

Track Static Routes for Service VPNs

Table 1: Feature History

Feature Name	Release Information	Description
Static Route Tracker for Service VPNs for Cisco vEdge Devices	Cisco SD-WAN Release 20.4.1 Cisco vManage Release 20.4.1	This feature enables you to configure IPv4 static route endpoint tracking for service VPNs. For static routes, endpoint tracking determines whether the configured endpoint is reachable before adding that route to the route table of the device.
TCP/UDP Endpoint Tracker and Dual Endpoint Static Route Tracker for Cisco vEdge devices	Cisco SD-WAN Release 20.7.1 Cisco vManage Release 20.7.1	This feature enables you to configure the TCP/UDP static route endpoint trackers. Using this feature you can also configure IPv4, TCP/UDP dual endpoint static-route tracker groups for service VPNs to enhance the reliability of probes.

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Information About Static Route Tracking

Static-route tracking for service VPNs enables you to track the availability of the configured endpoint address to determine if the static route can be included in the routing table of a device. This is applicable when a site uses a static route in a service VPN to advertise its route over Overlay Management Protocol (OMP). The

static route tracker periodically sends ICMP ping probes to the configured endpoint. If the tracker does not receive a response, the static route is not included in the routing table and is not advertised to OMP. You can configure an alternative next-hop address or a static route with a higher administrative distance to provide a backup path. This path is advertised over OMP.

Note

- From Cisco SD-WAN Release 20.7.1, you can configure TCP/UDP individual endpoint trackers and configure a tracker group with dual endpoints (using two trackers), and associate the trackers and tracker group to a static route. Dual endpoints help in avoiding false negatives that might be introduced because of the unavailability of the routes.
- From Cisco IOS XE Catalyst SD-WAN Release 17.15.1a only UP/DOWN status changes are reported to Cisco SD-WAN Manager, while RTT value changes are not. This optimization improves efficiency in extensive networks.

Restrictions for IPv4 Static Route Tracking

- Only one endpoint tracker is supported per static route per next-hop address.
- IPv6 static routes are not supported.
- You cannot link the same endpoint-tracker to static routes in different VPNs. Endpoint-tracker is identified by a name and can be used for multiple static routes in a single VPN.

Configure Tracker Group Using a Configuration Group

Before you begin

On the **Configuration** > **Configuration Groups** page, choose **SD-WAN** as the solution type.

Procedure

Step 1 From the Cisco SD-WAN Manager menu, choose **Configuration** > **Configuration Groups**.

Step 2 Create and configure a tracker group in a Service Profile.

Table 2: Tracker Group

Field	Description
Tracker Elements*	This field is displayed only if you chose **Tracker Type** as the **Tracker Group**. Add the existing interface tracker names, separated with a space. When you add this tracker to the template, the tracker group is associated with these individual trackers, and you can then associate the tracker group to an interface.

Field	Description
Tracker Boolean	This field is displayed only if you chose **Tracker Type** as the **Tracker Group**. Select **AND** or **OR**. **OR** is the default boolean operation. An **OR** ensures that the transport interface status is reported as active if either one of the associated trackers of the tracker group reports that the interface is active. If you select the **AND** operation, the transport-interface status is reported as active if both the associated trackers of the tracker group report that the interface is active.

What to do next

Also see Deploy a configuration group.

Workflow to Configure IPv4 Static Route Tracking

1. Configure an endpoint tracker using the System template.
2. Configure a static route using the VPN template.
3. Apply the tracker to the next-hop address.

Create a Static Route Tracker

Use the **System Template** to create a tracker for static routes.

1. From Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.
2. Click **Feature Templates**.

Note In Cisco vManage Release 20.7.x and earlier releases, **Feature Templates** is titled **Feature**.

3. Navigate to the **Cisco System** template for the device.

Note For information about creating a System template, see Create System Template.

4. Click **Tracker**. Click **New Endpoint Tracker** to configure the tracker parameters.

Table 3: Tracker Parameters

Field	Description
Name	Name of the tracker. The name can be up to 128 alphanumeric characters.
Threshold	Wait time for the probe to return a response before declaring that the configured endpoint is down. Range is from 100 to 1000 milliseconds. Default is 300 milliseconds.
Interval	Time interval between probes to determine the status of the configured endpoint. Default is 60 seconds (1 minute). Range is from 10 to 600 seconds.
Multiplier	Number of times probes are sent before declaring that the endpoint is down. Range is from 1 to 10. Default is 3.
Tracker Type	From the drop-down, choose Global. From the Tracker Type field drop-down, choose Static Route. From Cisco SD-WAN Release 20.7.1, you can configure a tracker group with dual endpoints on Cisco vEdge devices and associate this tracker group to a static route.
Endpoint Type	Choose endpoint type IP Address. **Note** Configuring the tracker type Static Route using endpoint URL or endpoint DNS name is not supported.
End-Point Type: IP Address	IP address of the static route end point. This is the destination on the internet to which the router sends probes to determine the status of the route.

5. Click **Add**.
6. Click **Save**.
7. To create a tracker group, click **New Endpoint Tracker**.

   From the **Tracker Type** drop-down list, choose **tracker-group** and configure the tracker group parameters.

Note Ensure that you have created two trackers to form a tracker group.

Table 4: Tracker Group Parameters

Fields	Description
Name	Name of the tracker group.

Fields	Description
Tracker Type	From the drop-down, choose **Global**. From the Tracker Type field drop-down, choose **Static Route**. From Cisco SD-WAN Release 20.7.1, you can configure a tracker group with dual endpoints on Cisco vEdge devices and associate this tracker group to a static route.
Tracker Elements	This field is displayed only if you chose **Tracker-group** as the tracker type. Add the existing interface tracker names (separated by a space). When you add this tracker to the template, the tracker group is associated with these individual trackers, and you can then associate the tracker group to a static route.
Tracker Boolean	From the drop-down list, choose **Global**. This field is displayed only if you chose **tracker-group** as the **Tracker Type**. By default, the **OR** option is selected. Choose **AND** or **OR**. **OR** ensures that the static route status is reported as active if either one of the associated trackers of the tracker group report that the route is active. If you select **AND**, the static route status is reported as active if both the associated trackers of the tracker group report that the route is active.

8. Click **Add**.
9. Click **Save**.

Note Complete all the mandatory actions before you save the template.

Configure a Next Hop Static Route with Tracker

Use the **VPN** template to associate a tracker to a static route next hop.

Note You can apply only one tracker per static route next hop.

1. From the Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.
2. Click **Feature Templates**.

Note In Cisco vManage Release 20.7.x and earlier releases, **Feature Templates** is titled **Feature**.

3. Navigate to the **Cisco VPN Template** for the device.

Note For information about creating a VPN template, see Create VPN Template.

4. Enter **Template Name** and **Description** as required.
5. In Basic Configuration, by default, VPN is set to 0. Set a VPN value within (Range: 1 to 65525, excluding 512. For details see the VRF range behavior change described here.) for service VPNs, for service-side data traffic on Cisco IOS XE Catalyst SD-WAN devices.

Note You can configure static route tracker only on service VPNs.

6. Click **IPv4 Route**.
7. Click **New IPv4 Route**.
8. In the **IPv4 Prefix** field, enter a value.
9. Click **Next Hop**.
10. Click **Add Next Hop** and enter values for the fields listed in the table.

Parameter Name	Description
Address	Specify the next-hop IPv4 address.
Distance	Specify the administrative distance for the route.
Tracker	Enter the name of the gateway tracker to determine whether the next hop is reachable before adding that route to the route table of the device.
Add Next Hop	Enter the name of the gateway tracker with the next hop address to determine whether the next hop is reachable before adding that route to the route table of the device.

11. Click **Add** to create the static route with the next-hop tracker.

Note Configuring a static route with a next-hop 'X.X.X.255' is not supported.

Cisco vEdge device does not implement RFC 3021.

12. Click **Save**.

Note You need to fill all the mandatory fields in the form to save the VPN template.

Monitor Static Route Tracker Configuration

View Static Route Tracker

To view information about a static tracker on a transport interface:

1. From the Cisco SD-WAN Manager menu, choose **Monitor** > **Devices**.

   Cisco vManage Release 20.6.x and earlier: From the Cisco SD-WAN Manager menu, choose **Monitor** > **Network**.

2. Choose a device from the list of devices.
3. Click **Real Time**.
4. From the **Device Options** drop-down list, choose **Static Route Tracker Info**.

Configure Static Routes Using CLI

The following sections provide information about how to configure static routes using the CLI.

Configure a Static Route Tracker



Note You can configure static route tracking using the Cisco SD-WAN Manager CLI Add-on feature templates and CLI device templates. For more information on configuring using CLI templates, see CLI Templates.

```
Device# config terminal
Device(config)# system tracker <tracker-name>
Device(config-tracker-trackername)# tracker-type <tracker-type>
Device(config-tracker-trackername)# endpoint-ip <ip-address>
Device(config-tracker-trackername)# threshold <value>
Device(config-tracker-trackername)# multiplier <value>
Device(config-tracker-trackername)# interval <value>
Device(config-tracker-trackername)# exit
```

Configure a Static Route Tracker with TCP Port as the Endpoint

```
Device# config terminal
Device(config)# system tracker <tracker-name>
Device(config-tracker-trackername)# tracker-type <tracker-type>
Device(config-tracker-trackername)# endpoint-ip <ip-address> tcp <port-number>
Device(config-tracker-trackername)# threshold <value>
Device(config-tracker-trackername)# multiplier <value>
Device(config-tracker-trackername)# interval <value>
Device(config-tracker-trackername)# exit
```

Configure a Static Route Tracker with UDP Port as the Endpoint

```
Device# config terminal
Device(config)# system tracker <tracker-name>
```

```
Device(config-tracker-trackername)# tracker-type <tracker-type>
Device(config-tracker-trackername)# endpoint-ip <ip-address> udp <port-number>
Device(config-tracker-trackername)# threshold <value>
Device(config-tracker-trackername)# multiplier <value>
Device(config-tracker-trackername)# interval <value>
Device(config-tracker-trackername)# exit
```

Configure Tracker Groups



Note You can create tracker groups to probe static routes from Cisco SD-WAN Release 20.7.1 and Cisco vManage Release 20.7.1.

```
Device# config terminal
Device(config)# system tracker <tracker-name1>
Device(config-tracker-trackername1)# tracker-type <tracker-type>
Device(config-tracker-trackername1)# endpoint-ip <ip-address> tcp <port-number>
Device(config-tracker-trackername1)# threshold <value>
Device(config-tracker-trackername1)# multiplier <value>
Device(config-tracker-trackername1)# interval <value>
Device(config-tracker-trackername1)# exit

Device(config)# system tracker <tracker-name2>
Device(config-tracker-trackername2)# tracker-type <tracker-type>
Device(config-tracker-trackername2)# endpoint-ip <ip-address> udp <port-number>
Device(config-tracker-trackername2)# threshold <value>
Device(config-tracker-trackername2)# multiplier <value>
Device(config-tracker-trackername2)# interval <value>
Device(config-tracker-trackername2)# exit

Device(config)# system tracker <tracker-group-name>
Device(config-tracker-tracker-group-name)# tracker-type <tracker-group>
Device(config-tracker-tracker-group-name)# tracker-elements <tracker-name1> <tracker-name2>
Device(config-tracker-tracker-group-name)# boolean {and | or}
Device(config-tracker-tracker-group-name)# exit
```

Configure a Next Hop Static Route with Tracker

```
Device(config)# system
Device(config)# vpn <vpn-number>
Device(config-vpn-vpn-number)# ip route <ipv4address/prefix> <ip-address>
<administrative-distance> tracker <tracker-name>
```



Note Configuring a static route with a next-hop 'X.X.X.255' is not supported.

Cisco vEdge device does not implement RFC 3021.

Note

- Use the **ip route** command to bind a tracker or tracker group with a static route and to configure a backup route for administrative distance that is higher than the default value of 1.
- You can apply only one tracker to an endpoint.
- A tracker group can have a mix of endpoint trackers. For example, you can create a tracker group with an IP address tracker and UDP tracker.

Configuration Examples for Static Route Tracking Using the CLI

Configure Tracker

This example shows how to configure a single static route tracker:

```
config terminal
!
 system tracker tracker1
!
  tracker-type static-route
  endpoint-ip 10.1.1.1
  threshold 100
  multiplier 5
  interval 60
  exit
!
  vpn 1
  ip route 192.0.2.0/24 10.20.24.17 tracker tracker1
  ip route 172.16.0.0/12 10.20.24.16 100
```

This example shows how to configure a tracker with TCP port as endpoint:

```
config terminal
!
 system tracker tcp-10001
!
  tracker-type static-route
  endpoint-ip 10.0.0.1 tcp 10001
  threshold    100
  interval     10
  multiplier   1
  exit
!
  vpn 1
  ip route 192.0.0.4/24 10.20.25.18 tracker tcp-10001
```

This example shows how to configure a tracker with UDP port as endpoint:

```
config terminal
!
  system tracker udp-10001
!
    tracker-type static-route
    endpoint-ip 10.0.0.1 udp 10001
    threshold    100
```

```
    interval     10
    multiplier   1
    exit
!
   vpn 1
   ip route 192.0.0.4/24 10.20.30.19 tracker udp-10001
```

Configure Tracker Groups

This example shows how to configure a tracker group with two trackers (two endpoints). You can create tracker groups to probes static routes from Cisco SD-WAN Release 20.7.1.

```
config terminal
!
 system tracker tcp-10001
!
    tracker-type static-route
    endpoint-ip 10.1.1.1 tcp 10001
    threshold 100
    multiplier 5
    interval 20
!
 system tracker udp-10002
!
   tracker-type static-route
   endpoint-ip 10.2.2.2 udp 10002
   threshold 100
   multiplier 5
   interval 20
!
system tracker group-tcp-10001-udp-10002
!
  tracker-type tracker-group
  boolean and
  tracker-elements tcp-10001 udp-10002
  exit
!
vpn 1
  ip route 192.168.2.0/16 10.20.24.17 tracker group-tcp-10001-udp-10002
  ip route 192.168.2.0/16 10.20.24.16 100
```



Note

- You must configure an administrative distance when you are configuring through CLI templates.
- Use the **ip route** command to bind the tracker or tracker group with a static route and to configure a backup route for administrative distance when it is higher than the default value of 1.
- You can apply only one tracker to an endpoint.
- Configuring a static route with a next-hop 'X.X.X.255' is not supported.

  Cisco vEdge device does not implement RFC 3021.

Verify Static Route Tracking Configuration Using CLI

Command Verification

Use the following command to verify if the configuration is committed. The following sample configuration shows tracker definition for a static route tracker and it's application to an IPv4 static route:

```
Device# show running-config system tracker
system
 tracker tracker1
 endpoint-ip 10.1.1.1
 interval 60
 multiplier 5
 tracker-type static-route

 tracker tracker2
 endpoint-ip 10.1.1.12
 interval 40
 multiplier 2
 tracker-type static-route
```

Use the following command to verify the IPv4 route:

```
Device# show running-config vpn 1 ip route

vpn 1
 ip route 10.20.30.0/24 10.20.30.1
 ip route 192.168.2.0/16 10.20.24.16 100
 ip route 192.168.2.0/16 10.20.24.17 tracker tracker1
!
```

The following is a sample output from the **show tracker static-route** command displaying individual static route tracker status:

```
Device#  show tracker static-route
TRACKER                RTT IN
NAME      VPN  STATUS  MSEC
---------------------------------
tcp-10001  1    UP      0
udp-10002  1    UP      0
```

The following is a sample output from the **show tracker static-route-group** command displaying tracker group status:

```
Device# show tracker static-route-group
                                                    TRACKER     TRACKER  TRACKER
                                                    ELEMENT     ELEMENT  ELEMENT
TRACKER NAME                VPN  BOOLEAN  STATUS  NAME        STATUS   RTT
-------------------------------------------------------------------------------
group-tcp-10001-udp-10002    1    and      UP     tcp-10001    UP       0
                                                    udp-10002    UP       0
```

The following is a sample output from the **show ip route static** command:

```
Device# show ip route static
 Codes Proto-sub-type:
  IA -> ospf-intra-area, IE -> ospf-inter-area,
  E1 -> ospf-external1, E2 -> ospf-external2,
  N1 -> ospf-nssa-external1, N2 -> ospf-nssa-external2,
  e -> bgp-external, i -> bgp-internal
Codes Status flags:
```

```
  F -> fib, S -> selected, I -> inactive,
  B -> blackhole, R -> recursive, L -> import

                                          PROTOCOL  NEXTHOP      NEXTHOP   NEXTHOP
VPN  PREFIX          PROTOCOL  SUB TYPE   IF NAME     ADDR        VPN      TLOC IP   COLOR
 ENCAP  STATUS
-------------------------------------------------------------------------------------------------
1    192.168.2.0/16  STATIC      -          ge0/4   10.20.24.17    -        -         -
 -      F,S
1    192.168.2.0/16  STATIC      -          ge0/4   10.20.24.16    -        -         -
 -      F,S
```