

NAT DIA Tracker

Table 1: Feature History

Feature Name	Release Information	Description
NAT DIA Tracker for Cisco IOS XE Catalyst SD-WAN Devices	Cisco IOS XE Catalyst SD-WAN Release 17.3.1a Cisco vManage Release 20.3.1	This feature allows you to configure a system tracker to probe the transport interface periodically to determine if the internet or external network becomes unavailable. You can configure the DIA tracker using the **Tracker** tab of the **Cisco System** template. You can apply the tracker to a transport interface using either the **Cisco VPN Interface Ethernet** or the **Cisco VPN Interface Cellular** template.
Dual Endpoint Support for Interface Status Tracking on Cisco IOS XE Catalyst SD-WAN Devices	Cisco IOS XE Catalyst SD-WAN Release 17.7.1a Cisco vManage Release 20.7.1	This feature allows you to configure tracker groups with dual endpoints using the Cisco SD-WAN Manager system template and associate each tracker group to an interface. Despite having an active Internet connection, a single endpoint may sometimes be inactive. This condition leads to false negatives. To overcome this disadvantage of a single endpoint tracker, you can use a dual endpoint tracker configuration.

Feature Name	Release Information	Description
NAT DIA Tracker for IPv6 Interface	Cisco IOS XE Catalyst SD-WAN Release 17.11.1a Cisco vManage Release 20.11.1	NAT DIA tracker is now supported on IPv6 interfaces. You can configure IPv6 DIA tracker using the **IPv6-Tracker** and **IPv6-Tracker Group** options under transport profile in configuration groups.
ICMP Endpoint Tracker for NAT DIA for IPv4 or IPv6 Interfaces	Cisco IOS XE Catalyst SD-WAN Release 17.13.1a Cisco Catalyst SD-WAN Manager Release 20.13.1	This feature allows you to configure an ICMP endpoint tracker over a DIA path. You can configure ICMP probes for NAT DIA on IPv4 or IPv6 endpoints. You can configure the ICMP tracker using the **Tracker** or the **IPv6 Tracker** features under transport profile in configuration groups. Configure a **Tracker DIA Stabilize Status** setting in the **Basic** feature profile to stabilize rapid tracker status changes that cause interface flaps.

- Information About NAT DIA Tracking, on page 2
- ICMP Endpoint Tracker for NAT DIA, on page 3
- Supported Interfaces for NAT DIA Tracker, on page 5
- Restrictions for NAT DIA Tracker, on page 5
- Workflow for NAT DIA Tracker on IPv4 Interfaces, on page 6
- Configure NAT DIA Tracker on IPv4 Interfaces in Cisco SD-WAN Manager, on page 6
- Configure NAT DIA Tracker, on page 8
- Monitor NAT DIA Tracker Configuration on IPv4 Interfaces, on page 14
- Verify the Configurations for NAT DIA Tracker on IPv4 Interfaces , on page 15
- Workflow for NAT DIA Tracker on IPv6 Interfaces, on page 17

Information About NAT DIA Tracking

The DIA tracker helps determine if the internet or external network has become unavailable. The NAT DIA Tracking feature is useful when NAT is enabled on a transport interface in VPN 0 to allow data traffic from the router to exit directly to the internet.

If the internet or external network becomes unavailable, the router continues to forward traffic based on the NAT route in the service VPN. Traffic that is forwarded to the internet gets dropped. To prevent the internet-bound traffic from being dropped, configure the DIA tracker on the edge router to track the status of the transport interface. The tracker periodically probes the interface to determine the status of the internet and return the data to the attach points that are associated with the tracker.

When the tracker is configured on the transport interface, the interface IP address is used as a source IP address for probe packets.

IP SLA monitors the status of probes and measures the round-trip time of these probe packets and compares the values with the configured latency in the probe. When the latency exceeds the configured threshold value, the tracker considers the network as unavailable.

If the tracker determines that the local internet is unavailable, the router withdraws the NAT route from Service VPN, and reroutes the traffic based on the local routing configuration, to overlay.

The local router continues to periodically check the status of the path to the interface. When it detects that the path is functioning again, the router reinstalls the NAT route to the internet.

From Cisco IOS XE Catalyst SD-WAN Release 17.7.1a, you can configure a tracker group with two trackers, and associate this tracker group to an interface. Probing a tracker group with two trackers (two endpoints) helps in avoiding false negatives that might be introduced when an internal or external network gets erroneously marked as unavailable.

From Cisco IOS XE Catalyst SD-WAN Release 17.11.1a, you can configure NAT DIA tracker on IPv6 interfaces. The tracker and tracker group address type should match IPv4 or IPv6 address types on the interface configuration. For example, if an IPv4 address is configured on a NAT DIA interface, only an IPv4 tracker can be applied. If an IPv6 address is configured on a NAT DIA interface, only an IPv6 tracker can be applied. If both IPv4 and IPv6 addresses are configured on a NAT DIA interface, both IPv4 and IPv6 tracker can be applied correspondingly.

ICMP Endpoint Tracker for NAT DIA

From Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, you can configure ICMP endpoint trackers on any NAT-enabled IPV4 or IPv6 transport interfaces used for NAT DIA. The ICMP tracker detects failures along the internet path to a given external service by sending probes to a configured external endpoint and monitors whether the probes fail or succeed. If the number of probes exceed the configured multiplier value, or if the ICMP probes exceed the configured threshold, the tracker considers the external endpoint unreachable and makes the transport interface unavailable for DIA.

ICMP probes ensure shorter failovers when the transport interface becomes unavailable for DIA. You can configure either endpoint IP or the endpoint DNS name for ICMP endpoint trackers. You can create a tracker group if you have configured more than one IPv4 or IPv6 tracker.



Warning Ensure that you configure a host route to egress through the DIA interface where you've configured the ICMP tracker. This ensures that the intended tracker interface receives the ICMP probe. When an endpoint is reachable through an interface other than the interface configured for ICMP tracker, the ICMP probes may be sent to the interface which is not tracked, causing ICMP probes to egress via an unintended interface.

You can configure the following types of ICMP Endpoint Tracker for NAT DIA:

Table 2: Types of ICMP Endpoint Trackers

Tracker	Supported Tracker Type
Single NAT DIA ICMP tracker	Tracker type: • IPv4 • IPv6 Tracker endpoint type: • Endpoint IP • DNS
NAT DIA ICMP tracker group	Tracker type: • IPv4 • IPv6 Tracker endpoint type: • Endpoint IP
NAT DIA Mixed Tracker Group (HTTP and ICMP)	Tracker type: • IPv4 • IPv6 Tracker endpoint type: • Endpoint IP

Supported Devices for ICMP Trackers

Minimum supported releases: Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, Cisco Catalyst SD-WAN Manager Release 20.13.1.

Restrictions for ICMP Trackers

- You cannot configure ICMP endpoint tracker type through feature templates.
- You cannot configure both an IPv4 and an IP6 tracker type in the same tracker group.
- You can configure the ICMP endpoint tracker for NAT DIA for the following interfaces only:
  - Ethernet Interfaces
  - Ethernet (PPPoE) Interfaces
  - Subinterfaces

- If only one DIA interface (default route) is configured, and the ICMP tracker goes down, the default route is withdrawn.

Supported Interfaces for NAT DIA Tracker

You can configure the NAT DIA tracker for the following interfaces:

- Cellular Interfaces



Note Cellular interfaces don't support negotiated IP addresses.

- Ethernet Interfaces
- Ethernet (PPPoE) Interfaces
- Subinterfaces
- DSL Dialer Interfaces (PPPoE and PPPoA)



Note IPv6 NAT DIA tracker is supported only on physical and subinterfaces of Ethernet interfaces.

Restrictions for NAT DIA Tracker

Restrictions for Cisco IOS XE Catalyst SD-WAN Release 17.10.1a and Earlier Releases

- In Cisco IOS XE Release 17.6.x and earlier, the NAT DIA tracker is not supported on dialer interfaces. From Cisco IOS XE Catalyst SD-WAN Release 17.7.1a, subinterfaces and dialer interfaces support single endpoint and dual endpoint trackers.
- DNS URL endpoint is not supported on Cisco IOS XE Catalyst SD-WAN devices.
- You can apply only one tracker or tracker group to an interface.
- The NAT fallback feature is supported only from Cisco IOS XE Catalyst SD-WAN Release 17.3.2.
- The IP address of the tunnel with address 169.254.x.x is not supported to track the zScaler endpoint on manual tunnels.
- You must configure a minimum of two single endpoint trackers to configure a tracker group.
- A tracker group can incorporate only a maximum of two single endpoint trackers.
- In Cisco IOS XE Release 17.10.1 and previous releases, you cannot configure IPv4 tracker on a IPv6 interface or vice versa. The tracker will not be active.

Restrictions for Cisco IOS XE Catalyst SD-WAN Release 17.11.1a

- API URL endpoint is supported only on IPv6 DIA tracker and not supported on IPv4 DIA tracker.
- Both IPv4 and IPv6 trackers cannot be used in the same tracker group.
- You must configure the **allow service all** command under the TLOC tunnel interface for IPv6 trackers to work with a TLOC tunnel interface.
- Multiple NAT66 DIA interfaces are not supported.

Restrictions for Cisco IOS XE Catalyst SD-WAN Release 17.13.1a

- Name resolution process is not bond to the ET interface. Name resolution is using VPN 0 routing table. It can exit any active interface with proper routing.

Workflow for NAT DIA Tracker on IPv4 Interfaces

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.7.1a and Cisco vManage Release 20.7.1

1. Configure an interface tracker using a **Cisco System** template. From Cisco IOS XE Catalyst SD-WAN Release 17.7.1a, you can configure a dual tracker or a tracker group.
2. Apply the tracker to a transport interface.
3. Verify NAT DIA tracker configuration.

Configure NAT DIA Tracker on IPv4 Interfaces in Cisco SD-WAN Manager

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.7.1a and Cisco vManage Release 20.7.1

Use the **Cisco System** template to track the status of transport interfaces.

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. Click **…** adjacent to the **Cisco System** template that you want to modify and choose **Edit**.
4. Click **Tracker**, and click **New Endpoint Tracker** to configure the tracker parameters.

Table 3: Tracker Parameters

Parameter Field	Description
Name	Name of the tracker. The name can be up to 128 alphanumeric characters. You can configure up to eight trackers.
Threshold	Duration to wait for the probe to return a response before declaring that the transport interface is down. *Range:* 100 to 1000 milliseconds. *Default:* 300 milliseconds
Interval	Frequency at which a probe is sent to determine the status of the transport interface. *Range:* 20 to 600 seconds. *Default:* 60 seconds (1 minute)
Multiplier	Number of times a probe can be resent before declaring that the transport interface is down. *Range:* 1 to 10. *Default:* 3
Tracker Type	Choose **Interface** to configure the DIA tracker.
End Point Type: IP Address	IP address of the end point. This is the destination in the internet to which the router sends probes to determine the status of the transport interface. Make sure that the IP address is enabled to respond to HTTP port 80 probes.
End Point Type: DNS Name	DNS name of the end point. This is the destination in the internet to which the router sends probes to determine the status of the transport interface.

5. Click **Add**.
6. To create a tracker group and configure the parameters, click **Tracker Groups** > **New Endpoint Tracker Groups**.

Table 4: Tracker Group Parameters

Parameter Field	Description
Tracker Type: Tracker Elements	This field is displayed only if you chose **Tracker Type** as the **Tracker Group**. 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 an interface.
Tracker Type: 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.

Note Ensure that you have configured two single endpoint trackers before configuring a tracker group.

7. Click **Add**.
8. Click **Advanced** and enter the **Track Interface** information.

   Enter the name of the tracker to track the status of transport interfaces that connect to the internet.

Note Tracking the interface status is useful when you enable NAT in a transport interface in VPN 0 to allow data traffic from the router to exit directly to the internet rather than having to first go to a router in a data center. In this situation, enabling NAT in the transport interface splits the TLOC between the local router and the data center into two, with one going to the remote router and the other going to the internet. When you enable transport tunnel tracking, the software periodically probes the path to the internet to determine whether it is up. If the software detects that this path is down, it withdraws the route to the internet destination, and traffic destined to the internet is then routed through the data center router. When the software detects that the path to the internet is functioning again, the route to the internet is reinstalled.

Note Ensure that you complete filling all the mandatory fields before you update the template.

9. Click **Update**.

Configure NAT DIA Tracker

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.7.1a and Cisco Catalyst SD-WAN Control Components Release 20.7.1.

From Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, you can configure ICMP trackers for NAT DIA.

Configure NAT DIA Tracker on IPv4 Interfaces using Configuration Groups in Cisco SD-WAN Manager

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.11.1a and Cisco vManage Release 20.11.1

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

   In Cisco IOS XE Catalyst SD-WAN Release 17.11.1a and earlier, choose **Configuration** > **Templates** > **Configuration Groups**.

2. Configure a Tracker in a Transport and Management Profile.

Table 5: Tracker

Field	Description
Tracker Name*	Name of the tracker. The name can be up to 128 alphanumeric characters.

Field	Description
Endpoint Tracker Type*	Choose a tracker type to configure endpoint trackers: • **http** • **icmp** This tracker type is available from Cisco Catalyst SD-WAN Manager Release 20.13.1.
Endpoint	Choose an endpoint type: • **Endpoint IP**: When you choose this option, the following field appears: **Endpoint IP**: IP address of the endpoint. This is the destination on the internet to which the probes are sent to determine the status of an endpoint. • **Endpoint DNS Name**: When you choose this option, the following field appears: **Endpoint DNS Name**: DNS name of the endpoint. This is the destination on the internet to which probes are sent to determine the status of the endpoint. The DNS name can contain a minimum of one character and a maximum of 253 characters. • **Endpoint API URL**: When you choose this option, the following field appears: **API URL of endpoint***: API URL for the endpoint of the tunnel. This is the destination on the internet to which probes are sent to determine the status of the endpoint.
Interval	Time interval between probes to determine the status of the configured endpoint. From Cisco Catalyst SD-WAN Manager Release 20.13.1, this option is called **Probe Interval**, allowing you to configure the time interval between probes. Range: 20 to 600 seconds Default: 60 seconds (1 minute). From Cisco Catalyst SD-WAN Manager Release 20.13.1, if you select **icmp** as the endpoint tracker type, the default probe interval is 2 seconds.
Multiplier	Number of times probes are sent before declaring that the endpoint is down. Range: 1 to 10 Default: 3

Field	Description
Threshold	Wait time for the probe to return a response before declaring that the configured endpoint is down. Range: 100 to 1000 milliseconds Default: 300 milliseconds

3. Configure **Tracker Group**.

Table 6: 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.
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.

4. After you create a configuration group, add devices to the group. For more information, see Add Devices to a Configuration Group in *Cisco Catalyst SD-WAN Configuration Groups Reference Guide*. You can then go ahead and deploy the devices associated to the configuration group. For more information, see Deploy Devices in *Cisco Catalyst SD-WAN Configuration Groups Reference Guide*.

Configure NAT DIA Tracker on IPv4 Interfaces Using the CLI

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.7.1a and Cisco vManage Release 20.7.1

Configure a NAT DIA Tracker Using the CLI (Single Endpoint)

You can configure NAT DIA tracking using a CLI add-on feature template or CLI device template.

```
Device# config-transaction
Device(config)# endpoint-tracker tracker1
Device(config-endpoint-tracker)# endpoint-ip ip-address
Device(config-endpoint-tracker)# threshold value
Device(config-endpoint-tracker)# multiplier value
Device(config-endpoint-tracker)# interval value
Device(config-endpoint-tracker)# tracker-type interface
```

Configure Tracker Groups

You can create tracker groups to probe NAT DIA tracker from Cisco IOS XE Catalyst SD-WAN Release 17.7.1a:

```
Device# config-transaction
Device(config)# endpoint-tracker tracker-name1
Device(config-endpoint-tracker)# tracker-type interface
Device(config-endpoint-tracker)# endpoint-ip ip-address
Device(config-endpoint-tracker)# threshold value
Device(config-endpoint-tracker)# multiplier value
Device(config-endpoint-tracker)# interval value
```

```
Device# config-transaction
Device(config)# endpoint-tracker tracker-name2
Device(config-endpoint-tracker)# tracker-type interface
Device(config-endpoint-tracker)# endpoint-dns-name <dns-name>
Device(config-endpoint-tracker)# threshold value
Device(config-endpoint-tracker)# multiplier value
Device(config-endpoint-tracker)# interval value
```

```
Device(config)# endpoint-tracker tracker-group-name
Device(config-endpoint-tracker)# tracker-type tracker-group
Device(config-endpoint-tracker)# boolean or
Device(config-endpoint-tracker)# tracker-elements tracker-name1 tracker-name2
Device(config)# interface GigabitEthernet0/0/1
Device(config-if)# endpoint-tracker tracker-group-name
```

Note A tracker group can have a mix of endpoint trackers. You can combine an IP-address tracker with a DNS tracker to create a tracker group.

Configure an ICMP Tracker for NAT DIA Using the CLI

Configure an ICMP Tracker for NAT DIA Using the CLI

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.13.1a and Cisco Catalyst SD-WAN Manager Release 20.13.1.

You can configure ICMP tracking for NAT DIA by using a CLI add-on profile or the Transport profile in a configuration group.

To configure single endpoints:

```
Device# config-transaction
Device(config)# endpoint-tracker t1
Device(config-endpoint-tracker)# tracker-type interface-icmp
Device(config-endpoint-tracker)# endpoint-ip ip-address
Device(config-endpoint-tracker)# threshold value
Device(config-endpoint-tracker)# multiplier value
Device(config-endpoint-tracker)# icmp-interval value
```

To configure a tracker group:

```
Device# config-transaction
Device(config)# endpoint-tracker tracker-name1
Device(config-endpoint-tracker)# tracker-type interface-icmp
Device(config-endpoint-tracker)# endpoint-ip <ip-address>
Device(config-endpoint-tracker)# threshold <value>
```

```
Device(config-endpoint-tracker)# multiplier <value>
Device(config-endpoint-tracker)# icmp-interval <value>

Device# config-transaction
Device(config)# endpoint-tracker <tracker-name2>
Device(config-endpoint-tracker)# tracker-type interface-icmp
Device(config-endpoint-tracker)# endpoint-dns-name <dns-name>
Device(config-endpoint-tracker)# threshold <value>
Device(config-endpoint-tracker)# multiplier <value>
Device(config-endpoint-tracker)# icmp-interval <value>

Device(config)# endpoint-tracker tracker-group-name
Device(config-endpoint-tracker)# tracker-type tracker-group
Device(config-endpoint-tracker)# boolean or
Device(config-endpoint-tracker)# tracker-elements tracker-name1 tracker-name2
Device(config)# interface GigabitEthernet0/0/1
Device(config-if)# endpoint-tracker tracker-group-name
```

The following example shows how to configure a tracker with endpoint IP address:

```
Device(config)# endpoint-tracker tracker1
Device(config-endpoint-tracker)# endpoint-ip 10.1.1.1
Device(config-endpoint-tracker)# threshold 100
Device(config-endpoint-tracker)# multiplier 5
Device(config-endpoint-tracker)# interval 2
Device(config-endpoint-tracker)# tracker-type interface
```

The following example shows how to configure a tracker with endpoint as a DNS:

```
Device(config)# endpoint-tracker tracker2
Device(config-endpoint-tracker)# endpoint-dns-name www.example.com
Device(config-endpoint-tracker)# threshold 100
Device(config-endpoint-tracker)# multiplier 5
Device(config-endpoint-tracker)# interval 2
```

The following example shows how to configure an ICMP tracker with endpoint IP address:

```
Device(config)# endpoint-tracker tracker3
Device(config-endpoint-tracker)# tracker-type interface-icmp
Device(config-endpoint-tracker)# endpoint-ip 10.1.1.1
Device(config-endpoint-tracker)# threshold 100
Device(config-endpoint-tracker)# multiplier 5
Device(config-endpoint-tracker)# icmp-interval 2
```

The following example shows how to configure an ICMP tracker with endpoint as a DNS:

```
Device(config)# endpoint-tracker tracker4
Device(config-endpoint-tracker)# tracker-type interface-icmp
Device(config-endpoint-tracker)# endpoint-dns-name www.example.com
Device(config-endpoint-tracker)# threshold 100
Device(config-endpoint-tracker)# multiplier 5
Device(config-endpoint-tracker)# icmp-interval 2
```

Configuration Examples for NAT DIA Tracking on IPv4 Interfaces Using the CLI

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.7.1a and Cisco vManage Release 20.7.1

The following sections provide examples for configuring NAT DIA trackers using the CLI.

Configuration Example: Single Endpoint NAT DIA Tracker Using the CLI

This example shows how to configure a single endpoint NAT DIA tracker:

```
config-transaction
    endpoint-tracker tracker1
    tracker-type interface
    endpoint-ip 10.1.1.1
    threshold 100
    multiplier 5
    interval 20
exit
```

Configuration Example: Tracker Groups

This example shows how to configure a tracker group with two trackers (two endpoints). You can create tracker groups to probe an interface from Cisco IOS XE Catalyst SD-WAN Release 17.7.1a.

```
config-transaction
    endpoint-tracker tracker1
    endpoint-ip 10.1.1.1
    interval 20
    threshold 100
    multiplier 1
    tracker-type interface
exit

endpoint-tracker tracker2
    endpoint-dns-name www.cisco.com
    interval 600
    threshold 1000
    multiplier 10
    tracker-type interface
exit

endpoint-tracker group1
    tracker-type tracker-group
    boolean or
    tracker-elements tracker1 tracker2
exit
```

This example shows how to apply a tracker group to an interface and configure it in the supported interfaces:

```
interface GigabitEthernet0/0/1
    endpoint-tracker group1
```

Stabilize NAT DIA Tracker Status

From Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, you can configure a global configuration setting called **Tracker DIA Stabilize Status** using the **Basic** feature profile in Cisco SD-WAN Manager. Alternatively, you can use the **dia-stabilize-status** command by using the CLI. This configuration is applied to all endpoint-tracker state changes across DIA interfaces, both HTTP, and ICMP to stabilize the tracker states and avoid rapid interface flaps due to rapid status changes.

When you configure the endpoint tracker for an interface, the tracker starts tracking that endpoint by sending HTTP or ICMP probes. If the endpoint is reachable, or when the probe is successful, the tracker is marked as UP. If the endpoint is not reachable, or when the probe is unsuccessful, the tracker is marked as DOWN. To avoid a continuous change in the tracker status, a multiplier is applied to ensure that the tracker status changes only after a significant number of probes.

The Multiplier specifies the number of times probes are sent before declaring that the endpoint is down. The range is 1–10 and the default is 3. The multiplier is used to probe the tracker repeatedly, based on the configured value, and marks the tracker as UP if the probe is successful only after the expiry of the multiplier. For example, if the multiplier is configured as 3, the status of the tracker changes to UP after 3 continuous successful probes.

The configured multiplier or retry value is applied to ensure that the probes are successful in bringing the tracker object up and notifying NAT. When the tracker state is up, NAT installs the route. This avoids interface flaps since the retries ensure that the tracker object is up. Prior to Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, for HTTP probes, the tracker is marked as down after probing for a number of times, as configured by the multiplier. Tracker is marked UP after the first successful probe. This mechanism causes network flaps. The **dia-stabilize-status** command stabilizes this behavior by using the value 'Multiplier+1' to change the status of the tracker. For example, if the value for the multiplier is 3, a tracker whose status is DOWN, is pinged 3+1 times (2 seconds apart, based on the ICMP interval). After the fourth probe is successful, the tracker is marked as UP.

In Cisco IOS XE Catalyst SD-WAN Release 17.12.x and earlier, the multiplier was used for SIG trackers (from UP to DOWN and DOWN to UP) and HTTP trackers (from UP to DOWN). From Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, the **dia-stabilize-status** setting is applied to ICMP and HTTP trackers to track status transitions from DOWN to UP.

Configure Using CLI

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.13.1a and Cisco Catalyst SD-WAN Manager Release 20.13.1

The following example shows how to configure this feature using the CLI:

```
device(config)# endpoint-tracker-settings dia-stabilize-status
```

Configure Using Cisco Catalyst SD-WAN Manager

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.13.1a and Cisco Catalyst SD-WAN Manager Release 20.13.1

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

   For more information on creating a configuration group, see Configuration Group Workflows.

2. Add a feature to the configuration group.

   For more information on adding a feature, see Feature Management.

3. Under **System Profile**, configure the **Basic** feature.

   For more information about configuring the **Basic** feature, see Basic.

4. Click **Track Settings**.

5. Under **Tracker DIA Stabilize Status**, choose **Global** from the drop-down list, and enable the setting.

6. Click **Save**.

Monitor NAT DIA Tracker Configuration on IPv4 Interfaces

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.7.1a and Cisco vManage Release 20.7.1

View Interface DIA Tracker

To view information about DIA 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. For single endpoint tracker, from the **Device Options** drop-down list, choose **Endpoint Tracker Info**.
5. For dual endpoint tracker, from the **Device Options** drop-down list, choose **Endpoint Tracker Group Info**.

Verify the Configurations for NAT DIA Tracker on IPv4 Interfaces

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.7.1a and Cisco vManage Release 20.7.1

You can check the command syntax after you attach a template to a device. The following sample configuration shows tracker definition for the NAT DIA tracker and how to apply a tracker to a transport interface:

```
endpoint-tracker tracker-t1
  threshold 1000
  multiplier 3
  interval 20
  endpoint-ip 10.1.16.13
  tracker-type interface

interface GigabitEthernet1
 no shutdown
 endpoint-tracker tracker-t1
 ip nat outside
```

The following sample configuration shows how to verify if the configuration is committed:

```
Device# show endpoint-tracker interface GigabitEthernet1

Interface          Record Name          Status        RTT in msecs    Probe ID        Next
 Hop
GigabitEthernet1   tracker-t1              UP             2               1
10.1.16.13
```

The following sample configuration shows timer-related information about the tracker, to help debug tracker-related issues, if any:

```
Device# show endpoint-tracker records
Record Name            Endpoint       EndPoint Type   Threshold    Multiplier   Interval
   Tracker-Type
p1                     10.1.16.13          IP              300          3          60
    interface
```



Note The **show endpoint-tracker** command does not display the NAT history records for a tracker when the interface is down and has an invalid network condition.

Verify Configuration for an ICMP Tracker

From Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, you can check the command syntax after you configure the ICMP tracker. The following sample configuration shows ICMP tracker definition for the NAT DIA tracker and how to apply a tracker to a transport interface:

```
endpoint-tracker tracker-t2
  tracker-type interface-icmp
  endpoint-ip 10.1.16.13
  threshold 1000
  multiplier 3
  icmp-interval 2



interface GigabitEthernet1
 no shutdown
 endpoint-tracker tracker-t2
```

The following sample configuration shows how to verify if the configuration is committed:

```
Device# show endpoint-tracker interface GigabitEthernet1

Interface          Record Name          Status        RTT in msecs    Probe ID        Next
 Hop
GigabitEthernet1   tracker-t2             UP             2               1
10.1.16.13
```

Dual-Tracker Show Commands

The following is a sample output of the **show endpoint-tracker tracker-group** command:

```
Device# show endpoint-tracker tracker-group
Tracker Name               Element trackers name       Status      RTT in msec    Probe ID
interface-tracker-group     tracker1, tracker2      UP(UP OR UP)      1,1          53, 54
```

```
Device# show ip sla summary

IPSLAs Latest Operation Summary
Codes: * active, ^ inactive, ~ pending
All Stats are in milliseconds. Stats with u are in microseconds

ID           Type        Destination       Stats       Return Code     Last Run

*9           dns         10.1.1.1           RTT=3       OK          12 seconds ago
*10          http        10.1.1.10 .        RTT=89      OK          23 seconds ago
```

```
Device# show endpoint-tracker records
Record Name            Endpoint       EndPoint Type   Threshold    Multiplier   Interval
   Tracker-Type
group1          tracker1 OR tracker2       N/A            N/A          N/A         N/A
   tracker-group
group3          tracker3 OR tracker4       N/A            N/A          N/A         N/A
   tracker-group
tracker1             198.168.20.2          IP             300          3            60
     interface
tracker2             198.168.20.3          IP             300          3            60
     interface
tracker3         www.cisco.com.com      DNS_NAME          300          3            60
     interface
tracker4         www.cisco.com.com      DNS_NAME          300          3            60
     interface
```

The following is a sample output of the **show ip sla summary** command:

```
Device# show ip sla summary
IPSLAs Latest Operation Summary
Codes: * active, ^ inactive, ~ pending
All Stats are in milliseconds. Stats with u are in microseconds
ID           Type       Destination      Stats   Return Code       Last Run
*53          http         10.1.1.1       RTT=2        OK        35 seconds ago
*54          http         10.1.1.10      RTT=2        OK        1 minute, 35 seconds ago
```

The following is a sample output of the **show endpoint-tracker tracker-group** command for ICMP endpoint trackers:

```
Device# show endpoint-tracker tracker-group
Tracker Name     Element trackers name     Address Family    Status            RTT in msec
      Probe ID
trackergroup1    tracker1, tracker2        IPv4              UP(UP OR UP)      1, 2
      5, 4
```

The following is a sample output of the **show ip sla summary** command for the ICMP endpoint tracker:

```
Device# show ip sla summary
IPSLAs Latest Operation Summary
Codes: * active, ^ inactive, ~ pending
All Stats are in milliseconds. Stats with u are in microseconds
ID           Type       Destination      Stats   Return Code       Last Run
*4          icmp-echo    10.1.29.99      RTT=1        OK        1 seconds ago
```

Workflow for NAT DIA Tracker on IPv6 Interfaces

Minimum supported release: Cisco IOS XE Catalyst SD-WAN Release 17.11.1a and Cisco vManage Release 20.11.1

Configure NAT DIA Tracker on IPv6 Interfaces using Configuration Groups in Cisco SD-WAN Manager

Minimum supported releases: Cisco IOS XE Catalyst SD-WAN Release 17.11.1a and Cisco vManage Release 20.11.1

Note You can configure the IPv6 DIA Tracker feature using a configuration group, device CLI template, or CLI-Add on feature template. This feature cannot be configured through a feature template.

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

   In Cisco IOS XE Catalyst SD-WAN Release 17.11.1a and earlier, choose **Configuration** > **Templates** > **Configuration Groups**.

2. Configure an IPv6 Tracker in a Transport and Management Profile.

   Table 7: IPv6 Tracker

Field	Description
Type	Choose a feature from the drop-down list.

Field	Description
Feature Name*	Enter a name for the feature.
Description	Enter a description of the feature. The description can contain any characters and spaces.
Tracker Name*	Name of the tracker. The name can be up to 128 alphanumeric characters.
Endpoint Tracker Type*	Choose a tracker type to configure endpoint trackers: • **ipv6-interface** **Note** This tracker type is available only in Cisco Catalyst SD-WAN Manager Release 20.12.x and earlier. • **http** • **icmp** This tracker type is available from Cisco Catalyst SD-WAN Manager Release 20.13.1.
Endpoint	Choose an endpoint type: • **Endpoint DNS Name**: When you choose this option, the following field appears: **Endpoint DNS Name**: DNS name of the endpoint. This is the destination on the internet to which probes are sent to determine the status of the endpoint. The DNS name can contain a minimum of one character and a maximum of 253 characters. • **Endpoint IP**: When you choose this option, the following field appears: **Endpoint IP**: IPv6 address of the endpoint. This is the destination on the internet to which the probes are sent to determine the status of an endpoint. The IPv6 address can be a valid IPv6 address in dotted-decimal notation. • **Endpoint API URL**: When you choose this option, the following field appears: **API url of endpoint**: API URL of the endpoint. The API URL can be a valid URL as described by RFC 3986.

Field	Description
Interval	Time interval between probes to determine the status of the configured endpoint. From Cisco Catalyst SD-WAN Manager Release 20.13.1, this option is called **Probe Interval**, allowing you to configure the time interval between probes. Range: 20 to 600 seconds Default: 60 seconds (1 minute) From Cisco Catalyst SD-WAN Manager Release 20.13.1, if you select **icmp** as the endpoint tracker type, the default probe interval is 2 seconds.
Multiplier	Number of times probes are sent before declaring that the endpoint is down. Range: 1 to 10 Default: 3
Threshold	Wait time for the probe to return a response before declaring that the configured endpoint is down. Range: 100 to 1000 milliseconds Default: 300 milliseconds

3. Configure IPv6 tracker group.

Table 8: IPv6 Tracker Group

Field	Description
Tracker Name	Enter a tracker name.
Tracker Elements	This field is displayed only if you chose **Tracker Type** as the **Tracker Group**. 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 an interface.
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.

4. After you create a configuration group, add devices to the group. For more information, see Add Devices to a Configuration Group in *Cisco Catalyst SD-WAN Configuration Groups Reference Guide*. You can then go ahead and deploy the devices associated to the configuration group. For more information, see Deploy Devices in *Cisco Catalyst SD-WAN Configuration Groups Reference Guide*.

Configure NAT DIA Tracker on IPv6 Interfaces using a CLI Template

Minimum supported releases: Cisco IOS XE Catalyst SD-WAN Release 17.11.1a and Cisco vManage Release 20.11.1

Note You can't configure ICMP tackers using CLI templates.

Configure IPv6 Endpoint Tracker

1. Configure the endpoint tracker for tracking the status of an endpoint:

   endpoint-tracker *tracker-name*

2. Configure the tracker type for the tracker:

   tracker-type *ipv6-interface*

Note From Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, you can configure ICMP tracking for NAT DIA using *ipv6-interface-icmp*.

3. Configure the IPv6 address of an endpoint:

   ipv6-endpoint *ipv6-address*

Note You can't configure an IPv4 and an IPv6 tracker in the same tracker group.

Here is the complete configuration example to configure an IPv6 endpoint tracker:

```
endpoint-tracker t1
   tracker-type ipv6-interface
   ipv6-endpoint 2001:DB8:1::1
```

Here is the complete configuration example to configure an IPv6 endpoint ICMP tracker:

```
endpoint-tracker t1
   tracker-type ipv6-interface-icmp
   ipv6-endpoint 2001:DB8:1::1
```

Configure DNS Tracker

1. Configure the endpoint tracker for tracking the status of an endpoint:

   endpoint-tracker *tracker-name*

2. Configure the tracker type for the tracker:

   tracker-type *ipv6-interface*

Note From Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, you can configure ICMP tracking for NAT DIA using *ipv6-interface-icmp*.

3. Configure the domain name of an endpoint:

   endpoint-dns-name *dns-name*

Here is the complete configuration example to configure DNS tracker:

```
endpoint-tracker dns_t1
   tracker-type ipv6-interface
   endpoint-dns-name cisco.com
```

Here is the complete configuration example to configure DNS ICMP tracker:

```
endpoint-tracker dns_t1
   tracker-type ipv6-interface-icmp
   endpoint-dns-name cisco.com
```

Configure IPv6 Tracker Group

1. Configure an HTTP or ICMP IPv6 endpoint tracker.
2. Configure an HTTP or ICMP DNS tracker in IPv6 interface.
3. Configure the endpoint tracker for tracking the status of an endpoint:

   endpoint-tracker *tracker-group-name*
4. Configure the tracker type for the tracker:

   tracker-type *tracker-group*

Note From Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, you can configure ICMP tracking for NAT DIA using *ipv6-interface-icmp*.

5. Enable Boolen logic while configuring a tracker group:

   boolean{**and** | **or**}
6. Add tracker names to create a dual endpoint tracker group:

   tracker-elements *tracker1 tracker2*

Here is the complete configuration example to configure IPv6 tracker group:

```
endpoint-tracker t1
   tracker-type ipv6-interface
   ipv6-endpoint 2001:DB8:1::1
!
endpoint-tracker t2
   tracker-type ipv6-interface
   endpoint-dns-name cisco.com
```

```
!
endpoint-tracker groupv6
   tracker-type tracker-group
   boolean or
   tracker-elements t1 t2
```

Here is the complete configuration example to configure IPv6 ICMP tracker group:

```
endpoint-tracker t3
   tracker-type ipv6-interface-icmp
   ipv6-endpoint 2001:DB8:1::1
!
endpoint-tracker t4
   tracker-type ipv6-interface-icmp
   endpoint-dns-name cisco.com
!
endpoint-tracker groupv7
   tracker-type tracker-group
   boolean or
   tracker-elements t3 t4
```

Configure Both IPv4 and IPv6 Trackers on the Same Interface

1. Configure the IPv4 endpoint tracker:

   ```
   endpoint-tracker t1
      tracker-type interface-ip
      endpoint-ip 10.1.1.1
   ```

2. Configure a DNS tracker in IPv4 interface.

   ```
   endpoint-tracker t2
      tracker-type interface-ip
      endpoint-dns-name example.com
   ```

3. Configure an IPv6 endpoint tracker.

   ```
   endpoint-tracker t3
      tracker-type ipv6-interface
      ipv6-endpoint 2001:DB8:1::1
   ```

4. Configure a DNS tracker in IPv6 interface.

   ```
   endpoint-tracker t4
      tracker-type ipv6-interface
      endpoint-dns-name cisco.com
   ```

5. Add IPv4 trackers to a tracker group:

   ```
   endpoint-tracker groupv4
      tracker-type tracker-group
      boolean and
      tracker-elements t1 t2
   ```

6. Add IPv6 trackers to a tracker group:

   ```
   endpoint-tracker groupv6
      tracker-type tracker-group
   ```

```
      boolean or
      tracker-elements t3 t4
```

7. Apply the tracker group to an interface:

```
interface GigabitEthernet1
 endpoint-tracker groupv4
 ipv6-endpoint-tracker groupv4
```

Here is the complete configuration example to configure both IPv4 and IPv6 trackers on the same interface:

```
endpoint-tracker t1
   tracker-type interface-ip
   endpoint-ip 10.1.1.1
!
endpoint-tracker t2
   tracker-type interface-ip
   endpoint-dns-name example.com
!
endpoint-tracker t3
   tracker-type ipv6-interface
   ipv6-endpoint 2001:DB8:1::1
!
endpoint-tracker t4
   tracker-type ipv6-interface
   endpoint-dns-name cisco.com
!
endpoint-tracker groupv4
   tracker-type tracker-group
   boolean and
   tracker-elements t1 t2
!
endpoint-tracker groupv6
   tracker-type tracker-group
   boolean or
   tracker-elements t3 t4
```

Configure an HTTP and an ICMP Tracker for a Tracker Group

Configure an HTTP IPv4 tracker and an ICMP IPv6 tracker, or vice versa on Cisco Catalyst SD-WAN devices, from Cisco IOS XE Catalyst SD-WAN Release 17.13.1a

1. Configure an HTTP IPv4 endpoint tracker:

```
endpoint-tracker t1
   tracker-type interface
   endpoint-ip 10.1.1.1
```

2. Configure an ICMP IPv4 endpoint tracker.

```
endpoint-tracker t2
   tracker-type ipv6-interface-icmp
   endpoint-ip 10.1.1.2
```

3. Configure a tracker group with an HTTP and an ICMP endpoint tracker.

```
endpoint-tracker t3
   tracker-type tracker-group
   tracker-elements t1 t2
```

4. Apply the tracker group to an interface.

```
interface GigabitEthernet1
    endpoint-tracker t3
```

Apply a Defined IPv6 Tracker or Tracker Group to a Supported IPv6 Interface

1. Configure an interface type and enter the interface configuration mode:

```
interface GigabitEthernet1
```

2. Apply a predefined IPv6 endpoint tracker name:

   ipv6-endpoint-tracker *tracker-name*

Here is the complete configuration example to apply a tracker to an interface and configure it in the supported interfaces:

```
interface GigabitEthernet1
    ipv6-endpoint-tracker t1
```

Verify the Configurations for NAT DIA Tracker on IPv6 Interfaces

Minimum supported releases: Cisco IOS XE Catalyst SD-WAN Release 17.11.1a and Cisco vManage Release 20.11.1

The following is a sample output from the **show endpoint-tracker** command for a single IPv6 endpoint tracker configuration.

```
Device# show endpoint-tracker

endpoint-tracker t1
ipv6-endpoint 2001:DB8:1::1
tracker-type ipv6-interface
```

The following is a sample output from the **show endpoint-tracker** command for a single IPv6 endpoint tracker applied to an interface.

```
Device# show endpoint-tracker

Interface                    Record Name            Status          Address Family   RTT
in msecs    Probe ID        Next Hop
GigabitEthernet1                  t1                  Up              IPv6             1
             6               2001:DB8:1::1
```

The following is a sample output from the **show endpoint-tracker** command for a DNS tracker configuration.

```
Device# show endpoint-tracker

Interface                    Record Name            Status          Address Family   RTT
in msecs    Probe ID        Next Hop
GigabitEthernet1                 dns_t1              Up              IPv6             1
           9               2001:DB8:1::1
```

The following is a sample output from the **show endpoint-tracker tracker-group** command for an IPv6 tracker group configuration.

```
Device# show endpoint-tracker tracker-group

Tracker Name                      Element trackers name              Address Family   Status
                        RTT in msec      Probe ID
groupv6                                t1, t2                          IPv6             UP(UP
 OR UP)                  1, 0             10, 11
```

The following is a sample output from the **show endpoint-tracker** command when both IPV4 and IPv6 trackers are configured on the same interface.

```
Device# show endpoint-tracker

Interface                     Record Name            Status          Address Family   RTT
in msecs    Probe ID        Next Hop
GigabitEthernet1                   t1                 Up              IPv4             1
            7               10.0.29.99
GigabitEthernet1                   t2                 Up              IPv6             1
            8               2001:DB8:1::1
```

Verify Configuration for an ICMP Tracker

From Cisco IOS XE Catalyst SD-WAN Release 17.13.1a, you can check the command syntax after you attach a template to a device.

The following is a sample output from the **show endpoint-tracker** command for a single IPv6 ICMP endpoint tracker applied to an interface.

```
Device# show endpoint-tracker

Interface                     Record Name            Status          Address Family   RTT
in msecs    Probe ID        Next Hop
GigabitEthernet1                   t2                 Up              IPv6             1
             6              2001:DB8:1::1
```