



Configuring IP SLA PBR Object Tracking

This chapter describes the PBR object tracking capabilities of IP Service Level Agreements (SLAs).

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IP SLA PBR Object Tracking

This feature allows you to make sure that the next hop is reachable before that route is used. If the next hop is not reachable, another route is used as defined in the policy-based routing (PBR) configuration. If no other route is present in the route map, the routing table is used.

Object Tracking

Object tracking monitors objects such as the following:

- State of the line protocol of an interface
- Existence of an entry in the routing table

Clients, such as PBR, can register their interest in specific, tracked objects and then take action when the state of the objects changes.

IP SLA PBR Object Tracking Overview

The PBR Object Tracking feature gives policy-based routing (PBR) access to all the objects that are available through the tracking process. The tracking process enables you to track individual objects—such as ICMP ping reachability, routing adjacency, an application running on a remote device, a route in the Routing Information Base (RIB)—or to track the state of an interface line protocol.

Object tracking functions in the following manner: PBR informs the tracking process that a certain object should be tracked, and the tracking process then notifies PBR when the state of that object changes.

Configuring IP SLA PBR Object Tracking

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal	Enters global configuration mode.
Step 2	ip sla operation-number Example: switch(config)# ip sla 1	Starts a Cisco IOS IP Service Level Agreement (SLA) operation configuration and enters IP SLA configuration mode.
Step 3	icmp-echo destination-ip-address Example: switch(config-ip-sla)# icmp-echo 10.3.3.2	Configures an IP SLA Internet Control Message Protocol (ICMP) echo probe operation.
Step 4	exit Example: switch(config-ip-sla)# exit	Exits IP SLA configuration mode and returns the router to global configuration mode.
Step 5	ip sla schedule operation-number life forever start-time now Example: switch(config)# ip sla schedule 1 life forever start-time now	Configures the scheduling parameters for a single Cisco IOS IP SLA operation. <ul style="list-style-type: none"> In this example, the time parameters for the IP SLA operation are configured. <p>Note Repeat Steps 2 to 5 to configure and schedule other IP SLA operations.</p>
Step 6	track object-number ip sla entry-number reachability Example: switch(config)# track 1 ip sla 1 reachability	Tracks the reachability of an object and enters tracking configuration mode. <p>Note Repeat this step to track other operations.</p>
Step 7	exit Example: switch(config-track)# exit	Exits tracking configuration mode and returns the router to global configuration mode.

	Command or Action	Purpose
Step 8	ip access-list standard <i>access-list-name</i> Example: <pre>switch(config)# ip access-list standard ACL</pre>	Defines an IP access list access control list (ACL) in order to enable filtering for packets.
Step 9	permit ip <i>source destination</i> Example: <pre>switch(config-acl)# permit ip 192.0.2.0/24 198.51.100.0/24</pre>	Creates an access control list (ACL) rule that permits traffic matching its conditions.
Step 10	ipv6 access-list <i>access-list-name</i> Example: <pre>switch(config)# ipv6 access-list IPv6ACL</pre>	Defines an IPv6 access list ACL in order to enable filtering for packets.
Step 11	permit ipv6 <i>source destination</i> Example: <pre>switch(config-ipv6-acl)# permit ipv6 2001:DB8::/32 2001:DB8::/48</pre>	Creates an access control list (ACL) rule that permits traffic matching its conditions.
Step 12	exit Example: <pre>switch(config-ipv6-acl)# exit</pre>	Exits ACL configuration mode and returns the router to global configuration mode.
Step 13	route-map <i>map-tag</i> Example: <pre>switch(config)# route-map PBR</pre>	Specifies a route map and enters route-map configuration mode.
Step 14	match ip address <i>access-list-name</i> Example: <pre>switch(config-route-map)# match ip address ACL</pre>	Distributes any routes that have a destination IPv4 network number address that is permitted by a standard access list.
Step 15	match ipv6 address <i>access-list-name</i> Example: <pre>switch(config-route-map)# match ipv6 address IPv6ACL</pre>	Distributes any routes that have a destination IPv6 network number address that is permitted by a standard access list.
Step 16	set ip next-hop verify-availability <i>next-hop-address track object</i>	Configures the route map to verify the reachability of the tracked object.

	Command or Action	Purpose
	<p>Example:</p> <pre>switch(config-route-map)# set ip next-hop verify-availability 198.51.100.2 track 1</pre>	<p>Note Repeat this step to configure the route map to verify the reachability of other tracked objects.</p>
Step 17	<p>set ipv6 next-hop verify-availability <i>next-hop-address track object</i></p> <p>Example:</p> <pre>switch(config-route-map)# set ipv6 next-hop verify-availability 2001:DB8:1::1 track 1</pre>	<p>Configures the route map to verify the reachability of the tracked object.</p> <p>Note Repeat this step to configure the route map to verify the reachability of other tracked objects.</p>
Step 18	<p>set ip default next-hop verify-availability <i>next-hop-address track object</i></p> <p>Example:</p> <pre>switch(config-route-map)# set ip default next-hop verify-availability 192.0.2.2 track 1</pre>	<p>Configures the route map to verify the reachability of the default next hop.</p>
Step 19	<p>set ipv6 default next-hop verify-availability <i>next-hop-address track object</i></p> <p>Example:</p> <pre>switch(config-route-map)# set ipv6 default next-hop verify-availability 2001:DB8:0:ABCD::1 track 1</pre>	<p>Configures the route map to verify the reachability of the default next hop.</p>
Step 20	<p>exit</p> <p>Example:</p> <pre>switch(config-route-map)# exit</pre>	<p>Exits route-map configuration mode and returns the router to global configuration mode.</p>
Step 21	<p>interface <i>type number</i></p> <p>Example:</p> <pre>switch(config)# interface ethernet 0/0</pre>	<p>Specifies an interface type and number and enters interface configuration mode.</p>
Step 22	<p>ip address <i>ip-address mask</i></p> <p>Example:</p> <pre>switch(config-if)# ip address 10.2.2.1 255.255.255.0</pre>	<p>Specifies a primary IP address for an interface.</p>
Step 23	<p>ipv6 address <i>ip-address mask</i></p> <p>Example:</p>	<p>Specifies a primary IPv6 address for an interface.</p>

	Command or Action	Purpose
	switch(config-if)# ipv6 address 2001:DB8::/48	
Step 24	ip policy route-map <i>map-tag</i> Example: switch(config-if)# ip policy route-map PBR	Enables policy routing and identifies a route map to be used for policy routing.
Step 25	ipv6 policy route-map <i>map-tag</i> Example: switch(config-if)# ipv6 policy route-map PBR	Enables IPv6 policy routing and identifies a route map to be used for policy routing.
Step 26	end Example: switch(config-if)# end	Exits interface configuration mode and returns the router to privileged EXEC mode.
Step 27	show track <i>object-number</i> Example: switch# show track 1	(Optional) Displays tracking information. Use this command to verify the configuration.
Step 28	show route-map <i>map-name</i> Example: switch# show route-map PBR	(Optional) Displays route map information.

Example: Configuring IP SLA PBR Object Tracking

This example shows that object tracking is configured for PBR:

```
! Configure and schedule IP SLA operations
ip sla 1
  icmp-echo 10.3.3.2
ip sla schedule 1 life forever start-time now
!
ip sla 2
  udp-echo 10.4.4.2
ip sla schedule 2 life forever start-time now
!
ip sla 3
  icmp-echo 10.5.5.2
ip sla schedule 3 life forever start-time now
!
ip sla 4
  icmp-echo 10.6.6.2
```

```

ip sla schedule 4 life forever start-time now
!
ip sla 5
  icmp-echo 10.7.7.2
ip sla schedule 5 life forever start-time now
!
! Configure Object Tracking to track the operations
!
track 1 ip sla 1 reachability
track 2 ip sla 2 reachability
track 3 ip sla 3 reachability
track 4 ip sla 4 reachability
track 5 ip sla 5 reachability
!
! Configure ACL
ip access-list standard ACL
  permit ip 10.2.2.0/24 10.1.1.1/32
!
! Configure PBR policing on the router
route-map PBR
  match ip address ACL
  set ip next-hop verify-availability 10.3.3.2 track 1
  set ip next-hop verify-availability 10.4.4.2 track 2
  set ip next-hop verify-availability 10.5.5.2 track 3
!
! Apply PBR policy on the incoming interface of the router.
interface ethernet 0/0
  ip address 10.2.2.1 255.255.255.0
  ip policy route-map PBR
!
! Display PBR related information
show route-map
show track brief
show ip sla stat
show ip sla application
!

```

Feature History for IP SLA PBR Object Tracking

This table includes only the updates for those releases that have resulted in additions or changes to the feature.

Table 1: Feature History for IP SLA PBR Object Tracking

Feature Name	Release	Feature Information
IP SLA PBR Object Tracking	6.2(2)	This feature was introduced.