

# Configure and Verify SD-WAN On-demand Tunnels

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## Introduction

This document describes configuration and verification steps to create SD-WAN On-demand Tunnels.

## Prerequisites

### Components Used

This document is based on these software, and hardware versions:

- vManage version 20.9.3
- Cisco Edge Routers version 17.9.3

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

## Background

Cisco SD-WAN supports dynamic On-demand tunnels between any two Cisco SD-WAN spoke devices. These tunnels are triggered to be set up only when there is traffic between the two devices, optimizing bandwidth usage and device performance.

### Advantages

On-demand tunnels come with these advantages:

- Improved performance, especially for less-powerful platforms operating in a full-mesh network.
- Improved latency in hub-and-spoke deployments when On-demand tunnels are used between spokes.
- Reduced bandwidth use in the network because tunnels in Inactive state do not require Bidirectional Forwarding Detection (BFD) probes, so there is less BFD traffic produced in the network.
- Direct tunnels between spokes, while also optimizing CPU and memory usage.

## Configure

### Configurations

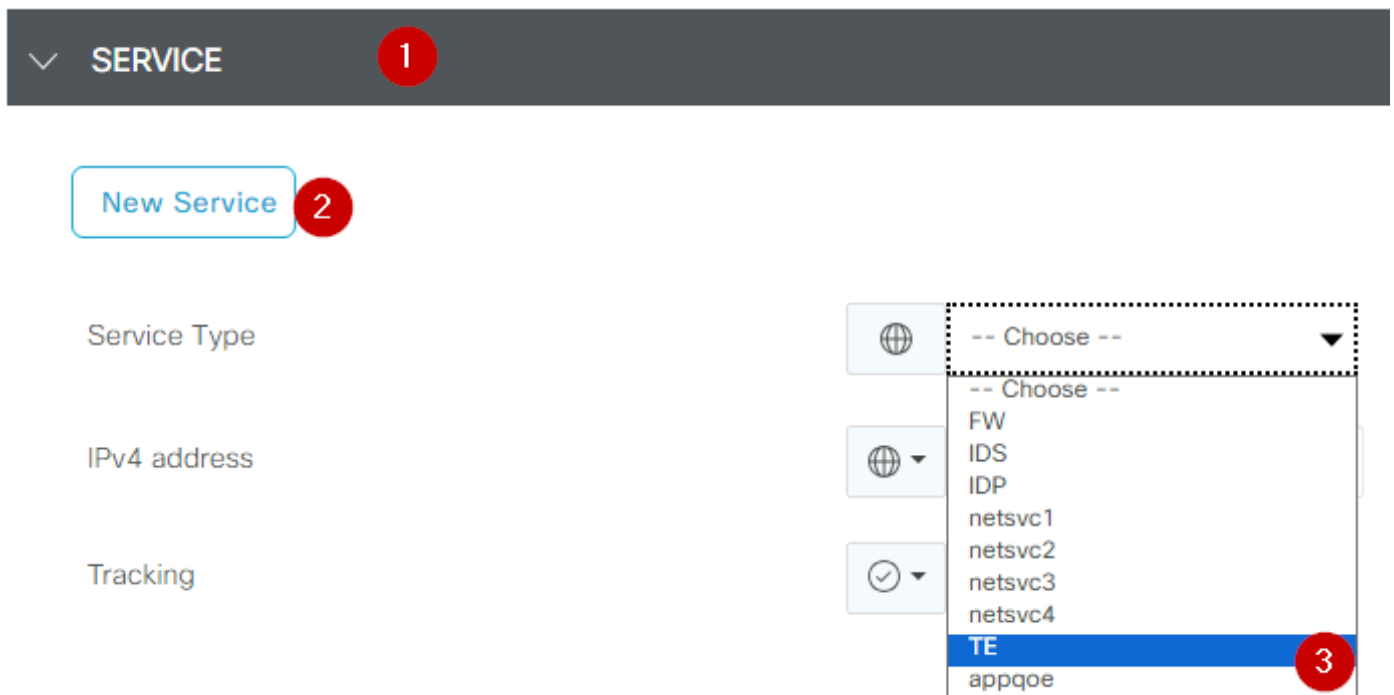
Here are the steps to configure On-demand Tunnels:

**Step 1:** Enable traffic engineering only on the Hub site routers under the VPN 0 feature template. It is recommended to have a separate VPN 0 feature template for hub sites and spoke sites.

Navigate to **Configuration > Templates > Feature Template**. Search for the correct **VPN 0** feature template assigned to Hub Routers, click on three dots and select **Edit**.

1. Under **Service** section
2. Click **New Service**
3. Choose **TE** from the service type.

Click **Add** and then **Update**.



*Enable TE*

**Step 2:** To increase the OMP path limit to the recommended value 16 on a Cisco Edge Router.

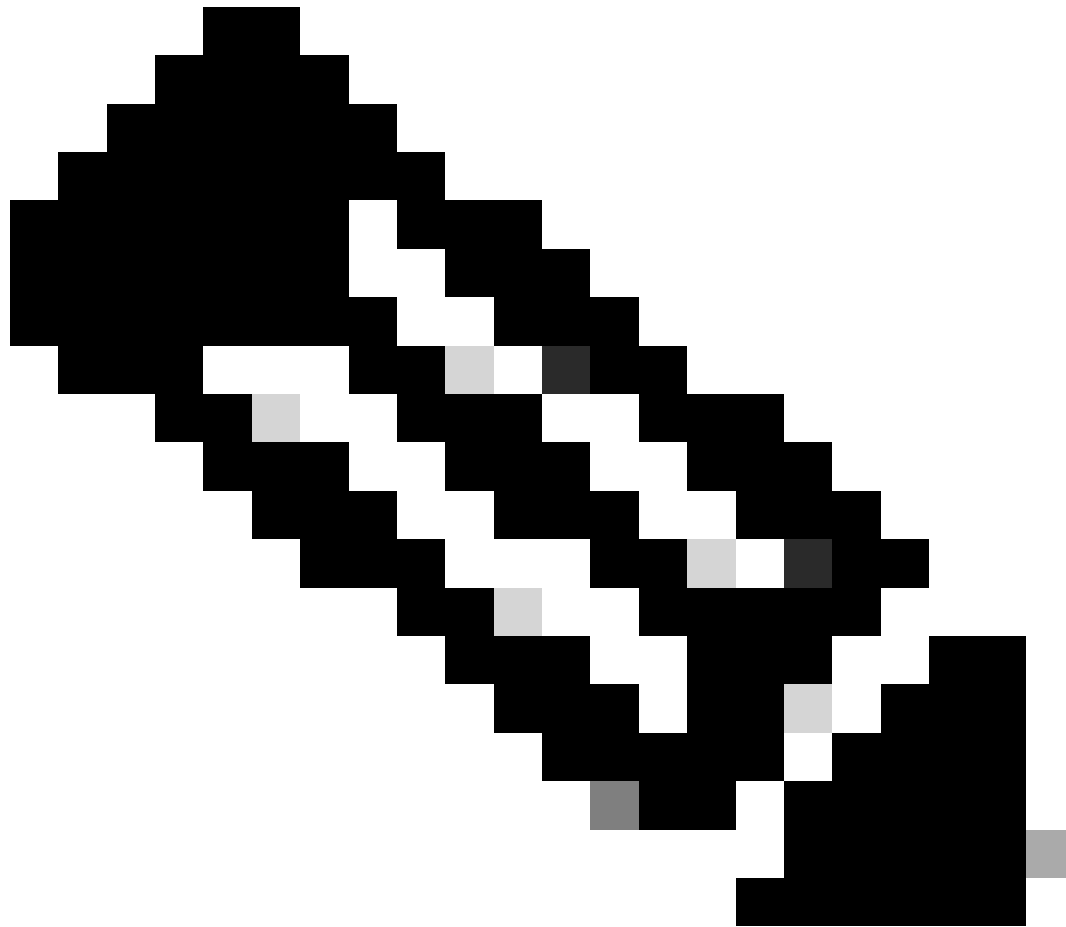
Navigate to **Configuration>Template> Feature Template**, search for the **OMP** feature template, click on the three dots, and select **Edit**.

Under **Basic Configuration**, locate **Number of Paths Advertised per Prefix**, and **ECMP Limit**, and change the values to 16.

▼ **BASIC CONFIGURATION**

Graceful Restart for OMP	<input checked="" type="checkbox"/>	<input checked="" type="radio"/> On	<input type="radio"/> Off
Overlay AS Number	<input checked="" type="checkbox"/>	<input type="text"/>	
Graceful Restart Timer (seconds)	<input checked="" type="checkbox"/>	<input type="text" value="43200"/>	
Number of Paths Advertised per Prefix	<input checked="" type="checkbox"/>	<input type="text" value="16"/>	
ECMP Limit	<input checked="" type="checkbox"/>	<input type="text" value="16"/>	
Shutdown	<input checked="" type="checkbox"/>	<input type="radio"/> Yes	<input checked="" type="radio"/> No

*OMP - ECMP Limit*



**Note:** To change the send-path-limit on vSmarts OMP to a value higher than 4, with the recommended value being 16, please refer to the Routing Configuration guides on the Cisco SD-WAN [Configuration Guides](#) for detailed instructions.

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**Step 3:** Create or clone a System feature template to enable **On-demand Tunnel** and modify **On-demand Tunnel Idle-Timeout** timer if desired (default value it is 10 minutes), and apply this system template specifically for the On-demand spoke sites.

Navigate to **Configuration > Templates > Feature Templates** search for the **System** feature template, click on three dots, and select **Edit**.

On **Advanced** section enable **On-demand Tunnel**. Optionally, adjust the **On-demand Tunnel Idle-Timeout** if you wish to bring the tunnel down faster than the default 10 minutes when there is no traffic passing between the sites.

Gateway Tracking	<input checked="" type="checkbox"/>	<input checked="" type="radio"/> On	<input type="radio"/> Off
Collect Admin Tech on Reboot	<input checked="" type="checkbox"/>	<input checked="" type="radio"/> On	<input type="radio"/> Off
Idle Timeout	<input checked="" type="checkbox"/>		
On-demand Tunnel	<input checked="" type="checkbox"/>	<input checked="" type="radio"/> On	<input type="radio"/> Off
On-demand Tunnel Idle Timeout(min)	<input checked="" type="checkbox"/>	2	

*On-demand Tunnel Enable*

**Step 4:** You need to create a custom topology policy using a route sequence on the match tab set site list (matching On-demand spoke sites), and under action tab set the TLOC list (matching the Hub tlocs) to backup.

Create the On-demand spoke list and HUB backup TLOC list.

Navigate to **Configuration > Policies > Custom Options** from the drop down menu select **Centralized Policy > Lists**, create the groups of interest:

- Click on **Site** create a new site list including all site-id for all On-demand sites.
- On **TLOC** create a TLOC list including all HUB tloc that are going to be used as backup.

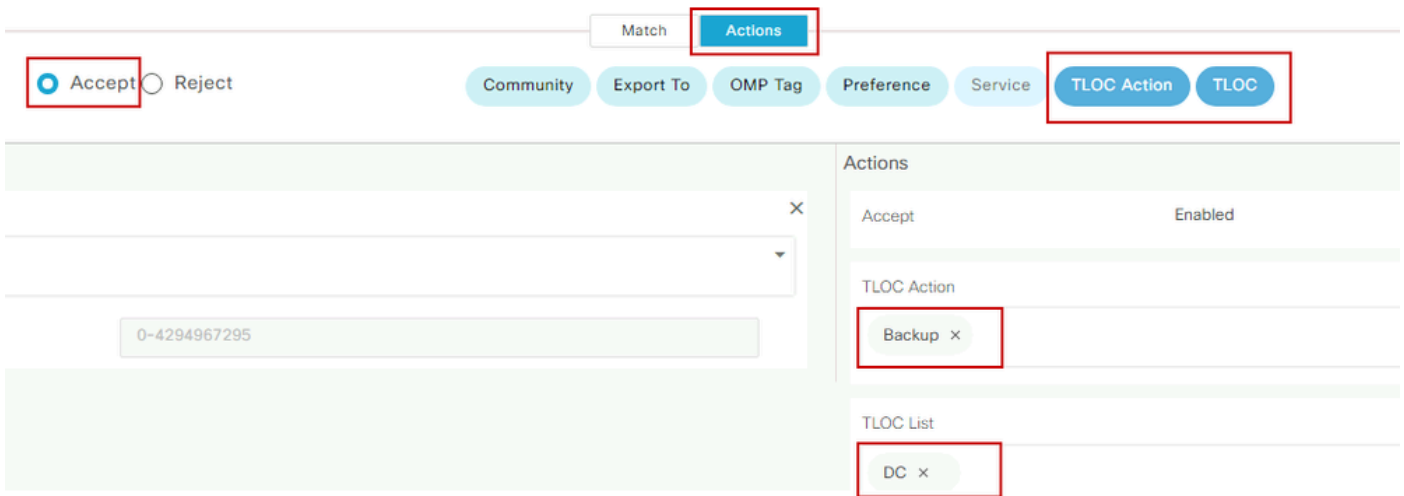
Once you have created the groups of interest list, navigate to **Custom Options** from the drop down menu select **Centralized Policy > Topology > Topology > Add Topology > Custom Control (Route & TLOC)**.

- Provide a name and description for the topology.
- Change Default Action to **Accept** by clicking the pencil icon, then click **Save Match And Action**.
- Click **Sequence Type** and select **Route**. Click **Sequence Rule** to add new sequence.
- On **Match** tab click **Site** and select the correct site list.

The screenshot shows the 'Route' configuration page. At the top, there is a 'Route' header and a 'Sequence Rule' button. Below this, there are several tabs: 'Match' (selected), 'Actions', 'Color List', 'Community List', 'Expanded Community List', 'OMP Tag', 'Origin', 'Originator', 'Preference', and 'Site'. The 'Match' tab is active, showing 'Match Conditions' and 'Actions' sections. In the 'Match Conditions' section, 'Site List' is set to 'Branches-ON-Demand' and 'Site ID' is '0-4294967295'. In the 'Actions' section, 'Reject' is selected and 'Enabled' is checked.

*Sequence creating*

- On the **Action** tab, click **Accept**, then, for the **TLOC Action** select **Backup**, and for **TLOC** select correct TLOC list. Click **Save Match and Actions** once you are done.



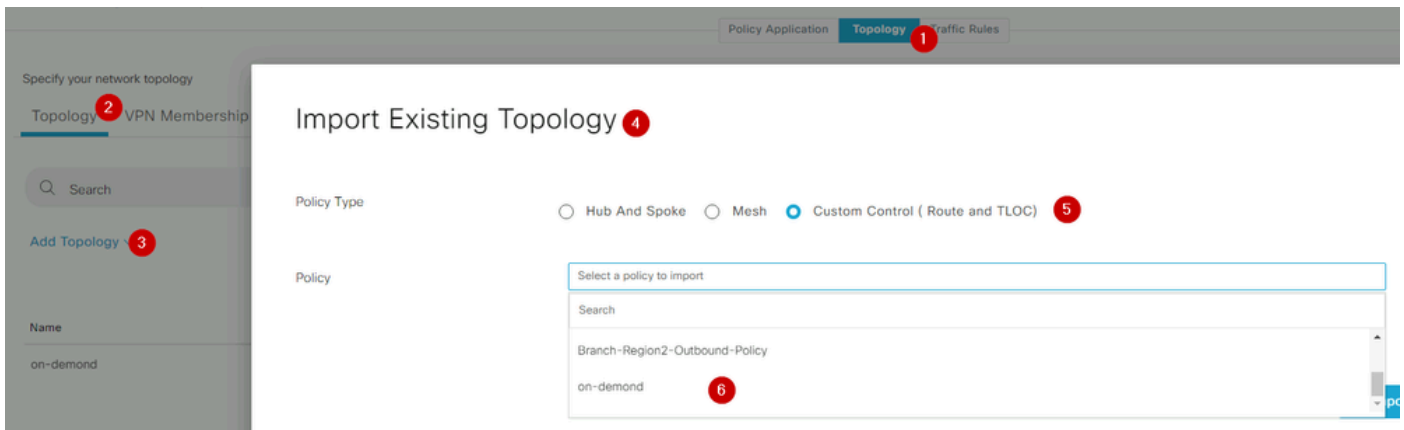
Action Policy set

Attach the control topology policy to the main policy by navigate to **Configuration > Policies > Centralized Policy**.

Find your active policy, click on the three dots, and select **Edit**.

Click on

1. **Topology**
2. **Topology**
3. **Add Topology**
4. **Import Existing**
5. **Custom Control (Route and TLOC)**
6. Find your policy from the drop-menu, then click Import.



Import Existing Policy

Click on **Policy Application > Topology > New Site/ Region List**

In the outbound Site List select correct site list name.

**1** Policy Application Tr

Add policies to sites and VPNs

Policy Name\*

Policy Description\*

**2** Topology **3** Application-Aware Routing Traffic Data Cflowd Role Mapping for Regions

**+** New Site/Region List **3**

Site List  Region **i**

Inbound Site List

Outbound Site List  
 **4**

*Apply the Policy Outband*

Click **Add**, and **Save Policy Changes**. Since this is an active policy, changes are going to be pushed to vSmarts.

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**Note:** For information about configuring a Cisco vSmart Controller centralized control policy refer to [Cisco SD-WAN Configuration Guides](#).

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## Verify

To verify run the command **show sdwan system on-demand remote-system**. From the output, you can locate **On-demand: yes**. If the status shows **inactive** it means the tunnel between sites is down.

```
<#root>
```

```
Spoke#show sdwan system on-demand remote-system
SITE-ID  SYSTEM-IP      ON-DEMAND      STATUS      IDLE-TIMEOUT-EXPIRY(sec)
-----
100      192.168.0.70   no             -           -
100      192.168.0.71   no             -           -
1000     192.168.0.72   yes            inactive    -
```



```

1000    192.168.0.73    yes    inactive    -
200     192.168.0.80    no     -           -

```

After generating some traffic between on-demand sites, you can check the same output. In this case the status shows **Active**, it is showing the number of seconds left before the tunnel goes down.

```
<#root>
```

```

Spoke#show sdwan system on-demand remote-system
SITE-ID    SYSTEM-IP    ON-DEMAND    STATUS    IDLE-TIMEOUT-EXPIRY(sec)
-----
100        192.168.0.70    no           -         -
100        192.168.0.71    no           -         -
1000       192.168.0.72    yes          active    105
1000       192.168.0.73    yes          active    105
200        192.168.0.80    no           -         -

```

From this example, you can notice that the BFD with sites 192.168.0.72 and 192.168.0.73 are missing while tunnel is down.

```
Spoke#show sdwan bfd sessions
```

```

SYSTEM IP    SITE ID    STATE    SOURCE TLOC    REMOTE TLOC    SOURCE IP
-----
192.168.0.70    100        up       public-internet    public-internet    <removed>
192.168.0.71    100        up       public-internet    public-internet    <removed>
192.168.0.80    200        up       public-internet    public-internet    <removed>
192.168.0.70    100        up       mpls              mpls              <removed>
192.168.0.71    100        up       mpls              mpls              <removed>
192.168.0.80    200        up       mpls              mpls              <removed>

```

When the tunnel between sites is up, you notice that BFD with sites 192.168.0.72 and 192.168.0.73 are up.

```
<#root>
```

```
Spoke#show sdwan bfd sessions
```

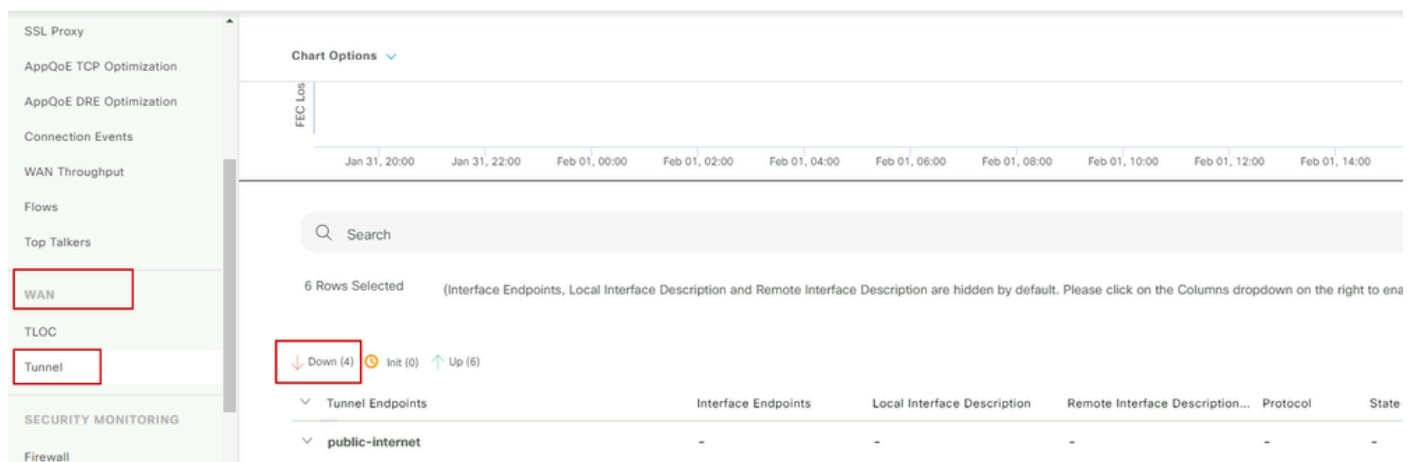
```

SYSTEM IP    SITE ID    STATE    SOURCE TLOC    REMOTE TLOC    SOURCE IP
-----
192.168.0.70    100        up       public-internet    public-internet    <removed>
192.168.0.71    100        up       public-internet    public-internet    <removed>
192.168.0.80    200        up       public-internet    public-internet    <removed>
192.168.0.73    1000       up       public-internet    public-internet    <removed>

```

192.168.0.72	1000	up	public-internet	public-internet	<removed>	<rem
	0:00:00:03	2				
192.168.0.70	100	up	mpls	mpls	<removed>	<re
192.168.0.71	100	up	mpls	mpls	<removed>	<re
192.168.0.80	200	up	mpls	mpls	<removed>	<re
192.168.0.73	1000	up	mpls	mpls	<removed>	<rem
192.168.0.72	1000	up	mpls	mpls	<removed>	<rem

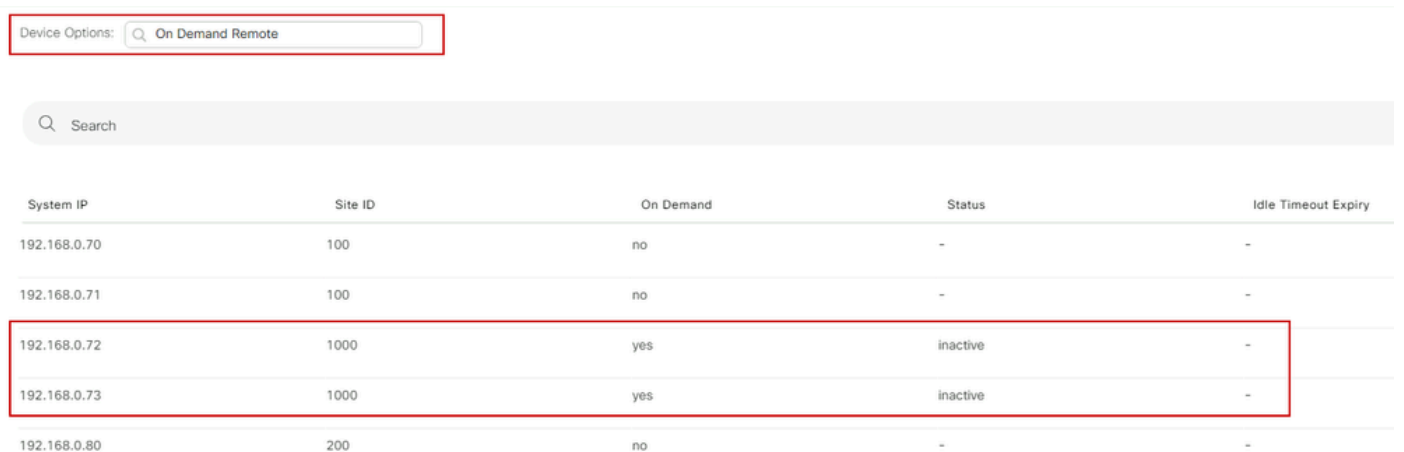
You can obtain the same results from vManage GUI by navigating to **Monitor > Device** or **Monitor > Network** (from code 20.6 and early), find your device and navigate **WAN > Tunnel**, focusing on the **Down** number.



*Monitoring On-demand Tunnels*

On the same menu, scroll down and click on **Real Time. On Device Options** search **On Demand Remote**.

This example shows the output when On Demand Tunnels are down.



*On-demand Tunnels Down*

This example shows the output when On-demand Tunnels are up.

Device Options:

Search

System IP	Site ID	On Demand	Status	Idle Timeout Expiry
192.168.0.70	100	no	-	-
192.168.0.71	100	no	-	-
192.168.0.72	1000	yes	active	111
192.168.0.73	1000	yes	active	111
192.168.0.80	200	no	-	-

*On-demand Tunnels Up*

## Troubleshoot

Refer to [Troubleshoot SD-WAN Dynamic On-Demand Tunnels](#) for more detailed steps.

## Related Information

- [Cisco Technical Support & Downloads](#)