



Virtual Router Redundancy Protocol

Feature History

Release	Modification
12.0(18)ST	This feature was introduced.
12.0(22)S	This feature was integrated into Cisco IOS Release 12.0(22)S.
12.2(13)T	This feature was integrated into Cisco IOS Release 12.2(13)T.
12.2(14)S	This feature was integrated into Cisco IOS Release 12.2(14)S.

This document describes the Virtual Router Redundancy Protocol feature. It includes the following sections:

- [Feature Overview, page 1](#)
- [Supported Platforms, page 5](#)
- [Supported Standards, MIBs, and RFCs, page 6](#)
- [Configuration Tasks, page 6](#)
- [Configuration Examples, page 8](#)
- [Command Reference, page 9](#)
- [Glossary, page 30](#)

Feature Overview

There are several ways a LAN client can determine which router should be the first hop to a particular remote destination. The client can use a dynamic process or static configuration. Examples of dynamic router discovery are as follows:

- Proxy ARP—The client uses Address Resolution Protocol (ARP) to get the destination it wants to reach, and a router will respond to the ARP request with its own MAC address.
- Routing protocol—The client listens to dynamic routing protocol updates (for example, from Routing Information Protocol [RIP]) and forms its own routing table.
- IRDP (ICMP Router Discovery Protocol) client—The client runs an Internet Control Message Protocol (ICMP) router discovery client.

The drawback to dynamic discovery protocols is that they incur some configuration and processing overhead on the LAN client. Also, in the event of a router failure, the process of switching to another router can be slow.

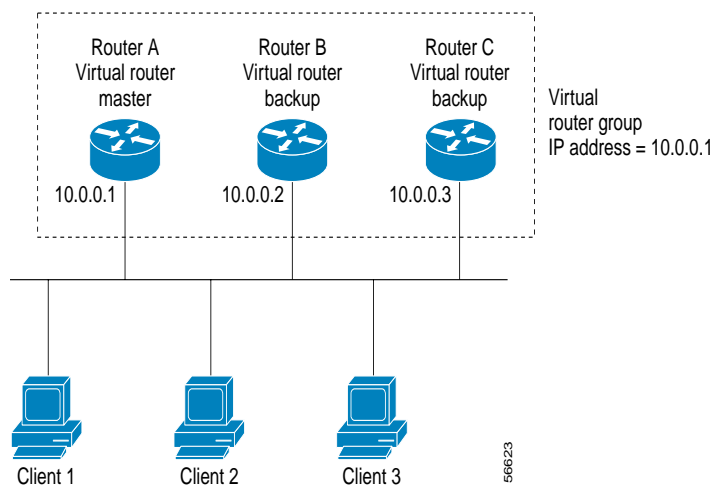
An alternative to dynamic discovery protocols is to statically configure a default router on the client. This approach simplifies client configuration and processing, but creates a single point of failure. If the default gateway fails, the LAN client is limited to communicating only on the local IP network segment and is cut off from the rest of the network.

The Virtual Router Redundancy Protocol (VRRP) feature can solve the static configuration problem. VRRP enables a group of routers to form a single *virtual router*. The LAN clients can then be configured with the virtual router as their default gateway. The virtual router, representing a group of routers, is also known as a VRRP group.

VRRP is supported on Ethernet, Fast Ethernet, and Gigabit Ethernet interfaces, and on MPLS VPNs and VLANs.

For example, [Figure 1](#) shows a LAN topology in which VRRP is configured. In this example, Routers A, B, and C are *VRRP routers* (routers running VRRP) that comprise a virtual router. The IP address of the virtual router is the same as that configured for the Ethernet interface of Router A (10.0.0.1).

Figure 1 Basic VRRP Topology

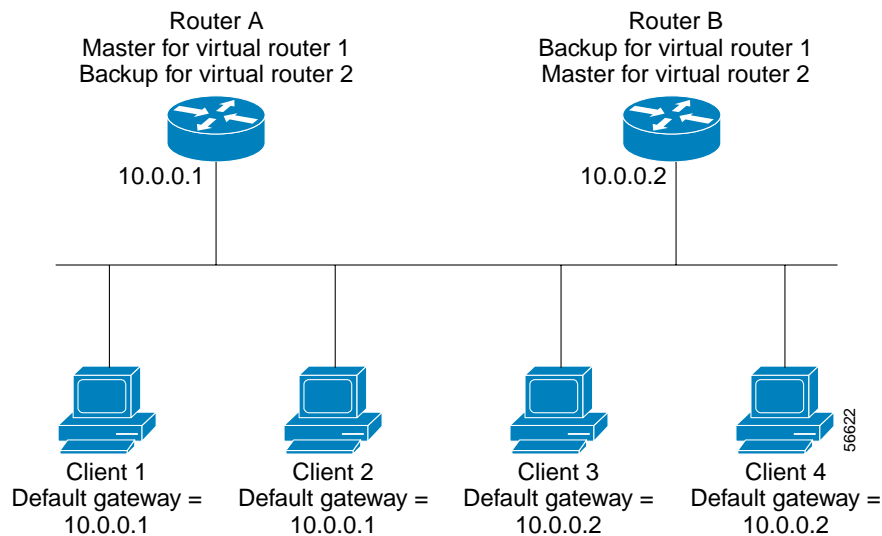


Because the virtual router uses the IP address of the physical Ethernet interface of Router A, Router A assumes the role of the *master virtual router* and is also known as the *IP address owner*. As the master virtual router, Router A controls the IP address of the virtual router and is responsible for forwarding packets sent to this IP address. Clients 1 through 3 are configured with the default gateway IP address of 10.0.0.1.

Routers B and C function as *backup virtual routers*. If the master virtual router fails, the router configured with the higher priority will become the master virtual router and provide uninterrupted service for the LAN hosts. When Router A recovers, it becomes the master virtual router again. For more detail on the roles that VRRP routers play and what happens if the master virtual router fails, see the [“VRRP Router Priority”](#) section later in this document.

[Figure 2](#) shows a LAN topology in which VRRP is configured so that routers A and B share the traffic to and from clients 1 through 4 and that Routers A and B act as backup virtual routers to each other if either router fails.

Figure 2 Load Sharing and Redundancy VRRP Topology



In this topology, two virtual routers are configured. (For more information, see the [“Multiple Virtual Router Support”](#) section later in this document.) For virtual router 1, Router A is the owner of IP address 10.0.0.1 and master virtual router, and Router B is the backup virtual router to Router A. Clients 1 and 2 are configured with the default gateway IP address of 10.0.0.1.

For virtual router 2, Router B is the owner of IP address 10.0.0.2 and master virtual router, and Router A is the backup virtual router to Router B. Clients 3 and 4 are configured with the default gateway IP address of 10.0.0.2.

Multiple Virtual Router Support

You can configure up to 255 virtual routers on a router physical interface. The actual number of virtual routers that a router interface can support depends on the following factors:

- Router processing capability
- Router memory capability
- Router interface support of multiple MAC addresses

In a topology where multiple virtual routers are configured on a router interface, the interface can act as a master for one virtual router and as a backup for one or more virtual routers.

VRRP Router Priority

An important aspect of the VRRP redundancy scheme is VRRP router priority. Priority determines the role that each VRRP router plays and what happens if the master virtual router fails.

If a VRRP router owns the IP address of the virtual router and the IP address of the physical interface, this router will function as a master virtual router.

Priority also determines if a VRRP router functions as a backup virtual router and the order of ascendancy to becoming a master virtual router if the master virtual router fails. You can configure the priority of each backup virtual router with a value of 1 through 254 using the **vrrp priority** command.

For example, if Router A, the master virtual router in a LAN topology, fails, an election process takes place to determine if backup virtual Routers B or C should take over. If Routers B and C are configured with the priorities of 101 and 100, respectively, Router B is elected to become master virtual router because it has the higher priority. If Routers B and C are both configured with the priority of 100, the backup virtual router with the higher IP address is elected to become the master virtual router.

By default, a preemptive scheme is enabled whereby a higher priority backup virtual router that becomes available takes over for the backup virtual router that was elected to become master virtual router. You can disable this preemptive scheme using the **no vrrp preempt** command. If preemption is disabled, the backup virtual router that is elected to become master virtual router remains the master until the original master virtual router recovers and becomes master again.

VRRP Advertisements

The master virtual router sends VRRP advertisements to other VRRP routers in the same group. The advertisements communicate the priority and state of the master virtual router. The VRRP advertisements are encapsulated in IP packets and sent to the IP Version 4 multicast address assigned to the VRRP group. The advertisements are sent every second by default; the interval is configurable.

Benefits

Redundancy

VRRP enables you to configure multiple routers as the default gateway router, which reduces the possibility of a single point of failure in a network.

Load Sharing

You can configure VRRP in such a way that traffic to and from LAN clients can be shared by multiple routers, thereby sharing the traffic load more equitably among available routers.

Multiple Virtual Routers

VRRP supports up to 255 virtual routers (VRRP groups) on a router physical interface, subject to the platform supporting multiple MAC addresses. Multiple virtual router support enables you to implement redundancy and load sharing in your LAN topology.

Multiple IP Addresses

The virtual router can manage multiple IP addresses, including secondary IP addresses. Therefore, if you have multiple subnets configured on an Ethernet interface, you can configure VRRP on each subnet.

Preemption

The redundancy scheme of VRRP enables you to preempt a backup virtual router that has taken over for a failing master virtual router with a higher priority backup virtual router that has become available.

Authentication

You can ensure that VRRP messages received from VRRP routers that comprise a virtual router are authenticated by configuring a simple text password.

Advertisement Protocol

VRRP uses a dedicated Internet Assigned Numbers Authority (IANA) standard multicast address (224.0.0.18) for VRRP advertisements. This addressing scheme minimizes the number of routers that must service the multicasts and allows test equipment to accurately identify VRRP packets on a segment. The IANA assigned VRRP the IP protocol number 112.

Restrictions

VRRP is intended for use with IPv4 routers only.

Related Features and Technologies

The VRRP feature is similar to the Hot Standby Router Protocol (HSRP) feature. The HSRP feature is documented in the “Configuring IP Services” chapter of the *Cisco IOS IP Configuration Guide* and in the *Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services*.

You can implement VRRP in a VLAN. VLANs are documented in the *Cisco IOS Switching Services Configuration Guide*.

Related Documents

For related information on this feature, refer to the following documents:

- *Cisco IOS IP Configuration Guide*
- *Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services*
- *Cisco IOS Switching Services Configuration Guide*

Supported Platforms

Refer to Feature Navigator for latest platform support as referenced below.

Determining Platform Support Through Cisco Feature Navigator

Cisco IOS software is packaged in feature sets that are supported on specific platforms. To get updated information regarding platform support for this feature, access Cisco Feature Navigator. Cisco Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Cisco Feature Navigator is a web-based tool that enables you to determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or release. Under the release section, you can compare releases side by side to display both the features unique to each software release and the features in common.

To access Cisco Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

<http://www.cisco.com/register>

Cisco Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Cisco Feature Navigator home page at the following URL:

<http://www.cisco.com/go/fn>

Availability of Cisco IOS Software Images

Platform support for particular Cisco IOS software releases is dependent on the availability of the software images for those platforms. Software images for some platforms may be deferred, delayed, or changed without prior notice. For updated information about platform support and availability of software images for each Cisco IOS software release, refer to the online release notes or, if supported, Cisco Feature Navigator.

Supported Standards, MIBs, and RFCs

Standards

No new or modified standards are supported by this feature.

MIBs

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

<http://tools.cisco.com/ITDIT/MIBS/servlet/index>

If Cisco MIB Locator does not support the MIB information that you need, you can also obtain a list of supported MIBs and download MIBs from the Cisco MIBs page at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

To access Cisco MIB Locator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

<http://www.cisco.com/register>

RFCs

- RFC 2338, *Virtual Router Redundancy Protocol*

Configuration Tasks

See the following sections for configuration tasks for VRRP. Each task in the list is identified as either optional or required.

- [Customizing VRRP](#) (optional)
- [Enabling VRRP](#) (required)
- [Verifying VRRP](#) (optional)

Customizing VRRP

Customizing the behavior of VRRP is optional. Be aware that as soon as you enable a VRRP group, that group is operating. It is possible that if you first enable a VRRP group before customizing VRRP, the router could take over control of the group and become the master virtual router before you have finished customizing the feature. Therefore, if you plan to customize VRRP, it is a good idea to do so before enabling VRRP.

To customize your VRRP configuration, use any of the following VRRP commands in interface configuration mode:

Command	Purpose
Router(config-if)# vrrp group authentication <i>string</i>	Authenticates VRRP packets received from other routers in the group. If you configure authentication, all routers within the VRRP group must use the same authentication string.
Router(config-if)# vrrp group description <i>text</i>	Assigns a text description to the VRRP group.
Router(config-if)# vrrp group priority <i>level</i>	Sets the priority level of the router within a VRRP group. The default value is 100.
Router(config-if)# vrrp group preempt [<i>delay seconds</i>]	Configures the router to take over as master virtual router for a VRRP group if it has a higher priority than the current master virtual router. This command is enabled by default. You can use it to change the delay.
Router(config-if)# vrrp group timers advertise [<i>msec</i>] <i>interval</i>	Configures the interval between successive advertisements by the master virtual router in a VRRP group.
Router(config-if)# vrrp group timers learn	Configures the router, when it is acting as backup virtual router for a VRRP group, to learn the advertisement interval used by the master virtual router.

Enabling VRRP

To enable VRRP on an interface, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# interface <i>type number</i>	Configures an interface.
Step 2	Router(config-if)# vrrp group ip <i>ipaddress</i>	Enables VRRP on an interface and identifies the primary IP address of the virtual router.
Step 3	Router(config-if)# vrrp group ip <i>ipaddress secondary</i>	(Optional) Enables VRRP on an interface. After you identify a primary IP address, you can use the vrrp ip command again with the secondary keyword to indicate additional IP addresses supported by this group.

Verifying VRRP

To verify VRRP, use either of the following commands in EXEC mode:

Command	Purpose
Router# <code>show vrrp [brief group]</code>	Displays a brief or detailed status of one or all VRRP groups on the router.
Router# <code>show vrrp interface type number [brief]</code>	Displays the VRRP groups and their status on a specified interface.

Configuration Examples

This section provides the following configuration example of Router A and Router B each belonging to three VRRP groups:

Router A

```
interface ethernet 1/0
 ip address 10.1.0.2 255.0.0.0
 vrrp 1 priority 120
 vrrp 1 authentication cisco
 vrrp 1 timers advertise 3
 vrrp 1 timers learn
 vrrp 1 ip 10.1.0.10
 vrrp 5 priority 100
 vrrp 5 timers advertise 30
 vrrp 5 timers learn
 vrrp 5 ip 10.1.0.50
 vrrp 100 timers learn
 no vrrp 100 preempt
 vrrp 100 ip 10.1.0.100
 no shutdown
```

Router B

```
interface ethernet 1/0
 ip address 10.1.0.1 255.0.0.0
 vrrp 1 priority 100
 vrrp 1 authentication cisco
 vrrp 1 timers advertise 3
 vrrp 1 timers learn
 vrrp 1 ip 10.1.0.10
 vrrp 5 priority 200
 vrrp 5 timers advertise 30
 vrrp 5 timers learn
 vrrp 5 ip 10.1.0.50
 vrrp 100 timers learn
 no vrrp 100 preempt
 vrrp 100 ip 10.1.0.100
 no shutdown
```

In the configuration, each group has the following properties:

- Group 1:
 - Virtual IP address is 10.1.0.10.
 - Router A will become the master for this group with priority 120.

- Advertising interval is 3 seconds.
 - Preemption is enabled.
- Group 5:
 - Router B will become master for this group with priority 200.
 - Advertising interval is 30 seconds.
 - Preemption is enabled.
- Group 100:
 - Router A will become master for this group first because it has a higher IP address (10.1.0.2).
 - Advertising interval is the default 1 second.
 - Preemption is disabled.

Command Reference

This section documents the new commands that configure the VRRP feature. All other commands used with this feature are documented in the Cisco IOS Release 12.0 command reference publications.

- [debug vrrp all](#)
- [debug vrrp error](#)
- [debug vrrp events](#)
- [debug vrrp packets](#)
- [debug vrrp state](#)
- [show vrrp](#)
- [show vrrp interface](#)
- [vrrp authentication](#)
- [vrrp description](#)
- [vrrp ip](#)
- [vrrp preempt](#)
- [vrrp priority](#)
- [vrrp timers advertise](#)
- [vrrp timers learn](#)

debug vrrp all

To display debug messages for Virtual Router Redundancy Protocol (VRRP) errors, events, and state transitions, use the **debug vrrp all** command in EXEC mode. To disable debugging output, use the **no** form of this command.

debug vrrp all

no debug vrrp all

Syntax Description This command has no arguments or keywords.

Command Modes EXEC

Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Examples The following example provides sample output for the **debug vrrp all** command:

```
Router# debug vrrp all

00:15:30: %IP-4-DUPADDR: Duplicate address 10.18.0.2 on Ethernet1/0, sourced by
0000.5e00.0101
May 22 18:41:54.447: VRRP: Grp 1 Advertisement Primary address 10.18.0.2
different from ours 10.18.0.1
May 22 18:41:57.443: VRRP: Grp 1 Advertisement Primary address 10.18.0.2
different from ours 10.18.0.1
May 22 18:42:00.443: VRRP: Grp 1 Advertisement Primary address 10.18.0.2
different from ours 10.18.0.1

May 22 18:48:41.521: VRRP: Grp 1 Event - Advert higher or equal priority
May 22 18:48:44.521: VRRP: Grp 1 Event - Advert higher or equal priority
May 22 18:48:47.521: VRRP: Grp 1 Event - Advert higher or equal priority

May 22 18:53:23.390: VRRP: Grp 1 changing to V_STATE_INIT

May 22 18:54:26.143: VRRP: Grp 1 changing to V_STATE_BACKUP
May 22 18:54:35.755: VRRP: Grp 1 changing to V_STATE_MASTER
May 22 18:53:23.390: VRRP: Grp 1 changing to V_STATE_INIT

May 22 18:54:26.143: VRRP: Grp 1 changing to V_STATE_BACKUP
May 22 18:54:35.755: VRRP: Grp 1 changing to V_STATE_MASTER
```

Related Commands

Command	Description
debug vrrp error	Displays debug messages about VRRP error conditions.
debug vrrp events	Displays debug messages about VRRP events.
debug vrrp state	Displays debug messages about the VRRP state transitions.

debug vrrp error

To display debug messages about Virtual Router Redundancy Protocol (VRRP) error conditions, use the **debug vrrp error** command in EXEC mode. To disable debugging output, use the **no** form of this command.

debug vrrp error

no debug vrrp error

Syntax Description This command has no arguments or keywords.

Command Modes EXEC

Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Examples The following example provides sample output for the **debug vrrp error** command:

```
Router# debug vrrp error

Router#
00:15:30: %IP-4-DUPADDR: Duplicate address 10.18.0.2 on Ethernet1/0, sourced by
0000.5e00.0101
May 22 18:41:54.447: VRRP: Grp 1 Advertisement Primary address 10.18.0.2
different from ours 10.18.0.1
May 22 18:41:57.443: VRRP: Grp 1 Advertisement Primary address 10.18.0.2
different from ours 10.18.0.1
May 22 18:42:00.443: VRRP: Grp 1 Advertisement Primary address 10.18.0.2
different from ours 10.18.0.1
```

In the example, the error being observed is that the router has a virtual address of 10.18.0.1 for group 1, but it received a virtual address of 10.18.0.2 for group 1 from another router on the same LAN.

Related Commands	Command	Description
	debug vrrp all	Displays debug messages for VRRP errors, events, and state transitions.

debug vrrp events

To display debug messages about Virtual Router Redundancy Protocol (VRRP) events that are occurring, use the **debug vrrp events** command in EXEC mode. To disable debugging output, use the **no** form of this command.

debug vrrp events

no debug vrrp events

Syntax Description This command has no arguments or keywords.

Command Modes EXEC

Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Examples The following example provides sample output for the **debug vrrp events** command:

```
Router# debug vrrp events
```

```
May 22 18:48:41.521: VRRP: Grp 1 Event - Advert higher or equal priority
May 22 18:48:44.521: VRRP: Grp 1 Event - Advert higher or equal priority
May 22 18:48:47.521: VRRP: Grp 1 Event - Advert higher or equal priority
```

In the example, the event being observed is that the router received an advertisement from another router for group 1 that has a higher or equal priority to itself.

Related Commands	Command	Description
	debug vrrp all	Displays debug messages for VRRP errors, events, and state transitions.

debug vrrp packets

To display summary information about Virtual Router Redundancy Protocol (VRRP) packets being sent or received, use the **debug vrrp packets** command in EXEC mode. To disable debugging output, use the **no** form of this command.

debug vrrp packets

no debug vrrp packets

Syntax Description This command has no arguments or keywords.

Command Modes EXEC

Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Examples The following example provides sample output for the **debug vrrp packets** command. The output is on the master virtual router; the router for group 1 is sending an advertisement with a checksum of 6BE7.

```
Router# debug vrrp packets
```

```
VRRP Packets debugging is on
```

```
May 22 18:51:03.220: VRRP: Grp 1 sending Advertisement checksum 6BE7
```

```
May 22 18:51:06.220: VRRP: Grp 1 sending Advertisement checksum 6BE7
```

In the following example, the router with physical address 10.18.0.3 is advertising a priority of 105 for VRRP group 1:

```
Router# debug vrrp packets
```

```
VRRP Packets debugging is on
```

```
May 22 18:51:09.222: VRRP: Grp 1 Advertisement priority 105, ipaddr 10.18.0.3
```

```
May 22 18:51:12.222: VRRP: Grp 1 Advertisement priority 105, ipaddr 10.18.0.3
```

debug vrrp state

To display debug messages about the state transitions occurring for Virtual Router Redundancy Protocol (VRRP) groups, use the **debug vrrp state** command in EXEC mode. To disable debugging output, use the **no** form of this command.

debug vrrp state

no debug vrrp state

Syntax Description This command has no arguments or keywords.

Command Modes EXEC

Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Examples The following example provides sample output for the **debug vrrp state** command:

```
Router# debug vrrp state
```

```
May 22 18:53:23.390: VRRP: Grp 1 changing to V_STATE_INIT
```

```
May 22 18:54:26.143: VRRP: Grp 1 changing to V_STATE_BACKUP
```

```
May 22 18:54:35.755: VRRP: Grp 1 changing to V_STATE_MASTER
```

Related Commands	Command	Description
	debug vrrp all	Displays debug messages for VRRP errors, events, and state transitions.

show vrrp

To display a brief or detailed status of one or all configured Virtual Router Redundancy Protocol (VRRP) groups on the router, use the **show vrrp** command in EXEC mode.

show vrrp [**brief** | *group*]

Syntax Description	brief	(Optional) Provides a summary view of the group information.
	<i>group</i>	(Optional) Virtual router group number of the group for which information is to be displayed. The group number is configured with the vrrp ip command.

Command Modes EXEC

Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Usage Guidelines If no group is specified, all groups are displayed.

Examples The following example provides output for the **show vrrp** command:

```
Router# show vrrp

Ethernet1/0 - Group 1
State is Master
Virtual IP address is 10.2.0.10
Virtual MAC address is 0000.5e00.0101
Advertisement interval is 3.000 sec
Preemption is enabled
min delay is 0.000 sec
Priority 100
Master Router is 10.2.0.1 (local), priority is 100
Master Advertisement interval is 3.000 sec
Master Down interval is 9.609 sec

Ethernet1/0 - Group 2
State is Master
Virtual IP address is 10.0.0.20
Virtual MAC address is 0000.5e00.0102
Advertisement interval is 1.000 sec
Preemption is enabled
min delay is 0.000 sec
Priority 95
Master Router is 10.0.0.1 (local), priority is 95
Master Advertisement interval is 1.000 sec
```

Master Down interval is 3.628 sec

Table 1 describes the significant fields shown in the display.

Table 1 *show vrrp Field Descriptions*

Field	Description
Ethernet1/0 - Group	Interface type and number, and VRRP group number.
State is	Role this interface plays within VRRP (master or backup).
Virtual IP address is	Virtual IP address for this interface.
Virtual MAC address is	Virtual MAC address for this interface.
Advertisement interval is	Interval at which the router will send VRRP advertisements when it is the master virtual router. This value is configured with the vrrp timers advertise command.
Preemption is	Indication of whether preemption is enabled or disabled.
Priority	Priority of the interface.
Master Router is	IP address of the current master virtual router.
priority is	Priority of the current master virtual router.
Master Advertisement interval is	Advertisement interval of the master virtual router.
Master Down interval is	Calculated time that the master virtual router can be down before the backup virtual router takes over.

The following example provides output for the **show vrrp** command with the **brief** keyword:

```
Router# show vrrp brief
```

```
Interface   Grp  Prio  Time   Own  Pre  State   Master addr  Group addr
Ethernet1/0  1   100   3609                P  Master  1.0.0.4     1.0.0.10
Ethernet1/0  2   105   3589                P  Master  1.0.0.4     1.0.0.20
```

Table 2 describes the significant fields shown in the display.

Table 2 *show vrrp brief Field Descriptions*

Field	Description
Interface	Interface type and number.
Grp	VRRP group to which this interface belongs.
Prio	VRRP priority number for this interface.
Time	Calculated time that the master virtual router can be down before the backup virtual router takes over.
Own	IP address owner.
Pre	Preemption. P indicates that preemption is enabled. If this field is empty, preemption is disabled.
State	Role this interface plays within VRRP (master or backup).
Master addr	IP address of the master virtual router.
Group addr	IP address of the virtual router.

■ show vrrp

Related Commands	Command	Description
	vrrp ip	Enables VRRP on an interface and identifies the IP address of the virtual router.

show vrrp interface

To display the Virtual Router Redundancy Protocol (VRRP) groups and their status on a specified interface, use the **show vrrp interface** command in EXEC mode.

show vrrp interface *type number* [**brief**]

Syntax Description	
<i>type</i>	Interface type.
<i>number</i>	Interface number.
brief	(Optional) Provides a summary view of the group information

Command Modes EXEC

Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Examples

The following example provides output for the **show vrrp interface** command:

```
Router# show vrrp interface ethernet 1/0

Ethernet1/0 - Group 1
State is Master
Virtual IP address is 10.2.0.10
Virtual MAC address is 0000.5e00.0101
Advertisement interval is 3.000 sec
Preemption is enabled
min delay is 0.000 sec
Priority 100
Master Router is 10.2.0.1 (local), priority is 100
Master Advertisement interval is 3.000 sec
Master Down interval is 9.609 sec

Ethernet1/0 - Group 2
State is Master
Virtual IP address is 10.0.0.20
Virtual MAC address is 0000.5e00.0102
Advertisement interval is 1.000 sec
Preemption is enabled
min delay is 0.000 sec
Priority 95
Master Router is 10.0.0.1 (local), priority is 95
Master Advertisement interval is 1.000 sec
Master Down interval is 3.628 sec
```

■ show vrrp interface

Related Commands	Command	Description
	vrrp ip	Enables VRRP and identifies the IP address of the virtual router.

vrrp authentication

To authenticate Virtual Router Redundancy Protocol (VRRP) packets received from other routers in the group, use the **vrrp authentication text** command in interface configuration mode. To disable VRRP authentication, use the **no** form of this command.

```
vrrp group authentication text text-string
```

```
no vrrp group authentication text text-string
```

Syntax Description

<i>group</i>	Virtual router group number for which authentication is being configured. The group number is configured with the vrrp ip command.
text <i>text-string</i>	Authentication string (up to eight alphanumeric characters) used to validate incoming VRRP packets.

Defaults

No authentication of VRRP messages occurs.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(18)ST	This command was introduced.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Usage Guidelines

When a VRRP packet arrives from another router in the VRRP group, its authentication string is compared to the string configured on the local system. If the strings match, the message is accepted. If they do not match, the packet is discarded.

All routers within the group must be configured with the same authentication string.

Note that plain text authentication is not meant to be used for security. It simply provides a way to prevent a misconfigured router from participating in VRRP.

Examples

The following example configures an authentication string of x30dn78k:

```
vrrp 1 authentication x30dn78k
```

Related Commands

Command	Description
vrrp ip	Enables VRRP and identifies the IP address of the virtual router.

vrrp description

To assign a description to the Virtual Router Redundancy Protocol (VRRP) group, use the **vrrp description** command in interface configuration mode. To remove the description, use the **no** form of this command.

vrrp *group* **description** *text*

no vrrp *group* **description**

Syntax Description

<i>group</i>	Virtual router group number.
<i>text</i>	Text (up to 80 characters) that describes the purpose or use of the group.

Defaults

There is no description of the VRRP group.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(18)ST	This command was introduced.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Examples

The following example enables VRRP on Ethernet interface 0. VRRP group 1 is described as Building A — Marketing and Administration.

```
interface ethernet 0
 ip address 10.0.1.1 255.255.255.0
!
 vrrp 1 ip 10.0.1.20
 vrrp 1 description Building A - Marketing and Administration
```

Related Commands

Command	Description
vrrp ip	Enables VRRP and identifies the IP address of the virtual router.

vrrp ip

To enable the Virtual Router Redundancy Protocol (VRRP) on an interface and identify the IP address of the virtual router, use the **vrrp ip** command in interface configuration mode. To disable VRRP on the interface and remove the IP address of the virtual router, use the **no** form of this command.

```
vrrp group ip ipaddress [secondary]
```

```
no vrrp group ip ipaddress [secondary]
```

Syntax Description

<i>group</i>	Virtual router group number.
<i>ipaddress</i>	IP address of the virtual router.
secondary	(Optional) Indicates additional IP addresses supported by this group.

Defaults

VRRP is not configured on the interface.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(18)ST	This command was introduced.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Usage Guidelines

Configure this command once without the **secondary** keyword to indicate the virtual router IP address. If you want to indicate additional IP addresses supported by this group, then do so and include the **secondary** keyword.

Note that removing the VRRP configuration from the IP address owner and leaving the IP address of the interface active is considered a misconfiguration because duplicate IP addresses on the LAN will result.

Examples

The following example enables VRRP on Ethernet interface 0. The VRRP group is 1. IP address 10.0.1.20 is the address of the virtual router.

```
interface ethernet 0
 ip address 10.0.1.1 255.255.255.0
 ip address 10.0.2.1 255.255.255.0 secondary
!
 vrrp 1 ip 10.0.1.20
 vrrp 1 ip 10.0.2.20 secondary
```

Related Commands

Command	Description
show vrrp	Displays a summary or detailed status of one or all configured VRRP groups.

vrrp preempt

To configure the router to take over as master virtual router for a Virtual Router Redundancy Protocol (VRRP) group if it has higher priority than the current master virtual router, use the **vrrp preempt** command in interface configuration mode. To disable this feature, use the **no** form of this command.

```
vrrp group preempt [delay seconds]
```

```
no vrrp group preempt
```

Syntax Description	group	Virtual router group number of the group for which preemption is being configured. The group number is configured with the vrrp ip command.
	delay seconds	(Optional) Number of seconds that the router will delay before issuing an advertisement claiming master ownership. The default delay is 0 seconds.

Defaults	Enabled
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Command Modes	Interface configuration
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Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Usage Guidelines	By default, the router being configured with this command will take over as master virtual router for the group if it has a higher priority than the current master virtual router. You can configure a delay, which will cause the VRRP router to wait the specified number of seconds before issuing an advertisement claiming master ownership.
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Note that the router that is the IP address owner will preempt, regardless of the setting of this command.

Examples	The following example configures the router to preempt the current master virtual router when its priority of 200 is higher than that of the current master virtual router. If the router preempts the current master virtual router, it waits 15 seconds before issuing an advertisement claiming it is the master virtual router.
----------	---

```
vrrp 1 preempt delay 15
vrrp 1 priority 200
```

Related Commands	
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Command	Description
vrrp ip	Enables VRRP and identifies the IP address of the virtual router.
vrrp priority	Sets the priority level of the router within a VRRP group.

vrrp priority

To set the priority level of the router within a Virtual Router Redundancy Protocol (VRRP) group, use the **vrrp priority** command in interface configuration mode. To remove the priority level of the router, use the **no** form of this command.

vrrp group priority level

no vrrp group priority level

Syntax Description	group	Virtual router group number.
	level	Priority of the router within the VRRP group. The range is from 1 to 254. The default is 100.

Defaults	<i>level: 100</i>
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Command Modes	Interface configuration
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Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Usage Guidelines	Use this command to control which router becomes the master virtual router.
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Examples	The following example configures the router with a priority of 254:
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```
vrrp 1 priority 254
```

Related Commands	Command	Description
	vrrp ip	Enables VRRP and identifies the IP address of the virtual router.
	vrrp preempt	Configures the router to take over as master virtual router for a VRRP group if it has higher priority than the current master virtual router.

vrrp timers advertise

To configure the interval between successive advertisements by the master virtual router in a Virtual Router Redundancy Protocol (VRRP) group, use the **vrrp timers advertise** command in interface configuration mode. To restore the default value, use the **no** form of this command.

```
vrrp group timers advertise [msec] interval
```

```
no vrrp group timers advertise [msec] interval
```

Syntax Description	
<i>group</i>	Virtual router group number.
msec	(Optional) Changes the unit of the advertisement time from seconds to milliseconds. Without this keyword, the advertisement interval is in seconds.
<i>interval</i>	Time interval between successive advertisements by the master virtual router. The unit of the interval is in seconds, unless the msec keyword is specified. The default is 1 second.

Defaults	
	<i>interval</i> : 1 second

Command Modes	
	Interface configuration

Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Usage Guidelines	
	The advertisements being sent by the master virtual router communicate the state and priority of the current master virtual router.

Examples	
	The following example configures the master virtual router to send advertisements every 4 seconds: <pre>vrrp 1 timers advertise 4</pre>

Related Commands	Command	Description
	vrrp ip	Enables VRRP and identifies the IP address of the virtual router.
	vrrp timers learn	Configures the router, when it is acting as backup virtual router for a VRRP group, to learn the advertisement interval used by the master virtual router.

vrrp timers learn

To configure the router, when it is acting as backup virtual router for a Virtual Router Redundancy Protocol (VRRP) group, to learn the advertisement interval used by the master virtual router, use the **vrrp timers learn** command in interface configuration mode. To prevent the local router from learning the advertisement interval of the master virtual router, use the **no** form of this command.

vrrp group timers learn

no vrrp group timers learn

Syntax Description	<i>group</i>	Virtual router group number to which the command applies.
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Defaults	Disabled; the local router calculates the downtime of the master virtual router based on the advertisement interval of the local router as configured by the vrrp timers advertise command.
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Command Modes	Interface configuration
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Command History	Release	Modification
	12.0(18)ST	This command was introduced.
	12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.

Usage Guidelines	If this command is configured, when the local router is acting as a backup virtual router for the group, it will learn the advertisement interval of the current master virtual router from its master advertisements. The local router will use that value to calculate how long it should wait before deciding that the master virtual router has gone down. This command synchronizes timers with the current master virtual router.
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Examples	The following example configures the router, when it is acting as backup virtual router, to learn the advertisement interval from the advertisements of the current master virtual router:
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```
vrrp 1 timers learn
```

Related Commands	Command	Description
	vrrp ip	Enables VRRP and identifies the IP address of the virtual router.
	vrrp timers advertise	Configures the interval between successive advertisements by the master virtual router in a VRRP group.

Glossary

backup virtual router—One or more VRRP routers that are available to assume the role of forwarding packets if the master virtual router fails.

master virtual router—The VRRP router that is currently responsible for forwarding packets sent to the IP addresses of the virtual router. Usually the master virtual router also functions as the IP address owner.

virtual IP address owner—The VRRP router that owns the IP address of the virtual router. The owner is the router that has the virtual router address as its physical interface address.

virtual router—One or more VRRP routers that form a group. The virtual router acts as the default gateway router for LAN clients. Also known as a VRRP group.

VRRP router—A router that is running VRRP.