



Enhanced Object Tracking

Prior to the introduction of the Enhanced Object Tracking feature, the Hot Standby Router Protocol (HSRP) had a simple tracking mechanism that allowed you to track the interface line-protocol state only. If the line-protocol state of the interface went down, the HSRP priority of the router was reduced, allowing another HSRP router with a higher priority to become active.

The Enhanced Object Tracking feature separates the tracking mechanism from HSRP and creates a separate standalone tracking process that can be used by any other process as well as HSRP. This feature allows tracking of other objects in addition to the interface line-protocol state.

A client process, such as HSRP, Virtual Router Redundancy Protocol (VRRP), or Gateway Load Balancing Protocol (GLBP), can now register its interest in tracking objects and then be notified when the tracked object changes state. The object can be an interface or a route.

Feature History for the Enhanced Object Tracking Feature

Release	Modification
12.2(15)T	This feature was introduced.
12.3(8)T	The object , track list , and track resolution commands were introduced and the debug track and show track commands were modified.
12.2(25)S	This feature was integrated to 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.

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Information About Enhanced Object Tracking

Before you configure the Enhanced Object Tracking feature, you should understand the following concepts:

- [Feature Design of Enhanced Object Tracking, page 2](#)
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Feature Design of Enhanced Object Tracking

The Enhanced Object Tracking feature provides complete separation between the objects to be tracked and the action to be taken by a client when a tracked object changes. Thus, several clients such as HSRP, VRRP, or GLPB can register their interest with the tracking process, track the same object, and each take different action when the object changes.

Each tracked object is identified by a unique number that is specified on the tracking command-line interface (CLI). Client processes use this number to track a specific object.

The tracking process periodically polls the tracked objects and notes any change of value. The changes in the tracked object are communicated to interested client processes, either immediately or after a specified delay. The object values are reported as either up or down.

In this release, the tracking capabilities have been enhanced to enable the configuration of a combination of tracked objects in a list, and a flexible method of combining objects using Boolean logic. The enhancements introduced the following capabilities:

- **Threshold**—The tracked list can be configured to use a weight or percentage threshold to measure the state of the list. Each object in a tracked list can be assigned a threshold weight. The state of the tracked list is determined by whether or not the threshold has been met.
- **Boolean “and” function**—When a tracked list has been assigned a Boolean “and” function, it means that *each* object defined within a subset must be in an up state so that the tracked object can become up.
- **Boolean “or” function**—When the tracked list has been assigned a Boolean “or” function, it means that *at least* one object defined within a subset must be in an up state so that the tracked object can become up.

Benefits of Enhanced Object Tracking

- Increases the availability and speed of recovery of a router system.
- Decreases outages and their duration.
- Provides a scalable solution that allows other processes such as VRRP and GLBP to track objects individually or a list of objects. Prior to the introduction of this feature, the tracking process was embedded within HSRP.

How to Configure Enhanced Object Tracking

The following sections describe configuration tasks for enhanced object tracking:

- [Tracking the IP-Routing State of an Interface, page 3](#) (optional)
- [Tracking the Line-Protocol State of an Interface, page 5](#) (optional)
- [Tracking IP-Route Reachability, page 6](#) (optional)
- [Tracking the Threshold of IP-Route Metrics, page 7](#) (optional)
- [Configuring a Tracked List and Boolean Expression, page 10](#) (optional)
- [Configuring a Tracked List and Threshold Weight](#) (optional)
- [Configuring a Tracked List and Threshold Percentage](#) (optional)
- [Configuring the Track List Defaults, page 15](#) (optional)
- [Configuring HSRP Object Tracking, page 16](#) (optional)
- [Configuring the Polling Interval, page 19](#) (optional)
- [Verifying Enhanced Object Tracking, page 20](#) (optional)

Tracking the IP-Routing State of an Interface

Perform this task to track the IP-routing state of an interface. An 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 is 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.

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

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track *object-number* interface *type number* ip routing**
4. **delay {up *seconds* [down *seconds*] | [up *seconds*] down *seconds*}**
5. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	track <i>object-number</i> interface <i>type number</i> ip routing Example: Router(config)# track 1 interface ethernet 0/1 ip routing	Tracks the IP-routing state of an interface and enters tracking configuration mode. • IP-route tracking tracks an IP route in the routing table and the ability of an interface to route IP packets.

	Command or Action	Purpose
Step 4	<pre>delay {up seconds [down seconds] [up seconds] down seconds}</pre> <p>Example: Router(config-track)# delay up 30</p>	(Optional) Specifies a period of time (in seconds) to delay communicating state changes of a tracked object.
Step 5	<pre>exit</pre> <p>Example: Router(config-track)# exit</p>	Returns to privileged EXEC mode.

Tracking the Line-Protocol State of an Interface

Perform this task to track the line-protocol state of an interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track** *object-number* **interface** *type number* **line-protocol**
4. **delay** { *up seconds* [*down seconds*] | [*up seconds*] *down seconds* }
5. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>enable</pre> <p>Example: Router> enable</p>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<pre>configure terminal</pre> <p>Example: Router# configure terminal</p>	Enters global configuration mode.
Step 3	<pre>track object-number interface type number line-protocol</pre> <p>Example: Router(config)# track 3 interface ethernet 0/1 line-protocol</p>	Tracks the line-protocol state of an interface and enters tracking configuration mode.

	Command or Action	Purpose
Step 4	delay { up seconds [down seconds] [up seconds] down seconds }	(Optional) Specifies a period of time (in seconds) to delay communicating state changes of a tracked object.
	Example: Router(config-track)# delay up 30	
Step 5	exit	Returns to privileged EXEC mode.
	Example: Router(config-track)# exit	

Tracking IP-Route Reachability

Perform this task to track the reachability of an IP route. A tracked object is considered up when a routing table entry exists for the route and the route is accessible.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track** *object-number* **ip route** *ip-address/prefix-length* **reachability**
4. **delay** {**up seconds** [**down seconds**] | [**up seconds**] **down seconds**}
5. **ip vrf** *vrf-name*
6. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
	Example: Router> enable	
Step 2	configure terminal	Enters global configuration mode.
	Example: Router# configure terminal	
Step 3	track <i>object-number</i> ip route <i>ip-address/prefix-length</i> reachability	Tracks the reachability of an IP route and enters tracking configuration mode.
	Example: Router(config)# track 4 ip route 10.16.0.0/16 reachability	

	Command or Action	Purpose
Step 4	<code>delay {up seconds [down seconds] [up seconds] down seconds}</code> Example: Router(config-track)# delay up 30	(Optional) Specifies a period of time (in seconds) to delay communicating state changes of a tracked object.
Step 5	<code>ip vrf vrf-name</code> Example: Router(config-track)# ip vrf VRF2	(Optional) Specifies which forwarding (VRF) table to look for the VPN route.
Step 6	<code>exit</code> Example: Router(config-track)# exit	Returns to privileged EXEC mode.

Tracking the Threshold of IP-Route Metrics

Perform this task to track the threshold of IP route metrics.

Scaled Route Metrics

The **track ip route** command enables tracking of a route in the routing table. If a route exists in the table, the metric value is converted into a number. To provide a common interface to tracking clients, route metric values are normalized to the range from 0 to 255, where 0 is connected and 255 is inaccessible. Scaled metrics can be tracked by setting thresholds. Up and down state notification occurs when the thresholds are crossed. 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.

Tracking uses a per-protocol configurable resolution value to convert the real metric to the scaled metric. [Table 1](#) shows the default values used for the conversion. You can use the **track resolution** command to change the metric resolution default values.

Table 1 Metric Conversion

Route Type ¹	Metric Resolution
Static	10
Enhanced Interior Gateway Routing Protocol (EIGRP)	2560
Open Shortest Path First (OSPF)	1
Intermediate System-to-Intermediate System (IS-IS)	10

1. RIP is scaled directly to the range from 0 to 255 because its maximum metric is less than 255.

For example, a change in 10 in an IS-IS metric results in a change of 1 in the scaled metric. The default resolutions are designed so that approximately one 2-Mbps link in the path will give a scaled metric of 255.

Scaling the very large metric ranges of EIGRP and IS-IS to a 0 to 255 range is a compromise. The default resolutions will cause the scaled metric to go above the maximum limit with a 2-Mbps link. However, this scaling allows a distinction between a route consisting of three Fast-Ethernet links and a route consisting of four Fast-Ethernet links.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track resolution ip route** { **eigrp** *resolution-value* | **isis** *resolution-value* | **ospf** *resolution-value* | **static** *resolution-value* }
4. **track object-number ip route** *ip-address/prefix-length* **metric threshold**
5. **delay** { **up** *seconds* [**down** *seconds*] | [**up** *seconds*] **down** *seconds* }
6. **ip vrf** *vrf-name*
7. **threshold metric** { **up** *number* **down** *number* | **up** *number* | **down** *number* }
8. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	track resolution ip route { eigrp <i>resolution-value</i> isis <i>resolution-value</i> ospf <i>resolution-value</i> static <i>resolution-value</i> } Example: Router(config)# track resolution ip route eigrp 300	(Optional) Specifies resolution parameters for a tracked object. <ul style="list-style-type: none"> • Use this command to change the default metric resolution values.
Step 4	track object-number ip route <i>ip-address/prefix-length</i> metric threshold Example: Router(config)# track 6 ip route 10.16.0.0/16 metric threshold	Tracks the scaled metric value of an IP route to determine if it is above or below a threshold. <ul style="list-style-type: none"> • The default down value is 255, which equates to an inaccessible route. • The default up value is 254.

	Command or Action	Purpose
Step 5	delay { up seconds [down seconds] [up seconds] down seconds } Example: Router(config-track)# delay up 30	(Optional) Specifies a period of time (in seconds) to delay communicating state changes of a tracked object.
Step 6	ip vrf <i>vrf-name</i> Example: Router(config-track)# ip vrf VRF1	(Optional) Configures a VRF table.
Step 7	threshold metric { up number down number up number down number } Example: Router(config-track)# threshold metric up 254 down 255	(Optional) Sets a metric threshold other than the default value.
Step 8	end Example: Router(config-track)# end	Exits to privileged EXEC mode.

Configuring a Tracked List and Boolean Expression

Perform this task to configure a tracked list of objects and a Boolean expression to determine the state of the list. A tracked list contains one or more objects. The Boolean expression enables two types of calculation by using either “and” or “or” operators. For example, when tracking two interfaces using the “and” operator, up means that *both* interfaces are up, and down means that *either* interface is down.

You may also configure a tracked list state to be measured using a weight or percentage threshold. See [“Configuring a Tracked List and Threshold Weight” section on page 11](#) and [“Configuring a Tracked List and Threshold Percentage” section on page 13](#).



Note

The “not” operator is specified for one or more objects and negates the state of the object.

Prerequisites

An object must exist before it can be added to a tracked list.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track** *track-number* **list boolean {and | or}**
4. **object** *object-number* [**not**]
5. **delay** {**up** *seconds* [**down** *seconds*] | [**up** *seconds*] **down** *seconds*}
6. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none">• Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
Step 3	<pre>track track-number list boolean {and or}</pre> <p>Example: Router(config)# track 100 list boolean and</p>	<p>Configures a tracked list object and enters tracking configuration mode. The keywords and arguments are as follows:</p> <ul style="list-style-type: none"> • boolean—Specifies that the state of the tracked list is based on a Boolean calculation. The keywords are as follows: <ul style="list-style-type: none"> – and—Specifies that the list is up if <i>all</i> objects are up, or down if <i>one or more</i> objects are down. For example when tracking two interfaces, up means that <i>both</i> interfaces are up, and down means that <i>either</i> interface is down. – or—Specifies that the list is up if <i>at least one</i> object is up. For example, when tracking two interfaces, up means that <i>either</i> interface is up, and down means that <i>both</i> interfaces are down.
Step 4	<pre>object object-number [not]</pre> <p>Example: Router(config-track)# object 3 not</p>	<p>Specifies the object to be tracked. The <i>object-number</i> argument has a valid range from 1 to 500. There is no default. The optional not keyword negates the state of the object.</p> <p>Note The example means that when object 3 is up, the tracked list detects object 3 as down.</p>
Step 5	<pre>delay {up seconds [down seconds] [up seconds] down seconds}</pre> <p>Example: Router(config-track)# delay up 3</p>	<p>(Optional) Specifies a tracking delay in seconds between up and down states.</p>
Step 6	<pre>exit</pre> <p>Example: Router(config-track)# exit</p>	<p>Returns to privileged EXEC mode.</p>

Examples

The following configuration example shows that tracked list 4 has two objects and one object state is negated (if the list is up, the list detects that object 2 is down):

```
track 4 list boolean and
  object 1
  object 2 not
```

Configuring a Tracked List and Threshold Weight

Perform this task to configure a tracked list of objects, to specify that weight be used as the threshold, and to configure a weight for each of its objects. A tracked list contains one or more objects. Using a weight threshold the state of each object is determined by comparing the total weight of all objects that are up against a threshold weight for each object.

You may also configure a tracked list state to be measured using a Boolean calculation or threshold percentage. See “[Configuring a Tracked List and Boolean Expression](#)” section on page 10 and “[Configuring a Tracked List and Threshold Percentage](#)” section on page 13.

Prerequisites

An object must exist before it can be added to a tracked list.

Restrictions

You cannot use the Boolean “not” operator in a weight or percentage threshold list.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track** *track-number* **list threshold weight**
4. **object** *object-number* [**weight** *weight-value*]
5. **threshold weight** {**up** *number* | **down** *number*}
6. **delay** {**up** *seconds* [**down** *seconds*] | [**up** *seconds*] **down** *seconds*}
7. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	track <i>track-number</i> list threshold weight Example: Router(config)# track 100 list threshold weight	Configures a tracked list object and enters tracking configuration mode. The keywords are as follows: • threshold —Specifies that the state of the tracked list is based on a threshold. • weight —Specifies that the threshold is based on a specified weight.
Step 4	object <i>object-number</i> [weight <i>weight-number</i>] Example: Router(config-track)# object 3 weight 30	Specifies the object to be tracked. The <i>object-number</i> argument has a valid range from 1 to 500. There is no default. The optional weight keyword specifies a threshold weight for each object.

	Command or Action	Purpose
Step 5	<p>threshold weight {up number [down number] }</p> <p>Example: Router(config-track)# threshold weight up 30</p>	<p>Specifies the threshold weight. The keywords and arguments are as follows:</p> <ul style="list-style-type: none"> • up number—Valid range is from 1 to 255. • down number—(Optional) Range depends upon what you select for the up keyword. For example, if you configure 25 for up, you will see a range from 0 to 24 for down.
Step 6	<p>delay {up seconds [down seconds] [up seconds] down seconds}</p> <p>Example: Router(config-track)# delay up 3</p>	<p>(Optional) Specifies a tracking delay in seconds between up and down states.</p>
Step 7	<p>exit</p> <p>Example: Router(config-track)# exit</p>	<p>Returns to privileged EXEC mode.</p>

Examples

The following configuration example shows that if object 1, and object 2 are down, then track list 4 is up, because object 3 satisfies the up threshold value of up 30. But, if object 3 is down, both objects 1 and 2 need to be up in order to satisfy the threshold weight.

```
track 4 list threshold weight
  object 1 weight 15
  object 2 weight 20
  object 3 weight 30
  threshold weight up 30 down 10
```

This configuration may be useful to you if you have two small bandwidth connections (represented by object 1 and 2) and one large bandwidth connection (represented by object 3). Also the down 10 value means that once the tracked object is up, it will not go down until the threshold value is lower or equal to 10, which in this example means that all connections are down.

Configuring a Tracked List and Threshold Percentage

Perform this task to configure a tracked list of objects, to specify that a percentage will be used as the threshold, and to specify a percentage for each object in the list. A tracked list contains one or more objects. Using the percentage threshold, the state of the list is determined by comparing the assigned percentage of each object to the list.

You may also configure a tracked list state to be measured using a Boolean calculation or threshold weight. See [“Configuring a Tracked List and Boolean Expression” section on page 10](#) and [“Configuring a Tracked List and Threshold Weight” section on page 11](#).

Prerequisites

An object must exist before it can be added to a tracked list.

Restrictions

You cannot use the Boolean “not” operator in a weight or percentage threshold lists.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track** *track-number* **list threshold percentage**
4. **object** *object-number*
5. **threshold percentage** { **up** *number* | **down** *number* }
6. **delay** { **up** *seconds* [**down** *seconds*] | [**up** *seconds*] **down** *seconds* }
7. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none">• Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	track <i>track-number</i> list threshold percentage Example: Router(config)# track 100 list threshold percentage	Configures a tracked list object and enters tracking configuration mode. The keywords are as follows: <ul style="list-style-type: none">• threshold—Specifies that the state of the tracked list is based on a threshold.• percentage—Specifies that the threshold is based on a percentage.
Step 4	object <i>object-number</i> Example: Router(config-track)# object 3	Specifies the object to be tracked. The <i>object-number</i> argument has a valid range from 1 to 500. There is no default.
Step 5	threshold percentage { up <i>number</i> [down <i>number</i>] } Example: Router(config-track)# threshold percentage up 30	Specifies the threshold percentage. The keywords and arguments are as follows: <ul style="list-style-type: none">• up <i>number</i>—Valid range is from 1 to 100.• down <i>number</i>—(Optional) Range depends upon what you have selected for the up keyword. For example, if you specify 25 as up, a range from 26 to 100 is displayed for the down keyword.

	Command or Action	Purpose
Step 6	<pre>delay {up seconds [down seconds] [up seconds] down seconds}</pre> <p>Example: Router(config-track)# delay up 3</p>	(Optional) Specifies a tracking delay in seconds between up and down states.
Step 7	<pre>exit</pre> <p>Example: Router(config-track)# exit</p>	Returns to privileged EXEC mode.

Examples

The following configuration example shows that tracked list 4 has three objects and specified percentages to measure the state of the list:

```
track 4 list threshold percentage
  object 1
  object 2
  object 3
  threshold percentage up 51 down 10
```

Configuring the Track List Defaults

Perform this task to configure a default delay value for a tracked list, a default object, and default threshold parameters for a tracked list.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track track-number list**
4. **default {delay | object object-number | threshold percentage}**
5. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>enable</pre> <p>Example: Router> enable</p>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<pre>configure terminal</pre> <p>Example: Router# configure terminal</p>	Enters global configuration mode.

	Command or Action	Purpose
Step 3	<code>track track-number list</code>	Enters tracking configuration mode.
	Example: <code>Router(config)# track 3 list</code>	
Step 4	<code>default {delay object object-number threshold percentage}</code>	Specifies a default delay value for a tracked list, a default object, and default threshold parameters for a tracked list. The keywords and arguments are as follows: <ul style="list-style-type: none"> • delay—Reverts to the default delay. • object—Specifies a default object for the track list. The valid range is from 1 to 500. • threshold percentage—Specifies a default threshold percentage.
	Example: <code>Router(config-track) default delay</code>	
Step 5	<code>exit</code>	Returns to privileged EXEC mode.
	Example: <code>Router(config-track)# exit</code>	

Configuring HSRP Object Tracking

Perform this task to configure a standby HSRP group to track an object and change the HSRP priority on the basis of the object state.



Note

There are many protocols that can use the tracking feature in addition to HSRP.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track** *object-number* **interface** *type-number* {**line-protocol** | **ip routing**}
4. **exit**
5. **interface** *type number*
6. **standby** [*group-number*] **ip** [*ip-address* [**secondary**]]
7. **standby** [*group-number*] **track** *object-number* [**decrement** [*priority-decrement*]]
8. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>enable</pre> <p>Example: Router> enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<pre>configure terminal</pre> <p>Example: Router# configure terminal</p>	<p>Enters global configuration mode.</p>
Step 3	<pre>track object-number interface type-number {line-protocol ip routing}</pre> <p>Example: Router(config)# track 100 interface serial2/0 line-protocol</p>	<p>Configures an interface to be tracked and enters tracking configuration mode.</p> <p>Note Repeat this step for each interface to be tracked.</p>
Step 4	<pre>exit</pre> <p>Example: Router(config-track)# exit</p>	<p>Returns to global configuration mode.</p>
Step 5	<pre>interface type number</pre> <p>Example: Router(config)# interface ethernet 2</p>	<p>Enters interface configuration mode.</p>
Step 6	<pre>standby [group-number] ip [ip-address] [secondary]</pre> <p>Example: Router(config-if)# standby 1 ip 10.10.10.0</p>	<p>Creates an HSRP group. The arguments and keywords are as follows:</p> <ul style="list-style-type: none"> <i>group-number</i>—(Optional) Group number on the interface for which HSRP is being activated. The default is 0. The group number range is from 0 to 255 for HSRP version 1 and from 0 to 4095 for HSRP version 2. ip <i>ip-address</i>—(Optional) Primary IP address. secondary—(Optional) IP address is secondary. If this keyword is omitted, the configured address is the primary IP address.

Command or Action	Purpose
<p>Step 7</p> <pre>standby [group-number] track object-number [decrement [priority-decrement]]</pre> <p>Example: Router(config-if)# standby 1 track 100 decrement 20</p>	<p>Configures HSRP to track an object and change the Hot Standby priority on the basis of the state of the object.</p> <ul style="list-style-type: none"> <i>group-number</i>—(Optional) Number that represents the group to which the tracking applies. <i>object-number</i>—Number that represents the object to be tracked. The range is from 1 to 500. The default is 1. decrement <i>priority-decrement</i>—(Optional) Amount by which the Hot Standby priority for the router is decremented (or incremented) when the tracked object goes down (or comes back up). The range is from 1 to 255. The default is 10. <p>Note If you have a Cisco IOS Release 12.2(13)T or earlier image installed, the syntax is different from the syntax shown in this step. Refer to Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services, Release 12.2 T for earlier command syntax.</p>
<p>Step 8</p> <pre>exit</pre> <p>Example: Router(config-if)# exit</p>	<p>Returns to privileged EXEC mode.</p>

Examples

In the following configuration example, the tracking process is configured to track the IP-routing capability of serial interface 1/0. HSRP 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, the priority of the HSRP group is reduced by 10.

If both serial interfaces are operational, Router A will be the HSRP active router because it has the higher priority. However, if IP routing on serial interface 1/0 in Router A fails, the HSRP group priority will be reduced and Router B will take over as the active 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
 standby 1 preempt
 standby 1 ip 10.1.0.1
 standby 1 priority 110
 standby 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
 standby 1 preempt
 standby 1 ip 10.1.0.1
```

```
standby 1 priority 105
standby 1 track 100 decrement 10
```

Configuring the Polling Interval

Perform this task to configure the tracking process to periodically poll the tracked objects. The tracking process notes any changes of value. The changes are communicated to interested client processes, either immediately or after a specified delay.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **track timer {interface | ip route} seconds**
4. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	track timer {interface ip route} seconds Example: Router(config)# track timer interface 50	Specifies the interval in which the tracking process polls the tracked object. <ul style="list-style-type: none"> • The <i>seconds</i> value range is from 1 to 3000. • The default polling interval for tracked interface objects is 1 second and for IP-route objects is 15 seconds.
Step 4	exit Example: Router(config)# exit	Exits to privileged EXEC mode.

Verifying Enhanced Object Tracking

Perform the following steps to verify that the specified objects are being tracked.

SUMMARY STEPS

1. **show track** *object-number*
2. **show standby**

DETAILED STEPS

Step 1 **show track** *object-number*

Use this command to display the IP-routing state of an interface when it is tracked, for example:

```
Router# show track 1

Track 1
  Interface Ethernet0/1 ip routing
  IP routing is Up
    1 change, last change 00:01:08
  Tracked by:
    HSRP Ethernet0/3 1
```

In the following example, the state of the line protocol on an interface when it is tracked is displayed:

```
Router# show track 3

Track 3
  Interface Ethernet0/1 line-protocol
  Line protocol is Up
    1 change, last change 00:00:05
  Tracked by:
    HSRP Ethernet0/3 1
```

In the following example, the state of the reachability of an IP route when it is tracked is displayed:

```
Router# show track 4

Track 4
  IP route 10.16.0.0 255.255.0.0 reachability
  Reachability is Up (RIP)
    1 change, last change 00:02:04
  First-hop interface is Ethernet0/1
  Tracked by:
    HSRP Ethernet0/3 1
```

In the following example, the threshold metric of an IP route when it is tracked is displayed:

```
Router# show track 6

Track 6
  IP route 10.16.0.0 255.255.0.0 metric threshold
  Metric threshold is Up (RIP/6/102)
    1 change, last change 00:00:08
  Metric threshold down 255 up 254
  First-hop interface is Ethernet0/1
  Tracked by:
    HSRP Ethernet0/3 1
```

In the following example, the method of object tracking in a list is displayed:

```
Router# show track

Track 6
List threshold weight
Threshold weight is Up (20/30)
  1 change, last change 00:00:08
  object 1 Down (0/10)
  object 2 weight 20 Up (20/30)
Threshold weight down 10 up 20
Tracked by:
  HSRP Ethernet0/3 1
```

This output shows that there are two objects. Object 1 has been configured with a weight of 10 down, and object 2 has been configured with a weight of 20 up. Object 1 is down (expressed as 0/10) and object 2 is up. The total weight of the tracked list is 20 with a maximum of 30 (expressed as 20/30). The up threshold is 20, so the list is up.

Step 2 **show standby**

Use this command to verify that the standby router has an IP address of 10.10.10.10 and group 3 is active, for example:

```
Router# show standby

Ethernet0/1 - Group 3
State is Active
  2 state changes, last state change 00:01:25
Virtual IP address is 10.21.0.10
Active virtual MAC address is 0000.0c07.ac03
Local virtual MAC address is 0000.0c07.ac03 (default)
Hello time 3 sec, hold time 10 sec
  Next hello sent in 1.828 secs
Preemption enabled
Active router is local
Standby router is 10.10.10.10
Priority 110 (configured 120)
Track object 2 state Down decrement 10
Track object 3 state Up decrement 10
```

Configuration Examples for Enhanced Object Tracking

This section provides the following configuration examples:

- [Interface IP Routing: Example, page 22](#)
- [Interface Line Protocol: Example, page 22](#)
- [IP-Route Reachability: Example, page 23](#)
- [IP-Route Threshold Metric: Example, page 24](#)
- [Threshold Weight for a Tracked List Configuration: Example, page 24](#)
- [Threshold Percentage for a Tracked List Configuration: Example, page 24](#)
- [Boolean Expression for a Tracked List Configuration: Example, page 25](#)

Interface IP Routing: Example

In the following example, the tracking process is configured to track the IP-routing capability of serial interface 1/0. HSRP 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-routing state on serial interface 1/0 goes down, the priority of the HSRP group is reduced by 10.

If both serial interfaces are operational, Router A will be the HSRP active router because it has the higher priority. However, if IP on serial interface 1/0 in Router A fails, the HSRP group priority will be reduced and Router B will take over as the active router, thus maintaining a default virtual gateway service to hosts on the 10.1.0.0 subnet.

See [Figure 1](#) for a sample topology.

Figure 1 Topology for IP Routing Support



Router A Configuration

```
track 100 interface serial1/0 ip routing
!
interface Ethernet0/0
 ip address 10.1.0.21 255.255.0.0
 standby 1 preempt
 standby 1 ip 10.1.0.1
 standby 1 priority 110
 standby 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
 standby 1 preempt
 standby 1 ip 10.1.0.1
 standby 1 priority 105
 standby 1 track 100 decrement 10
```

Interface Line Protocol: Example

The following example is very similar to the IP-routing example. Instead, the tracking process is configured to track the line-protocol state of serial interface 1/0. HSRP on Ethernet interface 0/0 then registers with the tracking process to be informed of any changes to the line-protocol state of serial interface 1/0. If the line protocol on serial interface 1/0 goes down, the priority of the HSRP group is reduced by 10.

Router A Configuration

```
track 100 interface serial1/0 line-protocol
!
interface Ethernet0/0
 ip address 10.1.0.21 255.255.0.0
 standby 1 preempt
 standby 1 ip 10.1.0.1
 standby 1 priority 110
 standby 1 track 100 decrement 10
```

Router B Configuration

```
track 100 interface serial1/0 line-protocol
!
interface Ethernet0/0
 ip address 10.1.0.22 255.255.0.0
 standby 1 preempt
 standby 1 ip 10.1.0.1
 standby 1 priority 105
 standby 1 track 100 decrement 10
```

IP-Route Reachability: Example

In the following example, the tracking process is configured to track the reachability of IP route 10.2.2.0/24:

Router A Configuration

```
track 100 ip route 10.2.2.0/24 reachability
!
interface Ethernet0/0
 ip address 10.1.1.21 255.255.255.0
 standby 1 preempt
 standby 1 ip 10.1.1.1
 standby 1 priority 110
 standby 1 track 100 decrement 10
```

Router B Configuration

```
track 100 ip route 10.2.2.0/24 reachability
!
interface Ethernet0/0
 ip address 10.1.1.22 255.255.255.0
 standby 1 preempt
 standby 1 ip 10.1.1.1
 standby 1 priority 105
 standby 1 track 100 decrement 10
```

IP-Route Threshold Metric: Example

In the following example, the tracking process is configured to track the threshold metric of IP route 10.2.2.0/24:

Router A Configuration

```
track 100 ip route 10.2.2.0/24 metric threshold
!
interface Ethernet0/0
 ip address 10.1.1.21 255.255.255.0
 standby 1 preempt
 standby 1 ip 10.1.1.1
 standby 1 priority 110
 standby 1 track 100 decrement 10
```

Router B Configuration

```
track 100 ip route 10.2.2.0/24 metric threshold
!
interface Ethernet0/0
 ip address 10.1.1.22 255.255.255.0
 standby 1 preempt
 standby 1 ip 10.1.1.1
 standby 1 priority 105
 standby 1 track 100 decrement 10
```

Threshold Weight for a Tracked List Configuration: Example

In the following example, three serial interfaces in tracked list 100 are configured with a threshold weight of 20 each. The down threshold is configured to 0 and the up threshold is configured to 40:

```
track 1 interface serial2/0 line-protocol
track 2 interface serial2/1 line-protocol
track 3 interface serial2/2 line-protocol

track 100 list threshold weight
 object 1 weight 20
 object 2 weight 20
 object 3 weight 20
 threshold weight down 0 up 40
```

The above example means that the track-list object goes down only when all three serial interfaces go down, and only comes up again when at least two serial interfaces are up (since $20+20 \geq 40$). The advantage of this configuration is that it prevents the track-list object from coming up if two interfaces are down and the third interface is flapping.

Threshold Percentage for a Tracked List Configuration: Example

In the following example, four serial interfaces in track list 100 are configured for an up threshold percentage of 75:

```
track 1 interface serial2/0 line-protocol
track 2 interface serial2/1 line-protocol
track 3 interface serial2/2 line-protocol
track 4 interface serial2/3 line-protocol
```

```

track 100 list threshold percentage
  object 1
  object 2
  object 3
  object 4
  threshold percentage up 75

```

Boolean Expression for a Tracked List Configuration: Example

In the following example, a track list object is configured to track two serial interfaces when both serial interfaces are up and when either serial interface is down:

```

track 1 interface serial2/0 line-protocol
track 2 interface serial2/1 line-protocol

```

```

track 100 list boolean and
  object 1
  object 2

```

In the following example, a track list object is configured to track two serial interfaces when either serial interface is up and when both serial interfaces are down:

```

track 1 interface serial2/0 line-protocol
track 2 interface serial2/1 line-protocol

```

```

track 101 list boolean or
  object 1
  object 2

```

Additional References

For additional information related to the Enhanced Object Tracking feature, see the following sections:

- [Related Documents, page 25](#)
- [Standards, page 26](#)
- [MIBs, page 26](#)
- [RFCs, page 26](#)
- [Technical Assistance, page 26](#)

Related Documents

Related Topic	Document Title
GLBP, HSRP, and VRRP configuration tasks	“Configuring IP Services” chapter in the <i>Cisco IOS IP Configuration Guide</i>
GLBP, HSRP, and VRRP commands: complete command syntax, command mode, defaults, usage guidelines, and examples	<i>Cisco IOS IP Command Reference, Volume 1 of 4: Addressing and Services</i> , Release 12.3 T

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

This section documents new and modified commands only.

New Commands

- [default \(tracking\)](#)
- [object \(tracking\)](#)
- [threshold percentage](#)
- [threshold weight](#)
- [track list](#)
- [track resolution](#)

Modified Commands

- [default \(tracking\)](#)
- [delay \(tracking\)](#)
- [ip vrf \(tracking\)](#)
- [show track](#)
- [standby track](#)
- [threshold metric](#)
- [track interface](#)
- [track ip route](#)
- [track timer](#)

debug track

To display tracking activity for tracked objects, use the **debug track** command in privileged EXEC mode. To turn off output, use the **no** form of this command.

debug track

no debug track

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(15)T	This command was introduced.
	12.3(8)T	The output was enhanced to include the track-list objects.
	12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.

Usage Guidelines Use this command to display activity for objects being tracked by the tracking process. These objects can be the state of IP routing, the line-protocol state of an interface, the IP-route reachability, and the IP-route threshold metric.

Examples The following example shows that object number 100 is being tracked and that the state of IP routing on Ethernet interface 0/2 is down:

```
Router# debug track

Feb 26 19:56:23.247:Track:100 Adding interface object
Feb 26 19:56:23.247:Track:Initialise
Feb 26 19:56:23.247:Track:100 New interface Et0/2, ip routing Down
Feb 26 19:56:23.247:Track:Starting process
```

The following example shows that object number 100 is being tracked and that the state of IP routing on Ethernet interface 0/2 has changed and is back up:

```
Router# debug track

Feb 26 19:56:41.247:Track:100 Change #2 interface Et0/2, ip routing Down->Up
00:15:07:%LINK-3-UPDOWN:Interface Ethernet0/2, changed state to up
00:15:08:%LINEPROTO-5-UPDOWN:Line protocol on Interface Ethernet0/2, changed state to up
```

Related Commands	Command	Description
	show track	Displays tracking information.

delay (tracking)

To specify a period of time to delay communicating state changes of a tracked object, use the **delay** command in tracking configuration mode. To disable the delay period, use the **no** form of this command.

delay { **up** *seconds* [**down** *seconds*] | [**up** *seconds*] **down** *seconds* }

no delay { **up** *seconds* [**down** *seconds*] | [**up** *seconds*] **down** *seconds* }

Syntax Description	up	Time to delay the notification of an up event.
	down	Time to delay the notification of a down event.
	<i>seconds</i>	Delay value, in seconds. Range is from 0 to 180. Default is 0.

Defaults No delay time is configured for tracking.

Command Modes Tracking configuration

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.

Usage Guidelines This command is available to all tracked objects.

If you specify, for example, **delay up 10 down 30**, then if the object state changes from down to up, clients tracking that object are notified after 10 seconds. If the object state changes from up to down, then clients tracking that object are notified after 30 seconds.

Examples In the following example, the tracking process is tracking the IP-route threshold metric. The delay period to communicate the changes of the tracked object to the client process is set to 30 seconds.

```
track 1 ip route 10.22.0.0/16 metric threshold
  threshold metric up 16 down 20
  delay down 30
```

default (tracking)

To set the default values for a tracked list, use the **default** command in tracking configuration mode. To disable the defaults, use the **no** form of this command.

default { **delay** | **object** *object-number* | **threshold percentage** }

no default { **delay** | **object** *object-number* | **threshold percentage** }

Syntax Description		
	delay	Default delay value.
	object	Default object for the list. The <i>object-number</i> argument has a valid range is from 1 to 500.
	threshold percentage	Default threshold percentage.

Defaults No default behavior or values

Command Modes Tracking configuration

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.

Examples The following example shows how to configure a default threshold percentage:

```
track 3 list
 default threshold percentage
```

Related Commands	Command	Description
	show track	Displays tracking information.
	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.
	threshold weight	Specifies a threshold weight for a tracked list.
	show track	Displays tracking information.
	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.
	threshold weight	Specifies a threshold weight for a tracked list.

ip vrf (tracking)

To configure a VPN routing and forwarding (VRF) table, use the **ip vrf** command in tracking configuration mode. To remove a VRF table, use the **no** form of this command.

ip vrf *vrf-name*

no ip vrf *vrf-name*

Syntax Description	<i>vrf-name</i>	Name assigned to a VRF.
--------------------	-----------------	-------------------------

Defaults The VRF table is not configured.

Command Modes Global configuration

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.	

Usage Guidelines This command is available for all IP-route tracked objects that are tracked by the **track ip route** global configuration command. Use this command to track a route that belongs to a specific VPN.

Examples In the following example, the route associated with a VRF named VRF1 is tracked:

```
track 1 ip route 10.0.0.0 255.255.0.0
 ip vrf VRF1
 rd 100:1
 route-target both 100:1
!
interface e0/2
 no shutdown
 ip vrf forwarding VRF1
 ip address 20.0.0.2 255.0.0.0
```

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

object (tracking)

To specify an object for a tracked list, use the **object** command in tracking configuration mode. To remove the object from the tracked list, use the **no** form of this command.

object *object-number* [**not**] [**weight** *weight-number*]

no object *object-number* [**not**] [**weight** *weight-number*]

Syntax Description	<i>object-number</i>	Object in a tracked list of objects. Range is from 1 to 500.
	not	(Optional) Negates the state of an object.
	Note	The not keyword cannot be used in a weight or percentage threshold list only the Boolean list.
	weight <i>weight-number</i>	The optional weight keyword specifies a threshold weight for each object.

Defaults The object is removed from the tracked list.

Command Modes Tracking configuration

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.

Examples The following example shows two serial interfaces (objects) that are in tracked list 100. The Boolean “not” negates state of object 2 , which means when object 2 is up, the tracked list regards the object as down.

```
track 1 interface serial2/0 line-protocol
track 2 interface serial2/1 line-protocol

track 100 list boolean and
  object 1
  object 2 not
```

Related Commands

Command	Description
show track	Displays tracking information.
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.
threshold weight	Specifies a threshold weight for a tracked list.

show track

To display tracking information, use the **show track** command in privileged EXEC mode.

show track [[*object-number* | **brief**] | [**interface** [**brief**] | **ip route** [**brief**] | **resolution** | **timers**]

Syntax Description	
<i>object-number</i>	(Optional) Object number that represents the object to be tracked. Range is from 1 to 500.
brief	(Optional) Displays a single line of output.
interface	(Optional) Displays tracked interface objects. The brief keyword is optional and displays a single line of interface information.
ip route	(Optional) Displays tracked IP-route objects. The brief keyword is optional and displays a single line of route information. Range is from 1 to 500.
resolution	(Optional) Displays resolution of tracked parameters.
timers	(Optional) Displays polling interval timers.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(15)T	This command was introduced.
	12.3(8)T	The output was enhanced to include the track-list objects.
	12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.

Usage Guidelines Use this command to display information about objects that are tracked by the tracking process. When no keywords are specified, information for all objects is displayed.

Examples The following example shows information about the state of IP routing on the interface that is being tracked:

```
Router# show track 1

Track 1
  Interface Ethernet0/2 ip routing
  IP routing is Down (no IP addr)
  1 change, last change 00:01:08
  Tracked by:
    HSRP Ethernet0/3 1
```

The following example shows information about the line-protocol state on the interface that is being tracked:

```
Router# show track 1

Track 1
  Interface Ethernet0/1 line-protocol
```

```

Line protocol is Up
  1 change, last change 00:00:05
Tracked by:
  HSRP Ethernet0/3 1

```

The following example shows information about the reachability of a route that is being tracked:

```

Router# show track 1

Track 1
  IP route 10.16.0.0 255.255.0.0 reachability
  Reachability is Up (RIP)
    1 change, last change 00:02:04
  First-hop interface is Ethernet0/1
  Tracked by:
    HSRP Ethernet0/3 1

```

The following example shows information about the threshold metric of a route that is being tracked:

```

Router# show track 1

Track 1
  IP route 10.16.0.0 255.255.0.0 metric threshold
  Metric threshold is Up (RIP/6/102)
    1 change, last change 00:00:08
  Metric threshold down 255 up 254
  First-hop interface is Ethernet0/1
  Tracked by:
    HSRP Ethernet0/3 1

```

The following example shows the object type, the interval in which it is polled, and the time until the next poll:

```

Router# show track timers

Object type  Poll Interval  Time to next poll
interface      1             expired
ip route       30            29.364

```

Table 2 describes the significant fields shown in the displays.

Table 2 *show track Field Descriptions*

Field	Description
Track	Object number that is tracked.
Interface Ethernet0/2 ip routing	Interface type, number, and object that is tracked.
IP routing is	State value of the object, displayed as Up or Down. If the object is down, the reason is displayed.
1 change, last change	Number of times the state of a tracked object has changed and the time (in hh:mm:ss) since the last change.
Tracked by	Client process that is tracking the object.
First-hop interface is	Displays the first-hop interface.
Object type	Object type that is being tracked.
Poll Interval	Interval (in seconds) in which the tracking process polls the object.
Time to next poll	Period of time until the next polling of the object.

The following output shows that there are two objects. Object 1 has been configured with a weight of 10 “down,” and object 2 has been configured with a weight of 20 “up.” Object 1 is down (expressed as 0/10) and object 2 is up. The total weight of the tracked list is 20 with a maximum of 30 (expressed as 20/30). The “up” threshold is 20, so the list is “up.”

```
Router# show track

Track 6
List threshold weight
Threshold weight is Up (20/30)
  1 change, last change 00:00:08
  object 1 Down (0/10)
  object 2 weight 20 Up (20/30)
Threshold weight down 10 up 20
Tracked by:
  HSRP Ethernet0/3 1
```

The following example shows information about the Boolean configuration:

```
Router# show track

Track 3
List boolean and
Boolean AND is Down
  1 change, last change 00:00:08
  object 1 not Up
  object 2 Down
Tracked by:
  HSRP Ethernet0/3 1
```

[Table 3](#) describes the significant fields shown in the displays.

Table 3 *show track Field Descriptions*

Field	Description
Track	Object number that is tracked.
Boolean AND is Down	
1 change, last change	Number of times the state of a tracked object has changed and the time (in hh:mm:ss) since the last change.
Tracked by	Client process that is tracking the object; in this case, HSRP.

Related Commands

Command	Description
track interface	Configures an interface to be tracked and enters tracking configuration mode.
track ip route	Tracks the state of an IP route and enters tracking configuration mode.

standby track

To configure the Hot Standby Router Protocol (HSRP) to track an object and change the Hot Standby priority on the basis of the state of the object, use the **standby track** command in interface configuration mode. To remove the tracking, use the **no** form of this command.

Cisco IOS Release 12.2(15)T and Later Releases

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

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

Cisco IOS Release 12.2(13)T and Earlier Releases

standby [*group-number*] **track** *interface-type interface-number* [*interface-priority*]

no standby [*group-number*] **track** *interface-type interface-number* [*interface-priority*]

Syntax Description		
<i>group-number</i>	(Optional) Group number to which the tracking applies.	
<i>object-number</i>	Object number that represents the object to be tracked. Range is from 1 to 500. Default is 1.	
decrement <i>priority-decrement</i>	(Optional) Amount by which the Hot Standby priority for the router is decremented (or incremented) when the tracked object goes down (or comes back up). Range is from 1 to 255. Default is 10.	
<i>interface-type</i>	Interface type (combined with interface number) that will be tracked.	
<i>interface-number</i>	Interface number (combined with interface type) that will be tracked.	
<i>interface-priority</i>	(Optional) Amount by which the Hot Standby priority for the router is decremented (or incremented) when the interface goes down (or comes back up). Range is from 0 to 255. Default is 10.	

Defaults There is no tracking.

Command Modes Interface configuration

Command History	Release	Modification
	10.3	This command was introduced.
	12.2(15)T	This command was enhanced to allow HSRP to track objects other than the interface line-protocol state.
	12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.

Usage Guidelines

This command ties the Hot Standby priority of the router to the availability of its tracked objects. Use the **track interface** or **track ip route** global configuration commands to track an interface object or an IP-route object. The HSRP client can register its interest in the tracking process by using the **standby track** command and take action when the object changes.

When a tracked object goes down, the Hot Standby priority decreases by 10. If an object is not tracked, its state changes do not affect the Hot Standby priority. For each object configured for Hot Standby, you can configure a separate list of objects to be tracked.

The optional *priority* argument specifies how much to decrement the Hot Standby priority when a tracked object goes down. When the tracked object comes back up, the priority is incremented by the same amount.

When multiple tracked objects are down, the decrements are cumulative, whether configured with *priority* values or not.

Use the **no standby group-number track** command to delete all tracking configuration for a group.

When group number 0 is used, no group number is written to NVRAM, providing backward compatibility.

The **standby track** command syntax prior to Cisco IOS Release 12.2(15)T is still supported. Using the older form of the command syntax will cause a tracked object to be created in the new tracking process. This tracking information can be displayed using the **show track** command.

Examples

In the following example, the tracking process is configured to track the IP-routing capability of serial interface 1/0. HSRP 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, the priority of the HSRP group is reduced by 10.

If both serial interfaces are operational, Router A will be the HSRP active router because it has the higher priority. However, if IP routing on serial interface 1/0 in Router A fails, the HSRP group priority will be reduced and Router B will take over as the active 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
 standby 1 preempt
 standby 1 ip 10.1.0.1
 standby 1 priority 105
 standby 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
 standby 1 preempt
 standby 1 ip 10.1.0.1
 standby 1 priority 11
 standby 1 track 100 decrement 10
```

Related Commands

Command	Description
show track	Displays HSRP information.
standby preempt	Configures HSRP preemption and preemption delay.
standby priority	Configures Hot Standby priority of potential standby routers.
track interface	Configures an interface to be tracked and enters tracking configuration mode.
track ip route	Tracks the state of an IP route and enters tracking configuration mode.

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* }

no threshold metric { **up** *number* | **down** *number* }

Syntax Description	up	down	<i>number</i>
	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.	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.	Threshold value. Range is from 0 to 255.

Defaults No threshold is configured.

Command Modes Tracking configuration

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.

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* }

no threshold percentage { **up** *number* | **down** *number* }

Syntax Description

up	Specifies the up threshold.
down	Specifies the down threshold.
<i>number</i>	Threshold value. Range is from 0 to 100.

Defaults

No threshold percentage is configured.

Command Modes

Tracking configuration

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.

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.

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* }

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

Syntax Description

up	Specifies the up threshold.
down	Specifies the down threshold.
<i>number</i>	Threshold value. Range is from 1 to 255.

Defaults

No threshold weight is configured.

Command Modes

Tracking configuration

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.

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 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		
	<i>object-number</i>	Object number that represents the interface to be tracked. Range is from 1 to 500.
	<i>type number</i>	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.

Defaults No interface is tracked.

Command Modes Global configuration

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.

Usage Guidelines This command reports a state value to clients. An 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 is 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.

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

Examples

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

```
track 1 interface serial1/0 ip routing
```

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		
<i>object-number</i>		Object number that represents the object to be tracked. Range is from 1 to 500.
<i>ip-address</i>		IP subnet address to the route that is being tracked.
<i>/prefix-length</i>		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.

Defaults The route to the subnet address is not tracked.

Command Modes Global configuration

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.

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.

Examples

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

```
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:

```
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 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	
<i>object-number</i>	Object number of the object to be tracked. Range is from 1 to 500.
boolean	State of the tracked list is based on a boolean calculation. The keywords are as follows: <ul style="list-style-type: none"> and—Specifies that the list is “up” if <i>all</i> objects are up, or “down” if <i>one or more</i> objects are down. For example when tracking two interfaces, “up” means that <i>both</i> interfaces are up, and “down” means that <i>either</i> interface is down. or—Specifies that the list is “up” if <i>at least one</i> objects is up. For example, when tracking two interfaces, “up” means that <i>either</i> interface is up, and “down” means that <i>both</i> interfaces are down.
threshold	State of the tracked list is based on a threshold. The keywords are as follows: <ul style="list-style-type: none"> percentage—Specifies that the threshold is based on a percentage. weight—Specifies that the threshold is based on a weight.

Defaults The list is not tracked.

Command Modes Global configuration

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.

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:

```
track 1 interface serial2/0 line-protocol
track 2 interface serial2/1 line-protocol
track 100 list boolean and
  object 1
  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:

```
track 1 interface serial2/0 line-protocol
track 2 interface serial2/1 line-protocol
track 101 list boolean or
  object 1
  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:

```
track 1 interface serial2/0 line-protocol
track 2 interface serial2/1 line-protocol
track 102 threshold weight
  object 1 weight 10
  object 2 weight 10
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.
track object	Tracks an object for a tracked list as to the up and down object states.
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.
threshold weight	Specifies a threshold weight for a tracked list.

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	<p>IP route for metric resolution for a specified track. The keywords and arguments are as follows:</p> <ul style="list-style-type: none"> • eigrp—EIGRP routing protocol. The <i>resolution-value</i> argument has a range from 256 to 40000000. • isis—ISIS routing protocol. The <i>resolution-value</i> argument has a range from 1 to 1000. • ospf—OSPF routing protocol. The <i>resolution-value</i> argument has a range from 1 to 1562. • static—Static route. The <i>resolution-value</i> argument has a range from 1 to 100000.
---------------------------	-----------------	---

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

Command Modes Global configuration

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.

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.
	track object	Tracks an object for a tracked list as to the up and down object states.
	track list threshold percentage	Specifies a percentage threshold for a tracked list.
	track list threshold weight	Specifies a weight threshold for a tracked list.
	threshold weight	Specifies a threshold weight for a tracked list.
	threshold percentage	Specifies a threshold percentage for a tracked list.

track timer

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

track timer {**interface** | **ip route**} *seconds*

no track timer {**interface** | **ip route**} *seconds*

Syntax Description		
	interface	Tracks the specified interface.
	ip route	Tracks the specified IP route.
	<i>seconds</i>	Interval (in seconds) in which the tracking process polls the object. The range is from 1 to 3000. The interface polling interval default is 1 second, and the IP-route polling interval default is 15 seconds.

Defaults 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 Tracking configuration

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.

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

```
track timer interface 3
```

Glossary

DHCP—Dynamic Host Configuration Protocol. DHCP is a protocol that delivers IP addresses and configuration information to network clients.

GLBP—Gateway Load Balancing Protocol. Provides automatic router backup for IP hosts that are configured with a single default gateway on an IEEE 802.3 LAN. Multiple first-hop routers on the LAN combine to offer a single virtual first-hop IP router while sharing the IP packet forwarding load. Other routers on the LAN may act as redundant (GLBP) routers that will become active if any of the existing forwarding routers fail.

HSRP—Hot Standby Router Protocol. Provides high network availability and transparent network topology changes. HSRP creates a Hot Standby router group with a lead router that services all packets sent to the Hot Standby address. The lead router is monitored by other routers in the group, and if it fails, one of these standby routers inherits the lead position and the Hot Standby group address.

IPCP—IP Control Protocol. The protocol used to establish and configure IP over PPP.

LCP—Link Control Protocol. The protocol used to establish, configure, and test data-link connections for use by PPP.

PPP—Point-to-Point Protocol. Provides router-to-router and host-to-network connections over synchronous and asynchronous circuits. PPP is most commonly used for dial-up Internet access. Its features include address notification, authentication via CHAP or PAP, support for multiple protocols, and link monitoring.

VRF—VPN routing and forwarding instance. A VRF consists of an IP routing table, a derived forwarding table, a set of interfaces that use the forwarding table, and a set of rules and routing protocols that determine what goes into the forwarding table. In general, a VRF includes the routing information that defines a customer VPN site that is attached to a provider edge router.

VRRP—Virtual Router Redundancy Protocol. Eliminates the single point of failure inherent in the static default routed environment. VRRP specifies an election protocol that dynamically assigns responsibility for a virtual router to one of the VRRP routers on a LAN. The VRRP router that controls the IP addresses associated with a virtual router is called the master, and forwards packets sent to these IP addresses. The election process provides dynamic failover in the forwarding responsibility should the master become unavailable. Any of the virtual router IP addresses on a LAN can then be used as the default first-hop router by end hosts.



Note

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