router: master, backup, or init
  - Adv—Advertisement interval, in seconds
  - Pri—Priority assigned to this router
  - Admin—Administrative state of the VRID: enabled or disabled
- Example

```
host1#show ip vrrp brief
Interface                VRID  Primary Address  State   Adv  Pri  Admin
-----------------------  ----  ---------------  ------  ---  ---  --------
fastEthernet12/8.1.1      255  123.123.123.123    init    1  100  disabled
gigabitEthernet12/8.1.1     1          1.1.1.1  master    1  254  enabled
```

show ip vrrp neighbor

- Use to display neighbors currently known to the VRRP routers.
- A neighbor—a router that shares a given VRID with the VRRP router—is known to the VRRP router only when the neighbor becomes a master for an IP address and sends VRRP advertisements to that effect. If a router sharing the VRID has not yet become a master, then the local router remains unaware of this neighbor and this command does not display that neighbor.
- Use the **interface** keyword to specify a specific Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet interface.
- Field descriptions
  - Interface—Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet interface specifier and VRID of neighbors known to the VRRP router
  - time discovered—Date and time that the neighbor was detected
  - primary address—Primary IP address of neighbor
  - adv interval (sec)—VRRP advertisement interval in seconds
  - priority—Priority status of VRRP router (255 = owner)
  - auth type—VRRP authentication type: none or text
  - assoc address(es)—IP addresses associated with the VRID that are advertised by the neighbor
- Example

```
host1#show ip vrrp neighbor
Interface: fastEthernet5/0.0 vrrpVrid: 1
  time discovered: 08/09/2001 07:44
  primary address: 10.0.0.1
  adv interval (sec): 1
  priority: 255 (owner)
  auth type: none
  assoc address(es): 10.0.0.1, 100.0.0.1, 101.0.0.1

Interface: fastEthernet5/0.1 vrrpVrid: 11
  time discovered: 08/09/2001 07:44
  primary address: 11.0.0.1
  adv interval (sec): 1
  priority: 255 (owner)
  auth type: none
  assoc address(es): 11.0.0.1, 110.0.0.1, 111.0.0.1
```

show ip vrrp statistics

- Use to display statistics of configured VRRP routers and each individual VRID.
- Use the **delta** keyword with the **show ip vrrp statistics** command to view the baseline statistics.
- Use the **interface** keyword with the **show ip vrrp statistics** command to specify a specific Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet interface.

- Field descriptions
  - checksumErrors—Total number of VRRP packets received with an invalid VRRP checksum value
  - versionErrors—Total number of VRRP packets received with an unknown or unsupported version number
  - vrIdErrors—Total number of VRRP packets received with an invalid VRID for this virtual router
  - iccErrors—Count of line module notifications that did not make it to the controller
  - txErrors—Count of advertisements that did not get sent due to resource limitations
  - rxErrors—Count of advertisements received that could not be parsed by VRRP applications
  - Interface—Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet interface specifier and VRID
  - becomeMaster—Total number of times that this VRID state has transitioned to master
  - advertiseRcvd—Total number of VRRP advertisements received
  - advertiseIntervalErrors—Total number of VRRP advertisement packets received for which the advertisement interval is different from the one configured for the VRID
  - authFailures—Total number of VRRP packets received that do not pass the authentication check
  - ipTtlErrors—Total number of VRRP packets received with IP TTL (time-to-live) not equal to 255
  - priorityZeroPktsRcvd—Total number of VRRP packets received with a priority of 0
  - priorityZeroPktsSent—Total number of VRRP packets sent with a priority of 0
  - invalidTypePktsRcvd—Total number of VRRP packets received with an invalid value in the Type field
  - addressListErrors—Total number of VRRP packets received for which the address list does not match the locally configured list for the VRID
  - invalidAuthType—Total number of VRRP packets received with an unknown authentication type
  - authTypeMismatch—Total number of VRRP packets received with an authentication type not equal to the locally configured authentication method
  - packetLengthErrors—Total number of VRRP packets received with a packet length less than the length of the VRRP header

- Example 1—statistics per interface

```
host1#show ip vrrp statistics interface fastEthernet 4/0
Globals:
  checksumErrors: 0
  versionErrors: 0
  vrIdErrors: 1
  iccErrors: 0
  txErrors: 0
  rxErrors: 0

Interface: fastEthernet4/0 vrrpVrid: 1
  becomeMaster: 10
  advertiseRcvd: 0
  advertiseIntervalErrors: 0
  authFailures: 0
  ipTtlErrors: 0
  priorityZeroPktsRcvd: 0
  priorityZeroPktsSent: 9
  invalidTypePktsRcvd: 0
  addressListErrors: 0
  invalidAuthType: 0
  authTypeMismatch: 0
  packetLengthErrors: 0

Interface: fastEthernet4/0 vrrpVrid: 50
  becomeMaster: 0
  advertiseRcvd: 1000
  advertiseIntervalErrors: 0
  authFailures: 0
  ipTtlErrors: 0
  priorityZeroPktsRcvd: 0
  priorityZeroPktsSent: 0
  invalidTypePktsRcvd: 0
  addressListErrors: 0
  invalidAuthType: 0
  authTypeMismatch: 0
  packetLengthErrors: 0
```

- Example 2—statistics per interface and VRID

```
host1#show ip vrrp statistics interface fastEthernet 4/0 1
Interface: fastEthernet4/0 vrrpVrid: 1
  becomeMaster: 0
  advertiseRcvd: 0
  advertiseIntervalErrors: 0
  authFailures: 0
  ipTtlErrors: 0
  priorityZeroPktsRcvd: 0
  priorityZeroPktsSent: 0
  invalidTypePktsRcvd: 0
  addressListErrors: 0
  invalidAuthType: 0
  authTypeMismatch: 0
  packetLengthErrors: 0
```

show ip vrrp statistics global

- Use to display the statistics of configured VRRP routers and each individual VRID.
- Use the **delta** keyword with the **show ip vrrp statistics global** command to view the baseline statistics.
- Field descriptions
  - checksumErrors—Total number of VRRP packets received with an invalid VRRP checksum value
  - versionErrors—Total number of VRRP packets received with an unknown or unsupported version number
  - vrIdErrors—Total number of VRRP packets received with an invalid VRID for this virtual router
  - iccErrors—Count of line module notifications that did not make it to the controller
  - txErrors—Count of advertisements that did not get sent due to resource limitations
  - rxErrors—Count of advertisements received that could not be parsed by VRRP applications
- Example

```
host1#show ip vrrp statistics global
Globals:
  checksumErrors: 0
  versionErrors: 0
  vrIdErrors: 0
  iccErrors: 0
  txErrors: 0
  rxErrors: 0
```

show ip vrrp summary

- Use to display a summary count on all configured VRIDs.
- Field descriptions
  - ip interfaces with vrrp—Total number of VRIDs configured on IP interfaces
  - entries—Total number of entries in all states
  - entries enabled—Number of entries that were enabled
  - entries with owner priority—Number of entries with owner priority
  - entries in init state—Number of entries in the init state
  - entries in backup state—Number of entries in the backup state
  - entries in master state—Number of entries in the master state
- Example

```
host1#show ip vrrp summary
  ip interfaces with vrrp: 1
  entries: 10
  entries enabled: 10
  entries with owner priority: 1
  entries in init state: 0
  entries in backup state: 9
  entries in master state: 1
```

show ip vrrp tracked-objects

- Use to display details of objects tracked by various VRIDs
- Field descriptions
  - Interface—Name of the interface
  - Vrid—VRRP router instance configured on the interface
  - Priority—Priority of the VRRP router
  - Object—Name of the object being tracked
  - Type—Type of object being tracked
  - State—State of the object
  - Decrement—Value by which the priority is decremented or restored following an object state change
- Example

```
host1#show ip vrrp tracked-objects
Interface          Vrid       Priority   Object        Type       State   Decrement
----------------   -------    --------   ------        --------   -----   ---------
FastEthernet3/0    1          100        ERX_Bangalore IP-route   Up      12
FastEthernet3/0    1          100        ERX_Bangalore IP-route   Up      15
FastEthernet3/0    1          100        ERX_Bangalore IP-route   Up      10
FastEthernet3/0    2          100        ERX_Bangalore IP-route   Up      10
FastEthernet3/0    3          100        ERX_Bangalore IP-route   Up      12
FastEthernet3/0    3          100        ERX_Bangalore IP-route   Up      15
```