threshold metric

To set a threshold metric other than the default value, use the **threshold metric** command in tracking configuration mode. To disable the threshold metric, use the **no** form of this command.

threshold metric {**up** *number* [**down** *number*] | **down** *number* [**up** *number*]}

no threshold metric

Syntax Description

up	Specifies the up threshold. The state is up if the scaled metric for that route is less than or equal to the up threshold. The default up threshold is 254.
down	Specifies the down threshold. The state is down if the scaled metric for that route is greater than or equal to the down threshold. The default down threshold is 255.
number	Threshold value. The range is from 0 to 255.

Command Default

No threshold is configured.

Command Modes

Tracking configuration (config-track)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

Usage Guidelines

This command is available only to IP-route threshold metric objects tracked by the **track ip route metric threshold** global configuration command.

The default up and down threshold values are 254 and 255, respectively. With these values, IP-route threshold tracking gives the same result as IP-route reachability tracking.

Examples

In the following example, the tracking process is tracking the IP-route threshold metric. The metric default value is changed to 16 for the up threshold and to 20 for the down threshold.

```
track 1 ip route 10.22.0.0/16 metric threshold
 threshold metric up 16 down 20
 delay down 20
```

Related Commands

Command	Description
track ip route	Tracks the state of IP routing and enters tracking configuration mode.

threshold percentage

To set a threshold percentage for a tracked object in a list of objects, use the **threshold percentage** command in tracking configuration mode. To disable the threshold percentage, use the **no** form of this command.

threshold percentage {**up** *number* [**down** *number*] | **down** *number* [**up** *number*]}

no threshold percentage

Syntax Description

up	Specifies the up threshold.
down	Specifies the down threshold.
number	Threshold value. The range is from 0 to 100.

Command Default

No threshold percentage is configured.

Command Modes

Tracking configuration (config-track)

Command History

Release	Modification
12.3(8)T	This command was introduced
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

Usage Guidelines

When you configure a tracked list using the **track** *object-number* **list** command, there are two keywords available: **boolean** and **threshold**. If you specify the **threshold** keyword, you can specify either the **percentage** or **weight** keywords. If you specify the **percentage** keyword, then the **weight** keyword is unavailable. If you specify the **weight** keyword, then the **percentage** keyword is unavailable.

You should configure the up percentage first. The valid range is from 1 to 100. The down percentage depends on what you have configured for up. For example, if you configure 50 percent for up, you will see a range from 0 to 49 percent for down.

Examples

In the following example, the tracked list 11 is configured to measure the threshold using an up percentage of 50 and a down percentage of 32:

```
track 11 list threshold percentage
 object 1
 object 2
 threshold percentage up 50 down 32
```

Related Commands

Command	Description
threshold weight	Sets a threshold weight for a tracked object in a list of objects.
track list	Specifies a list of objects to be tracked and the thresholds to be used for comparison.

threshold weight

To set a threshold weight for a tracked object in a list of objects, use the **threshold weight** command in tracking configuration mode. To disable the threshold weight, use the **no** form of this command.

threshold weight {**up** *number* [**down** *number*] | **down** *number* [**up** *number*]}

no threshold weight [{**up** *number* [**down** *number*] | **down** *number* [**up** *number*]}]

Syntax Description

up	Specifies the up threshold.
down	Specifies the down threshold.
number	Threshold value. The range is from 1 to 255.

Command Default

No threshold weight is configured.

Command Modes

Tracking configuration (config-track)

Command History

Release	Modification
12.3(8)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

Usage Guidelines

When you configure a tracked list of objects using the **track** *object-number* **list** command, there are two keywords available: **boolean** and **threshold**. If you specify the **threshold** keyword, you can specify either the **percentage** or **weight** keywords. If you specify the **weight** keyword, then the **percentage** keyword is unavailable. If you specify the **percentage** keyword, then the **weight** keyword is unavailable.

You should configure the up weight first. The valid range is from 1 to 255. The available down weight depends on what you have configured for the up weight. For example, if you configure 25 for up, you will see a range from 0 to 24 for down.

Examples

In the following example, the tracked list 12 is configured to measure a threshold using a specified weight:

```
track 12 list threshold weight
 object 1
 object 2
 threshold weight up 35 down 22
```

Related Commands

Command	Description
threshold percentage	Sets a threshold percentage for a tracked object in a list of objects.
track list	Specifies a list of objects to be tracked and the thresholds to be used for comparison.

timeout (custom UDP probe)

To set a timeout for custom User Datagram Protocol (UDP) probes, use the **timeout** command in custom UDP probe configuration mode. To restore the default timeout, use the **no** form of this command.

timeout *seconds*

no timeout

Syntax Description

seconds	Time, in seconds, that IOS SLB waits for a response packet from the server after sending a custom UDP probe request packet. Valid range is 1 to 255. The default value is 30 seconds.

Defaults

The default custom UDP probe timeout is 30 seconds.

Command Modes

Custom UDP probe configuration

Command History

Release	Modification
12.2(33)SRB	This command was introduced.

Examples

In the following example the custom UDP probe timeout is set to 20 seconds:

```
Router(config)# ip slb probe PROBE6 custom udp
Router(config-slb-probe)# timeout 20
```

Related Commands

Command	Description
ip slb probe custom udp	Configures a custom User Datagram Protocol (UDP) probe name and enters custom UDP probe configuration mode.
show ip slb probe	Displays information about an IOS Server Load Balancing (IOS SLB) probe.

track

To configure an interface to be tracked where the Gateway Load Balancing Protocol (GLBP) weighting changes based on the state of the interface, use the **track** command in global configuration mode. To remove the tracking, use the **no** form of this command.

track *object-number* **interface** *type number* {**line-protocol** | **ip routing**}

no track *object-number* **interface** *type number* {**line-protocol** | **ip routing**}

Syntax Description

object-number	Object number in the range from 1 to 1000 representing the interface to be tracked.
interface *type number*	Interface type and number to be tracked.
line-protocol	Tracks whether the interface is up.
ip routing	Tracks whether IP routing is enabled, an IP address is configured on the interface, and the interface state is up, before reporting to GLBP that the interface is up.

Command Default

The state of the interfaces is not tracked.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(14)S	This command was introduced.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
15.1(3)T	This command was modified. The valid range of the *object-number* argument increased to 1000.
15.1(1)S	This command was modified. The valid range for the *object-number* argument increased to 1000.

Usage Guidelines

Use the **track** command in conjunction with the **glbp weighting** and **glbp weighting track** commands to configure parameters for an interface to be tracked. If a tracked interface on a GLBP router goes down, the weighting for that router is reduced. If the weighting falls below a specified minimum, the router will lose its ability to act as an active GLBP virtual forwarder.

As of Cisco IOS Release 15.1(3)T, a maximum of 1000 objects can be tracked. Although 1000 tracked objects can be configured, each tracked object uses CPU resources. The amount of available CPU resources on a router is dependent upon variables such as traffic load and how other protocols are configured and run. The ability to use 1000 tracked objects is dependent upon the available CPU. Testing should be conducted on site to ensure that the service works under the specific site traffic conditions.

Examples

In the following example, Fast Ethernet interface 0/0 tracks whether serial interfaces 2/0 and 3/0 are up. If either serial interface goes down, the GLBP weighting is reduced by the default value of 10. If both serial interfaces go down, the GLBP weighting will fall below the lower threshold and the router will no longer be an active forwarder. To resume its role as an active forwarder, the router must have both tracked interfaces back up, and the weighting must rise above the upper threshold.

```
Router(config)# track 1 interface serial 2/0 line-protocol
Router(config-track)# exit
Router(config)# track 2 interface serial 3/0 line-protocol
Router(config-track)# exit
Router(config)# interface FastEthernet 0/0
Router(config-if)# ip address 10.21.8.32 255.255.255.0
Router(config-if)# glbp 10 weighting 110 lower 95 upper 105
Router(config-if)# glbp 10 weighting track 1
Router(config-if)# glbp 10 weighting track 2
```

In the following example, Fast Ethernet interface 0/0 tracks whether serial interface 2/0 is enabled for IP routing, whether it is configured with an IP address, and whether the state of the interface is up. If serial interface 2/0 goes down, the GLBP weighting is reduced by a value of 20.

```
Router(config)# track 2 interface serial 2/0 ip routing
Router(config-track)# exit
Router(config)# interface FastEthernet 0/0
Router(config-if)# ip address 10.21.8.32 255.255.255.0
Router(config-if)# glbp 10 weighting 110 lower 95 upper 105
Router(config-if)# glbp 10 weighting track 2 decrement 20
```

Related Commands

Command	Description
glbp weighting	Specifies the initial weighting value of a GLBP gateway.
glbp weighting track	Specifies an object to be tracked that affects the weighting of a GLBP gateway.

track application

To track the presence of Home Agent (HA), Gateway GPRS Support Node (GGSN), or Packet Data Serving Node (PDSN), traffic on a router and to enter tracking configuration mode, use the **track application** command in global configuration mode. To disable tracking of HA, GGSN, or PDSN traffic, use the no form of this command.

track *object-number* **application** {**home-agent** | **ggsn** | **pdsn**}

no track *object-number* **application** {**home-agent** | **ggsn** | **pdsn**}

Syntax Description

object-number	Number of the object to be tracked. The range is from 1 to 1000.
home-agent	Tracks Home Agent traffic on a router.
ggsn	Tracks GGSN traffic on a router.
pdsn	Tracks PDSN traffic on a router.

Command Default

Home Agent, GGSN, and PDSN traffic is not tracked.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.4(11)T	This command was introduced.
15.1(3)T	This command was modified. The valid range of the *object-number* argument increased to 1000.
15.1(1)S	This command was modified. The valid range for the *object-number* argument increased to 1000.

Usage Guidelines

Use this command to monitor the presence of Home Agent, PDSN, and GGSN traffic on a router for mobile wireless applications.

When a redundant pair of Home Agents running HSRP between them loses connectivity, both HSRP nodes become active. Once the connectivity is restored between the two nodes, a graceful way is needed to restore proper HSRP states without losing Home Agent bindings. During the time of no connectivity, one of the nodes will continue to process Home Agent, GGSN, or PDSN traffic while the other will not. The node that continues to process traffic needs to remain active once connectivity is restored. To ensure that the active node remains in the active state, the priority of the HSRP group member that does not process Home Agent traffic is reduced. Reducing the priority of the node that is not processing Home Agent traffic ensures that this node will become the standby after connectivity is restored. When connectivity is restored, the normal Home Agent state synchronization will get all bindings back into the inactive node and, depending on the preempt configuration, it may switch over again. This state synchronization ensures that no Mobile IP, GGSN or PDSN bindings are lost.

Note The **home-agent**, **ggsn**, or **pdsn** keywords do not appear in the CLI if the corresponding application is not present in the Cisco IOS image.

As of Cisco IOS Release 15.1(3)T, a maximum of 1000 objects can be tracked. Although 1000 tracked objects can be configured, each tracked object uses CPU resources. The amount of available CPU resources on a router is dependent upon variables such as traffic load and how other protocols are configured and run. The ability to use 1000 tracked objects is dependent upon the available CPU. Testing should be conducted on site to ensure that the service works under the specific site traffic conditions.

Examples

The following example shows how to configure a router to track home agent traffic:

```
Router(config)# track 4 application home-agent
Router(config-track)#
```

Related Commands

Command	Description
ip mobile home-agent	Enables home agent service.
router mobile	Enables Mobile IP on the router.
service cdma pdsn	Enables PDSN service.
service gprs ggsn	Specifies that the router or Cisco IOS instance functions as a GGSN.

track interface

To configure an interface to be tracked and to enter tracking configuration mode, use the **track interface** command in global configuration mode. To remove the tracking, use the **no** form of this command.

track *object-number* **interface** *type number* {**line-protocol** | **ip routing**}

no track *object-number* **interface** *type number* {**line-protocol** | **ip routing**}

Syntax Description

object-number	Object number that represents the interface to be tracked. The range is from 1 to 1000.
type number	Interface type and number to be tracked. No space is required between the values.
line-protocol	Tracks the state of the interface line protocol.
ip routing	Tracks whether IP routing is enabled, whether an IP address is configured on the interface, and whether the interface state is up before reporting to the tracking client that the interface is up.

Command Default

No interface is tracked.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.3(11)T	The **track interface ip routing** command was enhanced to allow the tracking of an IP address on an interface that was acquired through DHCP or PPP IPCP.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(18)SXF	This command was introduced on the Supervisor Engine 720.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.
15.1(3)T	This command was modified. The valid range of the *object-number* argument increased to 1000.
15.1(1)S	This command was modified. The valid range for the *object-number* argument increased to 1000.

Usage Guidelines

This command reports a state value to clients. A tracked IP-routing object is considered up when the following criteria exist:

- IP routing is enabled and active on the interface.
- The interface line-protocol state is up.
- The interface IP address in known. The IP address is configured or received through the Dynamic Host Configuration Protocol (DHCP) or IP Control Protocol (IPCP) negotiation.

Interface IP routing will go down when one of the following criteria exist:

- IP routing is disabled globally.
- The interface line-protocol state is down.
- The interface IP address is unknown. The IP address is not configured or received through DHCP or IPCP negotiation.

No space is required between the *type number* values.

Tracking the IP-routing state of an interface using the **track interface ip routing** command can be more useful in some situations than just tracking the line-protocol state using the **track interface line-protocol** command, especially on interfaces for which IP addresses are negotiated. For example, on a serial interface that uses the Point-to-Point Protocol (PPP), the line protocol could be up (link control protocol [LCP] negotiated successfully), but IP could be down (IPCP negotiation failed).

The **track interface ip routing** command supports the tracking of an interface with an IP address acquired through any of the following methods:

- Conventional IP address configuration
- PPP/IPCP
- DHCP
- Unnumbered interface

As of Cisco IOS Release 15.1(3)T, a maximum of 1000 objects can be tracked. Although 1000 tracked objects can be configured, each tracked object uses CPU resources. The amount of available CPU resources on a router is dependent upon variables such as traffic load and how other protocols are configured and run. The ability to use 1000 tracked objects is dependent upon the available CPU. Testing should be conducted on site to ensure that the service works under the specific site traffic conditions.

Examples

In the following example, the tracking process is configured to track the IP-routing capability of serial interface 1/0:

```
Router(config)# track 1 interface serial1/0 ip routing
Router(config-track)#
```

Related Commands

Command	Description
show track	Displays HSRP tracking information.

track ip route

To track the state of an IP route and to enter tracking configuration mode, use the **track ip route** command in global configuration mode. To remove the tracking, use the **no** form of this command.

track *object-number* **ip route** *ip-address/prefix-length* {**reachability** | **metric threshold**}

no track *object-number* **ip route** *ip-address/prefix-length* {**reachability** | **metric threshold**}

Syntax Description

object-number	Object number that represents the object to be tracked. The range is from 1 to 1000.
ip-address	IP subnet address to the route that is being tracked.
/prefix-length	The number of bits that comprise the address prefix. A slash must precede the value.
reachability	Tracks whether the route is reachable.
metric threshold	Tracks the threshold metric. The default up threshold is 254 and the default down threshold is 255.

Command Default

The route to the subnet address is not tracked.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.
15.1(3)T	This command was modified. The valid range of the *object-number* argument increased to 1000.
15.1(1)S	This command was modified. The valid range for the *object-number* argument increased to 1000.

Usage Guidelines

A tracked IP-route object is considered up and reachable when a routing-table entry exists for the route and the route is not inaccessible.

To provide a common interface to tracking clients, route metric values are normalized to the range of 0 to 255, where 0 is connected and 255 is inaccessible. The resulting value is compared against threshold values to determine the tracking state as follows:

- State is up if the scaled metric for that route is less than or equal to the up threshold.
- State is down if the scaled metric for that route is greater than or equal to the down threshold.

The tracking process uses a per-protocol configurable resolution value to convert the real metric to the scaled metric. The metric value communicated to clients is always such that a lower metric value is better than a higher metric value.

Use the **threshold metric** tracking configuration command to specify a threshold metric other than the default threshold metric.

As of Cisco IOS Release 15.1(3)T, a maximum of 1000 objects can be tracked. Although 1000 tracked objects can be configured, each tracked object uses CPU resources. The amount of available CPU resources on a router is dependent upon variables such as traffic load and how other protocols are configured and run. The ability to use 1000 tracked objects is dependent upon the available CPU. Testing should be conducted on site to ensure that the service works under the specific site traffic conditions.

Examples

In the following example, the tracking process is configured to track the reachability of 10.22.0.0/16:

```
Router(config)# track 1 ip route 10.22.0.0/16 reachability
```

In the following example, the tracking process is configured to track the threshold metric using the default threshold metric values:

```
Router(config)# track 1 ip route 10.22.0.0/16 metric threshold
```

Related Commands

Command	Description
show track	Displays HSRP tracking information.
threshold metric	Sets a threshold metric other than the default value.

track ip sla

To track the state of a Cisco IOS IP Service Level Agreements (SLAs) operation and to enter tracking configuration mode, use the **track ip sla** command in global configuration mode. To remove the tracking, use the **no** form of this command.

track *object-number* **ip sla** *operation-number* [**state** | **reachability**]

no track *object-number* **ip sla** *operation-number* [**state** | **reachability**]

Syntax Description

object-number	Object number representing the object to be tracked. The range is from 1 to 1000.
operation-number	Number used for the identification of the IP SLAs operation you are tracking.
state	(Optional) Tracks the operation return code.
reachability	(Optional) Tracks whether the route is reachable.

Command Default

IP SLAs tracking is disabled.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.4(20)T	This command was introduced. This command replaces the **track rtr** command.
12.2(33)SXI1	This command was integrated into Cisco IOS Release 12.2(33)SXI1. This command replaces the **track rtr** command.
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4. This command replaces the **track rtr** command.
12.2(33)SRE	This command was integrated into Cisco IOS XE 12.2(33)SRE. This command replaces the **track rtr** command.
15.1(3)T	This command was modified. The valid range of the *object-number* argument increased to 1000.
15.1(1)S	This command was modified. The valid range for the *object-number* argument increased to 1000.

Usage Guidelines

Every IP SLAs operation maintains an operation return-code value. This return code is interpreted by the tracking process. The return code may return OK, OverThreshold, and several other return codes. Different operations may have different return-code values, so only values common to all operation types are used.

Two aspects of an IP SLAs operation can be tracked: state and reachability. The difference between these aspects relates to the acceptance of the OverThreshold return code. Table 102 shows the state and reachability aspects of IP SLAs operations that can be tracked.

Table 102 Comparison of State and Reachability Operations

Tracking	Return Code	Track State
State	OK	Up
	(all other return codes)	Down
Reachability	OK or over threshold	Up
	(all other return codes)	Down

As of Cisco IOS Release 15.1(3)T, a maximum of 1000 objects can be tracked. Although 1000 tracked objects can be configured, each tracked object uses CPU resources. The amount of available CPU resources on a router is dependent upon variables such as traffic load and how other protocols are configured and run. The ability to use 1000 tracked objects is dependent upon the available CPU. Testing should be conducted on site to ensure that the service works under the specific site traffic conditions.

Examples

The following example shows how to configure the tracking process to track the state of IP SLAs operation 2:

```
Router(config)# track 1 ip sla 2 state
```

The following example shows how to configure the tracking process to track the reachability of IP SLAs operation 3:

```
Router(config)# track 2 ip sla 3 reachability
```

Related Commands

Command	Description
track ip route	Tracks the state of an IP route and enters tracking configuration mode.

track list

To specify a list of objects to be tracked and the thresholds to be used for comparison, use the **track list** command in global configuration mode. To disable the tracked list, use the **no** form of this command.

track *object-number* **list** {**boolean** {**and** | **or**} | **threshold** {**weight** | **percentage**}}

no track *object-number* **list** {**boolean** {**and** | **or**} | **threshold** {**weight** | **percentage**}}

Syntax Description

object-number	Object number of the object to be tracked. The range is from 1 to 1000.
boolean	State of the tracked list is based on a boolean calculation. The keywords are as follows: • **and**—Specifies that the list is "up" if all objects are up, or "down" if one or more objects are down. For example when tracking two interfaces, "up" means that both interfaces are up, and "down" means that either interface is down. • **or**—Specifies that the list is "up" if at least one objects is up. For example, when tracking two interfaces, "up" means that either interface is up, and "down" means that both interfaces are down.
threshold	State of the tracked list is based on a threshold. The keywords are as follows: • **percentage**—Specifies that the threshold is based on a percentage. • **weight**—Specifies that the threshold is based on a weight.

Command Default

The object list is not tracked.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(8)T	This command was introduced.
12.2(30)S	This command was integrated into Cisco IOS Release 12.2(30)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2. This command was implemented on the Cisco 7304 router.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.
15.1(3)T	This command was modified. The valid range of the *object-number* argument increased to 1000.
15.1(1)S	This command was modified. The valid range for the *object-number* argument increased to 1000.

Usage Guidelines

As of Cisco IOS Release 15.1(3)T, a maximum of 1000 objects can be tracked. Although 1000 tracked objects can be configured, each tracked object uses CPU resources. The amount of available CPU resources on a router is dependent upon variables such as traffic load and how other protocols are configured and run. The ability to use 1000 tracked objects is dependent upon the available CPU. Testing should be conducted on site to ensure that the service works under the specific site traffic conditions.

Examples

A track list object may be configured to track two serial interfaces when both serial interfaces are "up" and when either serial interface is "down," for example:

```
Router(config)# track 1 interface serial2/0 line-protocol
Router(config-track)# exit
Router(config)# track 2 interface serial2/1 line-protocol
Router(config-track)# exit
Router(config)# track 100 list boolean and
Router(config-track)# object 1
Router(config-track)# object 2
```

A track list object may be configured to track two serial interfaces when either serial interface is "up" and when both serial interfaces are "down," for example:

```
Router(config)# track 1 interface serial2/0 line-protocol
Router(config-track)# exit
Router(config)# track 2 interface serial2/1 line-protocol
Router(config-track)# exit
Router(config)# track 101 list boolean or
Router(config-track)# object 1
Router(config-track)# object 2
```

A track list object may be configured to track two serial interfaces when both serial interfaces are "up" and when both serial interface is "down," for example:

```
Router(config)# track 1 interface serial2/0 line-protocol
Router(config-track)# exit
Router(config)# track 2 interface serial2/1 line-protocol
Router(config-track)# exit
Router(config)# track 102 threshold weight
Router(config-track)# object 1 weight 10
Router(config-track)# object 2 weight 10
Router(config-track)# threshold weight up 20 down 0
```

The configuration shown above provides some hysteresis in case one of the serial interfaces is flapping.

Related Commands

Command	Description
show track	Displays tracking information.
threshold weight	Specifies a threshold weight for a tracked list.
track list threshold percentage	Tracks a list of objects as to the up and down object states using a threshold percentage.
track list threshold weight	Tracks a list of objects as to the up and down object states using a threshold weight.
track object	Tracks an object for a tracked list as to the up and down object states.

track resolution

To specify resolution parameters for a tracked object, use the **track resolution** command in global configuration mode. To disable this functionality, use the **no** form of this command.

track resolution ip route {**eigrp** *resolution-value* | **isis** *resolution-value* | **ospf** *resolution-value* | **static** *resolution-value*}

no track resolution ip route {**eigrp** *resolution-value* | **isis** *resolution-value* | **ospf** *resolution-value* | **static** *resolution-value*}

Syntax Description

ip route	IP route for metric resolution for a specified track. The keywords and arguments are as follows: • **eigrp**—EIGRP routing protocol. The *resolution-value* argument has a range from 256 to 40000000. • **isis**—ISIS routing protocol. The *resolution-value* argument has a range from 1 to 1000. • **ospf**—OSPF routing protocol. The *resolution-value* argument has a range from 1 to 1562. • **static**—Static route. The *resolution-value* argument has a range from 1 to 100000.

Command Default

The track **ip route metric resolution** default values are used.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(8)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

Usage Guidelines

The **track ip route** command causes tracking of a route in the routing table. If a route exists in the table, the metric value is converted into a number in the range from 0 to 255. The metric resolution for the specified routing protocol is used to do the conversion. There are default values for the metric resolution but the track resolution command can be used to change the metric resolution default values.

Examples

In the following example, the EIGRP routing protocol has a resolution value of 280.

```
track resolution ip route eigrp 280
```

Related Commands

Command	Description
show track	Displays tracking information.
threshold percentage	Specifies a threshold percentage for a tracked list.
threshold weight	Specifies a threshold weight for a tracked list.
track list threshold percentage	Specifies a percentage threshold for a tracked list.
track list threshold weight	Specifies a weight threshold for a tracked list.
track object	Tracks an object for a tracked list as to the up and down object states.

track rtr

Note Effective with Cisco IOS Release 12.4(20)T, 12.2(33)SXI1, 12.2(33)SRE and Cisco IOS XE Release 2.4, the **track rtr** command is replaced by the **track ip sla** command. See the **track ip sla** command for more information.

To track the state of a Cisco IOS IP Service Level Agreements (SLAs) operation and to enter tracking configuration mode, use the **track rtr** command in global configuration mode. To remove the tracking, use the **no** form of this command.

track *object-number* **rtr** *operation-number* {**state** | **reachability**}

no track *object-number* **rtr** *operation-number* {**state** | **reachability**}

Syntax Description

object-number	Object number representing the object to be tracked. The range is from 1 to 500.
operation-number	Number used for the identification of the IP SLAs operation you are tracking.
state	Tracks the operation return code.
reachability	Tracks whether the route is reachable.

Command Default

IP SLAs tracking is disabled.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(4)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.
12.4(20)T	This command was replaced. This command was replaced by the **track ip sla** command.
12.2(33)SXI1	This command was replaced. This command was replaced by the **track ip sla** command.
Cisco IOS XE Release 2.4	This command was replaced. This command was replaced by the **track ip sla** command.
12.2(33)SRE	This command was replaced. This command was replaced by the **track ip sla** command.

Usage Guidelines

Every IP SLAs operation maintains an operation return-code value. This return code is interpreted by the tracking process. The return code may return OK, OverThreshold, and several other return codes. Different operations may have different return-code values, so only values common to all operation types are used.

Two aspects of an IP SLAs operation can be tracked: state and reachability. The difference between these aspects relates to the acceptance of the OverThreshold return code. Table 102 shows the state and reachability aspects of IP SLAs operations that can be tracked.

Table 103 Comparison of State and Reachability Operations

Tracking	Return Code	Track State
State	OK	Up
	(all other return codes)	Down
Reachability	OK or over threshold	Up
	(all other return codes)	Down

Examples

The following example shows how to configure the tracking process to track the state of IP SLAs operation 2:

```
track 1 rtr 2 state
```

The following example shows how to configure the tracking process to track the reachability of IP SLAs operation 3:

```
track 2 rtr 3 reachability
```

track stub-object

To create a stub object that can be tracked by Embedded Event Manager (EEM) and to enter tracking configuration mode, use the **track stub-object** command in global configuration mode. To remove the stub object, use the **no** form of this command.

track *object-number* **stub-object**

no track *object-number* **stub-object**

Syntax Description

object-number	Object number that represents the object to be tracked. The range is from 1 to 1000.

Command Default

No stub objects are created.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.4(2)T	This command was introduced.
12.2(31)SB3	This command was integrated into Cisco IOS Release 12.2(31)SB3.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.
15.1(3)T	This command was modified. The valid range of the *object-number* argument increased to 1000.
15.1(1)S	This command was modified. The valid range for the *object-number* argument increased to 1000.

Usage Guidelines

Use the **track stub-object** command to create a stub object, which is an object that can be tracked and manipulated by an external process, EEM. After the stub object is created, the **default-state** command can be used to set the default state of the stub object.

EEM is a distributed, scalable, and customized approach to event detection and recovery offered directly in a Cisco IOS device. EEM offers the ability to monitor events and take informational or corrective action when the monitored events occur or when a threshold is reached. An EEM policy is an entity that defines an event and the actions to be taken when that event occurs.

As of Cisco IOS Release 15.1(3)T, a maximum of 1000 objects can be tracked. Although 1000 tracked objects can be configured, each tracked object uses CPU resources. The amount of available CPU resources on a router is dependent upon variables such as traffic load and how other protocols are configured and run. The ability to use 1000 tracked objects is dependent upon the available CPU. Testing should be conducted on site to ensure that the service works under the specific site traffic conditions.

Examples

The following example shows how to create and configure stub object 1 with a default state of up:

```
Router(config)# track 1 stub-object
Router(config-track)# default-state up
```

Related Commands

Command	Description
default-state	Sets the default state for a stub object.
show track	Displays tracking information.

track timer

To specify the interval during which the tracking process polls the tracked object, use the **track timer** command in global configuration mode. To disable this functionality, use the **no** form of this command.

track timer {**interface** | **ip route** | **sla** } | **list** | **stub**}{ *seconds* | **msec** *milliseconds*}

no track timer {**interface** | **ip route** | **sla** } | **list** | **stub**}{ *seconds* | **msec** *milliseconds*}

Syntax Description

application	Tracks the mobile IP application polling timer.
interface	Tracks the specified interface.
ip	Tracks the specified IP protocol.
route	Tracks the IP route polling timer.
sla	Tracks the IP service level agreement (SLA) polling timer.
list	Tracks the boolean list polling timer.
stub	Tracks the Embedded Event Manager (EEM) stub polling timer.
seconds	Interval (in seconds) during which the tracking process polls the object. The range is from 1 to 3000. The default interval for interface polling is 1 second, and the default interval for IP-route polling is 15 seconds.
msec	Specifies the polling interval, in milliseconds.
milliseconds	The tracking process polling frequency interval (in milliseconds). The valid range is from 500 to 5000. All polling frequencies can be configured down to 500 milliseconds, overriding the minimum 1 second interval configured previously.

Command Default

If you do not use the **track timer** command to specify a polling interval, a tracked object will be tracked at the default polling interval.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SRE	This command was modified. The **list** and **sla** keywords was added.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

Release	Modification
15.0(1)M	This command was modified. The **application**, **msec** keywords and *milliseconds* argument was added.
12.2(33)SXI4	This command was modified. The **application**, **msec** keywords and *milliseconds* argument was added.

Examples

In the following example, the tracking process is configured to poll the tracked interface every 3 seconds:

```
Router# configure terminal
Router(config)# track timer interface 3
```

url (WSP probe)

To specify the URL path that a Wireless Session Protocol (WSP) probe is to request from the server, use the **url** command in WSP probe configuration mode. To restore the default settings, use the **no** form of this command.

url [*path*]

no url [*path*]

Syntax Description

path	(Optional) Path from the server. This argument is case-sensitive.

Defaults

If no URL path is specified, the default is /.

Command Modes

WSP probe configuration (config-slb-probe)

Command History

Release	Modification
12.1(5a)E	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Examples

The following example configures a ping probe named PROBE3, enters WSP probe configuration mode, and configures the probe to request URL path http://localhost/test.txt:

```
Router(config)# ip slb probe PROBE3 wsp
Router(config-slb-probe)# url http://localhost/test.txt
```

Related Commands

Command	Description
ip slb probe wsp	Configures a Wireless Session Protocol (WSP) probe name and enters WSP probe configuration mode.
show ip slb probe	Displays information about an IOS Server Load Balancing (IOS SLB) probe.

username (IOS SLB)

To configure an ASCII regular expression string to be matched against the username attribute for RADIUS load balancing, use the **username (IOS SLB)** command in SLB RADIUS map configuration mode. To delete the username match string, use the **no** form of this command.

username *string*

no username *string*

Syntax Description

string	ASCII regular expression string to be matched against the username attribute in the RADIUS payload. For information about regular expressions and how to use them in Cisco IOS software configurations, refer to the "Understanding Regular Expressions" section of the "Using the Cisco IOS Command-Line Interface" chapter of the *Cisco IOS Configuration Fundamentals Configuration Guide*: http://www.cisco.com/en/US/docs/ios/fundamentals/configuration/guide/cf_cli-basics.html

Defaults

None

Command Modes

SLB RADIUS map configuration (config-slb-radius-map)

Command History

Release	Modification
12.2(33)SRB	This command was introduced.

Usage Guidelines

For a given IOS SLB RADIUS map, you can configure a single **calling-station-id** command or a single **username (IOS SLB)** command, but not both.

Examples

The following example specifies that, for IOS SLB RADIUS map **1**, string **...?525*** is to be matched against the username attribute in the RADIUS payload:

```
Router(config)# ip slb map 1 radius
Router(config-slb-radius-map)# username ...?525*
```

Related Commands

Command	Description
calling-station-id	Configures an ASCII regular expression string to be matched against the calling station ID attribute in the RADIUS payload.
ip slb map	Configures an IOS SLB protocol map and enters SLB map configuration mode.

Command	Description
show ip slb map	Displays information about IOS SLB protocol maps.

virtual

To configure virtual server attributes, use the **virtual** command in SLB virtual server configuration mode. To remove the attributes, use the **no** form of this command.

Encapsulation Security Payload (ESP) and Generic Routing Encapsulation (GRE) Protocols

virtual *ipv4-address* [*ipv4-netmask* [**group**]] {**esp** | **gre** | *protocol*}

no virtual *ipv4-address* [*ipv4-netmask* [**group**]] {**esp** | **gre** | *protocol*}

TCP and User Datagram Protocol (UDP)

virtual *ipv4-address* [*ipv4-netmask* [**group**]] [**ipv6** *ipv6-address* [**prefix** *ipv6-prefix*]] {**tcp** | **udp**} [*port* | **any**] [**service** *service*]

no virtual *ipv4-address* [*ipv4-netmask* [**group**]] [**ipv6** *ipv6-address* [**prefix** *ipv6-prefix*]] {**tcp** | **udp**} [*port* | **any**] [**service** *service*]

Syntax Description

ipv4-address	IPv4 address for this virtual server instance, used by clients to connect to the IPv4 real servers through the IPv4 server farm.
ipv4-netmask	(Optional) IPv4 network mask for transparent web cache load balancing. The default is 0.0.0.0 (all subnets).
group	(Optional) Allows the virtual subnet to be advertised. If you do not specify the **group** keyword, the virtual subnet cannot be advertised.
esp	Performs load balancing for only Encapsulation Security Payload (ESP) connections.
gre	Performs load balancing for only Generic Routing Encapsulation (GRE) connections.
protocol	Protocol for which load balancing is performed. The valid range is 2 to 127.
ipv6 *ipv6-address*	(Optional) For dual-stack, IPv6 address for this virtual server instance, used by IPv6 clients to connect to IPv6 real servers through the IPv6 server farm.
prefix *ipv6-prefix*	(Optional) For dual-stack, IPv6 prefix.
tcp	Performs load balancing for only TCP connections.
udp	Performs load balancing for only User Datagram Protocol (UDP) connections.
port	(Optional) IOS Server Load Balancing (IOS SLB) virtual port (the TCP or UDP port number or port name). If specified, only the connections for the specified port on the server are load-balanced. The ports and the valid name or number for the *port* argument are as follows: • All ports: **any 0** • Access Service Network (ASN): **asn 2231** • Connectionless secure Wireless Session Protocol (WSP): **wsp-wtls 9202**

port (continued)	• Connectionless WSP: **wsp 9200** • Connection-oriented secure WSP: **wsp-wtp-wtls 9203** • Connection-oriented WSP: **wsp-wtp 9201** • Domain Name System: **dns 53** • File Transfer Protocol: **ftp 21** • General packet radio service (GPRS) tunneling protocol (GTP) v0: **gtp 3386** • GTP v1 or v2: **gtp 2123** • HTTP over Secure Socket Layer: **https 443** • Internet Key Exchange (IKE): **isakmp 500** • Mapping of airline traffic over IP, Type A: **matip-a 350** • Network News Transport Protocol: **nntp 119** • Post Office Protocol v2: **pop2 109** • Post Office Protocol v3: **pop3 110** • Simple Mail Transport Protocol: **smtp 25** • Telnet: **telnet 23** • X.25 over TCP (XOT): **xot 1998** • World Wide Web (HTTP): **www 80** Specify a port number of 0 to configure an all-port virtual server (that is, a virtual server that accepts flows destined for all ports except GTP ports).
any	(Optional) Performs load balancing on all ports.
service *service*	(Optional) Couples connections associated with a given service, such as HTTP or Telnet, so all related connections from the same client use the same real server. The following are the valid types of connection coupling: • **asn**—Enables ASN load balancing. • **ftp**—Couples FTP data connections with the control session that created them. • **gtp**—Enables GPRS load balancing without general packet radio service (GPRS) tunneling protocol (GTP) cause code inspection enabled, which allows load-balancing decisions to be made using Layer 5 information. You can balance UDP flows without awareness of GTP by omitting the **service gtp** keywords. • **gtp-inspect**—Enables GPRS load balancing with GTP cause code inspection enabled. • **ipmobile**—Enables the Home Agent Director. • **per-packet**—Does not maintain connection objects for packets destined for this virtual server. • **radius**—Enables IOS SLB to build RADIUS session objects for RADIUS load balancing.

Command Default No default behavior or values.

Command Modes SLB virtual server configuration (config-slb-vserver)

Command History

Release	Modification
12.0(7)XE	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.2	This command was integrated into Cisco IOS Release 12.2.
12.1(5a)E	The **wsp**, **wsp-wtp**, **wsp-wtls**, and **wsp-wtp-wtls** keywords were added.
12.1(9)E	The **gtp** option was added as a new value on the *service* argument.
12.1(11b)E	The following keywords, arguments, and options were added: • The **esp**, **gre**, and **all** keywords • The *protocol* argument • The **isakmp** option on the *port* argument • The **per-packet** and **radius** options on the *service* argument The **wsp**, **wsp-wtp**, **wsp-wtls**, and **wsp-wtp-wtls** keywords were changed to options for the *port* argument.
12.1(12c)E	The **group** keyword was added.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.1(13)E3	The **gtp-inspect** option was added as a new value on the *service* argument.
12.2(14)ZA2	The **ipmobile** option was added as a new value on the *service* argument.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SRC	The **asn** option was added on the *service* argument.
15.0(1)S	The **ipv6** *ipv6-address* and **prefix** *ipv6-prefix* options were added.

Usage Guidelines The **no virtual** command is allowed only if the virtual server was removed from service by the **no inservice** command.

For some applications, it is not feasible to configure all the virtual server TCP or UDP port numbers for IOS SLB. To support such applications, you can configure IOS SLB virtual servers to accept flows destined for all ports. To configure an all-port virtual server, specify a port number of 0 or any.

Note In general, you should use port-bound virtual servers instead of all-port virtual servers. When you use all-port virtual servers, flows can be passed to servers for which no application port exists. When servers reject these flows, IOS SLB might fail the server and remove it from load balancing.

Specifying port 9201 for connection-oriented WSP mode also activates the Wireless Application Protocol (WAP) finite state machine (FSM), which monitors WSP and drives the session FSM accordingly.

In RADIUS load balancing, IOS SLB maintains session objects in a database to ensure that re-sent RADIUS requests are load-balanced to the same real server.

IOS SLB supports general packet radio service (GPRS) Tunneling Protocol (GTP) v0, v1, and v2 real servers. A GTP v0 or v1 real server cannot manage GTP v2 requests. Therefore, you must configure separate virtual servers for GTPv2 real servers and for GTP v0 or v1 real servers.

IOS SLB supports dual-stack addresses for GTP load balancing only. To support dual-stack addresses:

- You must configure the virtual server as a dual-stack virtual server, with the virtual IPv4 and IPv6 addresses and the optional IPv6 prefix, using this command.
- You must associate an IPv6 server farm with the dual-stack virtual server.

Examples

The following example specifies that the virtual server with the IPv4 address 10.0.0.1 performs load balancing for TCP connections for the port named www. The virtual server processes HTTP requests.

```
Router(config)# ip slb vserver PUBLIC_HTTP
Router(config-slb-vserver)# virtual 10.0.0.1 tcp www
```

The following example specifies that the virtual server with the IPv4 address 10.0.0.13 performs load balancing for UDP connections for all ports. The virtual server processes HTTP requests.

```
Router(config)# ip slb vserver PUBLIC_HTTP
Router(config-slb-vserver)# virtual 10.0.0.13 udp 0
```

Related Commands

Command	Description
ip slb vserver	Identifies a virtual server.
show ip slb vservers	Displays information about the virtual servers defined to IOS Server Load Balancing (IOS SLB).

vrrp authentication

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

vrrp *group* **authentication** {*text-string* | **text** *text-string* | **md5** {**key-chain** *key-chain* | **key-string** [**0** | **7**] *key-string* [**timeout** *seconds*]}}

no vrrp *group* **authentication** {*text-string* | **text** *text-string* | **md5** {**key-chain** *key-chain* | **key-string** [**0** | **7**] *key-string* [**timeout** *seconds*]}}

Syntax Description

group	Virtual router group number for which authentication is being configured. The group number is configured with the **vrrp ip** command. The valid range is 1 to 255.
text-string	Plain text authentication. There is no default value.
text *text-string*	Plain text authentication. The *text-string* argument is the authentication string and can be up to eight alphanumeric characters. There is no default value.
md5	Message digest 5 (MD5) authentication. The arguments and keywords are as follows: • **key-chain**—Authentication using a live key and key ID. The *key-chain* argument specifies a string and must match the assigned key-chain name using the **key chain** command. • **key-string**—Specifies the secret key for the MD5 authentication string. The arguments and keywords are as follows: – **0**—(Optional) The key is unencrypted. – **7**—(Optional) The key is encrypted. – *key-string*—Up to 64 characters. It is recommended that the string be at least 16 characters. No prefix to the *key-string* argument means that the key is unencrypted. – **timeout** *seconds* —(Optional) Duration in seconds that VRRP will accept message digests based on both the old and new keys. **Note** The key-string authentication method is encrypted if the **service password-encryption** command has been specified.

Command Default

VRRP authentication is disabled.

Command Modes

Interface configuration (config-if)

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(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(14)T	The **md5**, **key-string**, **0**, **7**, and **key-chain** keywords were added. The *text-string*, *key-string*, and *key-chain* arguments were added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(31)SG	This command was integrated into Cisco IOS Release 12.2(31)SG.
12.2(17d)SXB	This command was integrated into Cisco IOS Release 12.2(17d)SXB.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

Usage Guidelines

VRRP does not accept a virtual router group number 0 and never has an empty group. The valid range for the VRRP group is 1 to 255.

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. The authentication string is sent unencrypted in all VRRP messages when using the **vrrp authentication text** *text-string* option.

All routers within the VRRP group must be configured with the same authentication string. If the same authentication string is not configured, the routers in the VRRP group will not communicate with each other and any misconfigured router in the group will change its state to master.

If password encryption is configured with the **service password-encryption** command, the software saves the *key-string* as encrypted text.

Note Plain text authentication is not meant to be used for security. It simply provides a way to prevent a router that does not belong to a configured VRRP group from participating in it.

The **timeout** *seconds* keyword and argument specify the duration that the VRRP group will accept message digests based on both the old and new keys. This option allows time for configuration of all routers in a group with the new key. VRRP route flapping can be minimized by changing the keys on all the routers, provided that the master router is changed last. The master router should have its key string changed no later than one holdtime period, specified by the **vrrp timers advertise** interface configuration command, after the backup routers. This procedure ensures that the backup routers do not time out the master router.

Examples

The following example shows how to configure an authentication text string of x30dn78k:

```
vrrp 1 authentication x30dn78k
```

The following example shows how to configure an MD5 key string:

```
interface Ethernet0/1
 description ed1-cat5a-7/10
 vrrp 1 ip 10.21.0.10
 vrrp 1 priority 110
```

```
 vrrp 1 authentication md5 key-string f00c4s
```

The key ID for key-string authentication is always zero. If a key chain is configured with a key ID of zero, then the following configuration will work:

Router 1

```
key chain vrrp1
 key 0
 key-string 54321098452103ab
!
interface Ethernet0/1
 vrrp 1 ip 10.21.0.10
 vrrp 1 authentication md5 key-chain vrrp1
```

Router 2

```
interface Ethernet0/1
 vrrp 1 ip 10.21.0.10
 vrrp 1 authentication md5 key-string 54321098452103ab
```

Related Commands

Command	Description
key chain	Enables authentication for routing protocols.
service password-encryption	Encrypts passwords.
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.

vrrp delay

To configure the delay period before the initialization of all Virtual Router Redundancy Protocol (VRRP) groups on an interface, use the **vrrp delay** command in interface configuration mode. To remove all configured delays, use the **no** form of this command.

vrrp delay {**minimum** *seconds* [**reload** *seconds*] | **reload** *seconds*}

no vrrp delay {**minimum** *seconds* [**reload** *seconds*] | **reload** *seconds*}

Syntax Description

minimum *seconds*	The minimum time, in seconds, to delay VRRP group initialization after an interface comes up. Valid range is 1–10000.
reload *reload-seconds*	Time, in seconds, to delay after the router has reloaded. Valid range is 0–10000.

Command Default

No delay value is used.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Cisco IOS XE Release 2.6	This command was introduced.

Usage Guidelines

Use the **vrrp delay** command to configure the delay period before the initialization of VRRP groups. This command applies to all VRRP groups on an interface. This command cannot be configured per-VRRP group.

The **minimum** *seconds* value is the minimum time (in seconds) to delay VRRP group initialization after an interface comes up. This minimum delay period applies to all subsequent interface events.

The **reload** *seconds* value is the time period to delay after the router has reloaded. This delay period applies only to the first interface-up event after the router has reloaded.

The recommended **minimum** *seconds* value is 30 seconds and the recommended **reload** *seconds* value is 60 seconds.

The **no vrrp delay** command removes all delays, and is equivalent to configuring 0 for each argument. When the **no vrrp delay** command is configure, there is no appreciable delay between the interface coming up and the VRRP groups on that interface becoming operational.

Examples

The following example shows how to configure a minimum delay of 30 seconds and a reload delay of 60 seconds:

```
Router(config)# interface gigabitethernet0/0/0
Router(config-if)# vrrp delay minimum 30 reload 60
```

Related Commands

Command	Description
vrrp name	Links a VRRS client to a VRRP group.

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

group	Virtual router group number. The group number range is from 1 to 255.
text	Text (up to 80 characters) that describes the purpose or use of the group.

Command Default

There is no description of the VRRP group.

Command Modes

Interface configuration (config-if)

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.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

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** *ip-address* [**secondary**]

no vrrp *group* **ip** *ip-address* [**secondary**]

Syntax Description

group	Virtual router group number. The group number range is from 1 to 255.
ip-address	IP address of the virtual router.
secondary	(Optional) Indicates additional IP addresses supported by this group.

Command Default

VRRP is not configured on the interface.

Command Modes

Interface configuration (config-if)

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(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(31)SG	This command was integrated into Cisco IOS Release 12.2(31)SG.
12.2(17d)SXB	This command was integrated into Cisco IOS Release 12.2(17d)SXB.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

Usage Guidelines

The **vrrp ip** command activates VRRP on the configured interface. The first IP address specified in the VRRP configuration is used as the primary address for the virtual router. For VRRP to elect a designated router, at least one router on the cable must have been configured with the primary address of the virtual router. Configuration of the primary address on the master router always overrides a primary address that is currently in use.

VRRP does not support address learning. All addresses must be configured.

All routers in the VRRP group must be configured with the same primary address for the virtual router. If different primary addresses are configured, the routers in the VRRP group will not communicate with each other and any misconfigured routers in the group will change their state to master.

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 You can configure the primary IP address of a VRRP group with the same address as the interface. When VRRP is configured in this manner, the router that has the interface IP address is always the master router. Removing the VRRP configuration from a router configured in this way and leaving the IP address of the interface active is considered a misconfiguration because duplicate IP addresses on the LAN will result. If you have configured VRRP in this way and need to remove the VRRP configuration, you can change the interface address to a different value. Alternately, you can also remove all VRRP group members that are using the virtual address equal to the interface address on the router. To avoid a period of duplicate address warnings, deconfigure all VRRP routers in the group. This leaves the address owner router the last to be deconfigured, which avoids duplicate address warnings.

VRRP must be in the master state for proxy Address Resolution Protocol (ARP) to use the VRRP virtual MAC address.

Examples

The following example shows how to enable 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 name

To link a Virtual Router Redundancy Service (VRRS) client to a Virtual Router Redundancy Protocol (VRRP) group, use the **vrrp name** command in interface configuration mode. To disassociate a VRRS group from VRRS, use the **no** form of this command.

vrrp *group-number* **name** [*vrrp-group-name*]

no vrrp *group-number* **name** [*vrrp-group-name*]

Syntax Description

group-number	Virtual router group number. The group number range is from 1 to 255.
vrrp-group-name	(Optional) VRRP group name.

Command Default

VRRS clients are not linked to VRRP groups.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Cisco IOS XE Release 2.6	This command was introduced.

Usage Guidelines

Use the **vrrp name** command to link VRRS clients to VRRP groups. VRRP provides stateless redundancy for IP routing. VRRP by itself is limited to maintaining its own state. Linking a VRRS client to a VRRP group allows client applications to implement stateful failover. IP redundancy clients are other Cisco IOS processes or applications that use VRRP to provide or withhold a service or resource dependent upon the state of the group.

Use the **no vrrp name** command to dissociates a VRRP group from VRRS. After this, the same VRRP group can be attached to a different VRRP name; or the VRRS name can be applied to a different VRRP group.

Examples

The following example shows how to link VRRS clients to a VRRP group named VRRP-Partition-1:

```
Router(config)# interface gigabitethernet0/0/0
Router(config-if)# vrrp 1 name VRRP-Partition-1
```

Related Commands

Command	Description
vrrs follow	Configures a name association between VRRS plug-ins and the VRRS server.
vrrp name	Links a VRRS client to a VRRP group.

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 function, use the **no** form of this command.

vrrp *group* **preempt** [**delay minimum** *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. The group number range is from 1 to 255.
delay minimum *seconds*	(Optional) Number of seconds that the router will delay before issuing an advertisement claiming master ownership. The default delay is 0 seconds.

Defaults

This command is enabled.

Command Modes

Interface configuration (config-if)

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(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(31)SG	This command was integrated into Cisco IOS Release 12.2(31)SG.
12.2(17d)SXB	This command was integrated into Cisco IOS Release 12.2(17d)SXB.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

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.

Note 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 minimum 15
vrrp 1 priority 200
```

Related Commands

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. The group number range is from 1 to 255.
level	Priority of the router within the VRRP group. The range is from 1 to 254. The default is 100.

Defaults

level: 100

Command Modes

Interface configuration (config-if)

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.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

Usage Guidelines

Use this command to control which router becomes the master virtual router.

Examples

The following example configures the router with a priority of 254:

```
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 shutdown

To disable the Virtual Router Redundancy Protocol (VRRP) group on an interface, use the **vrrp shutdown** command in interface configuration mode.

vrrp *group-number* **shutdown**

Syntax Description

group-number	Virtual router group number. The group number range is from 1 to 255.

Defaults

VRRP groups configured by the **vrrp** *group-number* **ip** command are enabled by default.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(11)T	This command was introduced.
Cisco IOS XE Release 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

When a VRRP group has been configured using the **vrrp** *group-number* **ip** command, the protocol is fully operational. The **vrrp shutdown** command is not displayed on the router, and to disable the protocol for one group, you must explicitly specify the group using the **vrrp shutdown** command.

Examples

The following example shows how to disable one VRRP group on Ethernet interface 0/1 (group 1) while retaining the VRRP group on Ethernet interface 0/2 (group 2):

```
interface ethernet0/1
 ip address 10.0.1.1 255.255.255.0
 vrrp 1 ip 10.0.1.254
 vrrp 1 shutdown
!
interface ethernet0/2
 ip address 10.0.42.1 255.255.255.0
 vrrp 2 ip 10.0.42.254
```

Related Commands

Command	Description
show vrrp	Displays a summary or detailed status of one or all configured VRRP groups.
vrrp ip	Enables the VRRP on an interface and identify the IP address of the virtual router.

vrrp sso

To enable Virtual Router Redundancy Protocol (VRRP) support of Stateful Switchover (SSO) if it has been disabled, use the **vrrp sso** command in global configuration mode. To disable VRRP support of SSO, use the **no** form of this command.

vrrp sso

no vrrp sso

Syntax Description

This command has no arguments or keywords.

Command Default

VRRP support of SSO is enabled by default.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SRC	This command was introduced.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.

Usage Guidelines

Use this command to enable VRRP support of SSO if it has been manually disabled by the **no vrrp sso** command.

Examples

The following example shows how to disable VRRP support of SSO:

```
Router(config)# no vrrp sso
```

Related Commands

Command	Description
debug vrrp all	Displays debugging messages for VRRP errors, events, and state transitions.
debug vrrp ha	Displays debugging messages for VRRP high availability.
show vrrp	Displays a brief or detailed status of one or all configured VRRP groups.

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

group	Virtual router group number. The group number range is from 1 to 255.
msec	(Optional) Changes the unit of the advertisement time from seconds to milliseconds. Without this keyword, the advertisement interval is in seconds.
interval	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. The valid range is 1 to 255 seconds. When the **msec** keyword is specified, the valid range is 50 to 999 milliseconds.

Defaults

interval: 1 second

Command Modes

Interface configuration (config-if)

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(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(31)SG	This command was integrated into Cisco IOS Release 12.2(31)SG.
12.2(17d)SXB	This command was integrated into Cisco IOS Release 12.2(17d)SXB.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

Usage Guidelines

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

The **vrrp timers advertise** command configures the time between successive advertisement packets and the time before other routers declare the master router to be down. Routers or access servers on which timer values are not configured can learn timer values from the master router. The timers configured on

the master router always override any other timer settings. All routers in a VRRP group must use the same timer values. If the same timer values are not set, the routers in the VRRP group will not communicate with each other and any misconfigured router will change its state to master.

Examples

The following example shows how to configure the master virtual router to send advertisements every 4 seconds:

```
vrrp 1 timers advertise 4
```

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

group	Virtual router group number to which the command applies. The group number range is from 1 to 255.

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.

Command Modes

Interface configuration (config-if)

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(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(31)SG	This command was integrated into Cisco IOS Release 12.2(31)SG.
12.2(17d)SXB	This command was integrated into Cisco IOS Release 12.2(17d)SXB.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.

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.

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:

```
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.

vrrp track

To configure the Virtual Router Redundancy Protocol (VRRP) to track an object, use the **vrrp track** command in interface configuration mode. To disable the tracking, use the **no** form of this command.

vrrp *group* **track** *object-number* [**decrement** *priority*]

no vrrp *group* **track** *object-number* [**decrement** *priority*]

Syntax Description

group	Group number to which the tracking applies. The group number range is from 1 to 255.
object-number	Object number in the range from 1 to 500 representing the object to be tracked.
decrement *priority*	(Optional) Amount by which the priority for the router is decremented (or incremented) when the tracked object goes down (or comes back up). The default value is 10. Decrements can be set to any value between 1 and 255.

Defaults

The default decrement value is 10. The range is from 1 and 255.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(2)T	This command was introduced.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

You can configure VRRP to track specific objects, such as an interface or IP route, that can alter the priority level of a virtual router for a VRRP group. The tracked objects are first defined using the **track interface** or **track ip route** global configuration command. The client process, in this case VRRP, registers interest in tracking these objects and can then be notified when the tracked object changes state.

Examples

In the following example, the tracking process is configured to track the IP routing capability of serial interface 1/0. VRRP on Ethernet interface 0/0 then registers with the tracking process to be informed of any changes to the IP routing state of serial interface 1/0. If the IP state on serial interface 1/0 goes down, then the priority of the VRRP group is reduced by 10.

If both serial interfaces are operational, then Router A will be the master virtual router because it has the higher priority.

However, if IP routing on serial interface 1/0 in Router A fails, then the HSRP group priority will be reduced and Router B will take over as the master virtual router, thus maintaining a default virtual gateway service to hosts on the 10.1.0.0 subnet.

Router A Configuration

```
!
track 100 interface serial1/0 ip routing
!
interface Ethernet0/0
  ip address 10.1.0.21 255.255.0.0
  vrrp 1 ip 10.1.0.1
  vrrp 1 priority 105
  vrrp 1 track 100 decrement 10
```

Router B Configuration

```
!
track 100 interface serial1/0 ip routing
!
interface Ethernet0/0
  ip address 10.1.0.22 255.255.0.0
  vrrp 1 ip 10.1.0.1
  vrrp 1 priority 100
  vrrp 1 track 100 decrement 10
```

Related Commands

Command	Description
track interface	Configures an interface to be tracked.
track ip route	Tracks the state of an IP route.

vrrs

To specify a distinct AAA accounting method list to use, a non-zero delay time for accounting-off messages, and additional attributes other than the default for a Virtual Router Redundancy Protocol (VRRP) group, enter the **vrrs** command in the global configuration mode. To return to the default values, use the **no** form of this command.

vrrs *vrrs-group-name*

no vrrs *name*

Syntax Description

vrrs-group-name	Name of a VRRS group.

Command Default

Accounting-on and accounting-off messages for a VRRP group are set with default accounting attributes, without any delay for accounting-off messages, and using the VRRS default accounting method list.

Command Modes

Global configuration (config)

Command History

Release	Modification
Cisco IOS XE Release 2.6	This command was introduced.

Usage Guidelines

The VRRS group name specified by the *vrrs-group-name* argument should match a VRRP group as configured by the **vrrp name** command in interface configuration mode.

Note VRRS does not perform a cross-check of the VRRS group name between the **vrrs** global configuration command and the **vrrp name** interface configuration command. Any string entered is accepted.

.The following RADIUS attributes are included in accounting messages by default:

- Attribute 4, NAS-IP-Address
- Attribute 26, Cisco VSA Type 1, vrrs
- Attribute 40, Acct-Status-Type
- Attribute 41, Acct-Delay-Type
- Attribute 44 Acct-Session-Id

Examples

The following example shows how to configure a VRRS group named vrrp-group-1:

```
Router(config)# vrrs vrrp-group-1
```

```
Router(config-vrrs)# exit
Router(config)# interface gigabitethernet 1/0/0
Router(config-if)# ip address 10.1.0.2 255.0.0.0
Router(config-if)# vrrp 1 ip 10.1.0.10
Router(config-if)# vrrp 1 name vrrp-group-1
```

Related Commands

Command	Description
vrrp ip	Enables the VRRP on an interface and identifies the IP address of the virtual router.
vrrp name	Links a VRRS client to a VRRP group.

vrrs follow

To configure a name association between Virtual Router Redundancy Service (VRRS) plug-ins and the VRRS server, use the **vrrs follow** command in subinterface configuration mode. To disassociate the VRRS plug-ins from a server, use the **no** form of this command.

vrrs follow *name*

no vrrs follow *name*

Syntax Description

name	A name that associates the VRRS plug-ins with a First Hop Redundancy Protocol (FHRP) server, via VRRS, that shares the same name.

Command Default

VRRS plug-ins remain detached and in the DOWN state.

Command Modes

Subinterface configuration (config-subif)

Command History

Release	Modification
Cisco IOS XE Release 2.6	This command was introduced.

Usage Guidelines

This command can be applied only to subinterfaces.

The **no vrrs follow** command disassociate the VRRS plug-ins from a server. The VRRS plug-ins are disabled after this, and are forced to the DOWN state until they are reattached to a new name.

Examples

The following example configures a name association between the VRRS interface-state and mac-address plug-ins and the VRRS server:

```
Router(config)# interface gigabitethernet0/0/0.1
Router(config-subif)# ip address 172.24.1.1 255.255.255.0
Router(config-subif)# vrrs follow name1
Router(config-subif)# vrrs interface-state
Router(config-subif)# vrrs mac-address
```

Related Commands

Command	Description
vrrs interface-state	Configures the VRRP shutdown plug-in on an interface.
vrrs mac-address	Configures the VRRS mac-address plug-in on an interface.

vrrs interface-state

To configure the Virtual Router Redundancy Protocol (VRRP) shutdown plug-in on an interface, use the **vrrs interface-state** command in subinterface configuration mode. To disable the shutdown plug-in, use the **no** form of this command.

vrrs interface-state

no vrrs interface-state

Syntax Description

This command has no arguments or keywords.

Command Default

The VRRS shutdown plug-in remains detached and in the DOWN state.

Command Modes

Subinterface configuration (config-subif)

Command History

Release	Modification
Cisco IOS XE Release 2.6	This command was introduced.

Usage Guidelines

Use the **vrrs interface-state** command to configure the VRRP shutdown plug-in on an interface. When the line protocol is configured, and the Virtual Router Redundancy Service (VRRS) is in a nonactive state, the line protocol state of the interface is transitioned to down.

The **vrrs follow** command associates the interface-state plug-in with a First Hop Redundancy Protocol (FHRP) that is using the same name with VRRS. Removal of the **vrrs interface-state** command, or a change in the VRRS state to an active state, causes the line protocol state of the interface to transition to UP.

Examples

The following example shows how to configure the VRRP shutdown plug-in on an interface:

```
Router(config)# interface gigabitethernet0/0/1.1
Router(config-subif)# ip address 10.0.0.0 255.255.255.0
Router(config-subif)# vrrs follow vrrp-partition-1
Router(config-subif)# vrrs interface-state
Router(config-subif)# vrrs mac-address arp interval 5 duration 60
```

Related Commands

Command	Description
vrrs follow	Configures a name association between VRRS plug-ins and the VRRS server.
vrrs mac-address	Configures the VRRS mac-address plug-in on an interface.

vrrs mac-address

To configure the Virtual Router Redundancy Service (VRRS) mac-address plug-in on an interface, use the **vrrs mac-address** command in subinterface configuration mode. To disable the mac-address plug-in, use the **no** form of this command.

vrrs mac-address [**arp** [**interval** *seconds*] [**duration** *seconds*]]

no vrrs mac-address [**arp** [**interval** *seconds*] [**duration** *seconds*]]

Syntax Description

arp	(Optional) Enables sending gratuitous ARP messages.
interval *seconds*	(Optional) Specifies, the interval, in seconds, at which gratuitous ARPs are sent by the VRRS mac-address plug-in.
duration *seconds*	(Optional) Specifies, in seconds, how long the gratuitous ARP repeats continue. A value of 0 means indefinitely, but use of this option should be carefully considered because it may have a detrimental effect on the performance of the router or network.

Command Default

The VRRS mac-address plug-in remains detached and in the DOWN state.

Command Modes

Subinterface configuration (config-subif)

Command History

Release	Modification
Cisco IOS XE Release 2.6	This command was introduced.

Usage Guidelines

Use the **vrrs mac-address** command to configure the VRRS mac-address plug-in on an interface. When a virtual-MAC is configured, and VRRS is in an ACTIVE state, a virtual-MAC is added to the interface that is to be associated with the Primary IP address configured on that interface. Use the **vrrs follow** command to associate the mac-address plug-in with a First Hop Redundancy Protocol (FHRP) that is using the same name as VRRS. The mac-address plug-in can be enabled with all defaults by configuring the **vrrs mac-address** command with no optional keywords or arguments.

Examples

The following example shows how to configure the VRRS mac-address plug-in on an interface:

```
Router(config)# interface gigabitethernet0/0/1.1
Router(config-subif)# ip address 10.0.0.0 255.255.255.0
Router(config-subif)# vrrs follow vrrp-partition-1
Router(config-subif)# vrrs interface-state
Router(config-subif)# vrrs mac-address arp interval 5 duration 60
```

Related Commands

Command	Description
vrrs follow	Configures a name association between VRRS plug-ins and the VRRS server.
vrrs interface-state	Configures the VRRP shutdown plug-in on an interface.

weight (firewall farm real server)

To specify a real server's capacity, relative to other real servers in the firewall farm, use the **weight** command in firewall farm real server configuration mode. To restore the default weight value, use the **no** form of this command.

weight *setting*

no weight

Syntax Description

setting	Weight setting to use for the real server predictor algorithm. Valid settings range from 1 to 255. The default weight setting is 8.

Defaults

The default setting to use for the real server predictor algorithm is 8.

Command Modes

Firewall farm real server configuration (config-slb-fw-real)

Command History

Release	Modification
12.1(3a)E	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Examples

The following example specifies the relative weights of three real servers as 16, 8 (by default), and 24, respectively:

```
Router(config)# ip slb firewallfarm FIRE1
Router(config-slb-fw)# real 10.10.1.1
Router(config-slb-fw-real)# weight 16
Router(config-slb-fw-real)# inservice
Router(config-slb-fw-real)# exit
Router(config-slb-fw)# real 10.10.1.2
Router(config-slb-fw-real)# inservice
Router(config-slb-fw-real)# exit
Router(config-slb-fw)# real 10.10.1.3
Router(config-slb-fw-real)# weight 24
```

Related Commands

Command	Description
real (server farm)	Identifies a real server by IP address and optional port number as a member of a server farm and enters real server configuration mode.
show ip slb firewallfarm	Displays information about the firewall farm configuration.
show ip slb reals	Displays information about the real servers.

weight (real server)

To specify a real server's capacity, relative to other real servers in the server farm, use the **weight** command in SLB real server configuration mode. To restore the default weight value, use the **no** form of this command.

weight *setting*

no weight

Syntax Description

setting	Weight setting to use for the real server predictor algorithm. Valid settings range from 1 to 255. The default weight setting is 8.

Defaults

The default setting to use for the real server predictor algorithm is 8.

Command Modes

SLB real server configuration (config-slb-sfarm)

Command History

Release	Modification
12.0(7)XE	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.2	This command was integrated into Cisco IOS Release 12.2.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

The static weights you define using this command are overridden by the weights calculated by Dynamic Feedback Protocol (DFP). If DFP is removed from the network, IOS Server Load Balancing (IOS SLB) reverts to these static weights.

Examples

The following example specifies the relative weights of three real servers as 16, 8 (by default), and 24, respectively:

```
Router(config)# ip slb serverfarm PUBLIC
!-----First real server
Router(config-slb-sfarm)# real 10.10.1.1
!-----Assigned weight of 16
Router(config-slb-real)# weight 16
!-----Enabled
Router(config-slb-real)# inservice
Router(config-slb-real)# exit
!-----Second real server
Router(config-slb-sfarm)# real 10.10.1.2
!-----Enabled with default weight
Router(config-slb-real)# inservice
```

```
Router(config-slb-real)# exit
!-----Third real server
Router(config-slb-sfarm)# real 10.10.1.3
!-----Assigned weight of 24, not enabled
Router(config-slb-real)# weight 24
```

Related Commands

Command	Description
real (server farm)	Identifies a real server by IP address and optional port number as a member of a server farm and enters real server configuration mode.
show ip slb reals	Displays information about the real servers.
show ip slb serverfarms	Displays information about the server farm configuration.